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HEALTH GUIDE 2023

VOLUME XVIII

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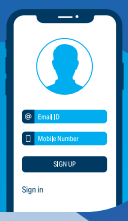

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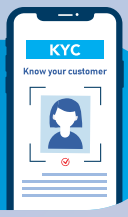

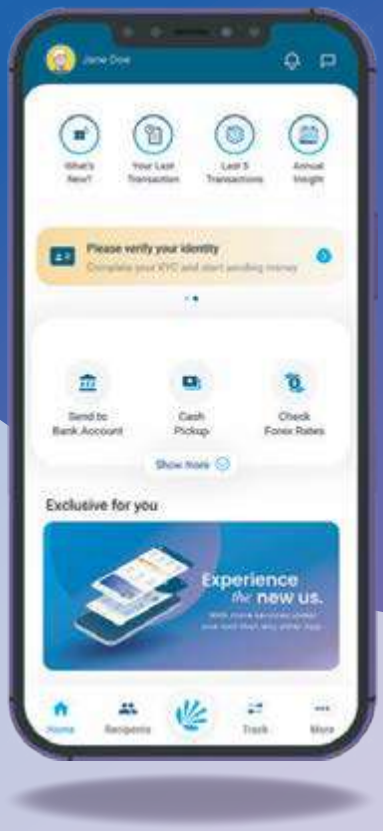

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Foreword

I am very happy to know that the Indian Doctors' Forum (IDF)-Kuwait is celebrating their 17th anniversary by organizing Doc Fest 2023 on Friday the 27th of January 2023 at which the much awaited and prestigious Health Guide will be released.

Indian doctors have been the backbone of the health care system in Kuwait from its inception. Their invaluable contribution have helped us to build our system to the international levels they are at present.

The health guides published by the Indian Doctors Forum since 2004 are invaluable not only to the medical profession but also to the common man by writing in layman's language. This years Health Guide. "Global Health challenges" is highly relevant in a world where health has taken a real beating due to many circumstances. I am grateful that the Indian Doctors Forum has dedicated so much of their time and work for the betterment of the public. I wish to thank all the members for their continuing efforts not only in the organized healthcare services, but also for conducting so many health camps for the underprivileged members of the community and public health awareness campaigns.

I wish the Indian Doctors' Forum for all success in their noble endeavors and hope that they reach newer and higher milestones in their journey.

I thank His Highness the Amir of Kuwait Sheikh Nawaf Al Ahmad Al Jaber Al Sabah,
His Highness the Crown Prince Sheikh Mishal Al Ahmad Al Jaber Al Sabah and His Highness the Prime Minister Sheikh Ahmad Nawaf Al Ahmad al Sabah.

Dr Ahmed Abdulwahab Al-Awadhi
H.E. Minister of Health - State of Kuwait

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MESSAGE

I am happy to learn that Indian Doctors Forum, Kuwait (IDF-Kuwait) is bringing out the next edition of its annual health guide on the topic of "Global Health Challenges".

2. I am sure that the Health Guide 2023 would not only bring forth the recent advances in medical field of use to medical practitioners but also present actionable knowledge and practical advice for the benefit of the wider community.

3. Life is returning back to normalcy after the unprecedented challenge of Covid-19 pandemic which impacted almost every sector of human activity. It was the medical fraternity with doctors at the forefront leading the indefatigable army of all medical professionals who helped the humanity globally to face and sail through this formidable challenge. The dedication and equanimity with which you all have been serving the community is commendable. As we move ahead, public health will remain our top priority and the role played by by all Doctors will continue to define the story of our times.

4. As highly skilled professionals, Indian Doctors in Kuwait have been Instrumental in bringing world class Healthcare services to Kuwait. Contributions of members of Indian Doctors' Forum in promoting the best of Brand India in Kuwait and deepening the healthcare and people-to-people cooperation between India and Kuwait are commendable.

5. I commend the President and Office-Bearers as well as members of Indian Doctors' Forum (IDF) Kuwait for their valuable service to the community and extend my warm greetings and felicitations to all those associated with the publication of IDF-Kuwait's Annual Health Guide- 2023.

6. I also take this opportunity to convey my best wishes for a happy, healthy and prosperous 2023 for all.

Kuwait
18 January, 2023

(Dr. Adarsh Swaika)

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To,
Dr Diwakara Chaluviah,
President,
Indian Doctors Forum – Kuwait.

The Indian Doctors' Forum (IDF), affiliated to the Kuwait Medical Association is an organisation of Indian health care professionals with a stellar reputation in the community. Their untiring work in the areas of free health camps for underprivileged and public health awareness campaigns are highly commendable. Their colourful and innovative cultural program like DocFest and Ghabka have all been crowd pullers, and have contributed to fostering amity between Indians and Kuwaitis.

I am happy to learn that the topic of this Health Guide is "Global Health Challenges". The pandemic has taught us that every country's health care system is vulnerable in the face of a challenge and this topic is the need of the hour. I understand that the articles in the health guide have all been written by eminent doctors of the IDF, and touch upon common health topics, in simple layman terms, making it a powerful tool for spreading health awareness among the public.

I, on behalf of the Kuwait Medical Association express my immense gratitude to The Indian Doctors for their invaluable contribution to medical services in Kuwait and their efforts in shouldering our social responsibility in the field of health care.

Dr Ibrahim AlTwalah
KMA President

Dr. Ibrahim Al Tawalah
President

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Indian Doctors Forum [IDF]-Kuwait is a premier sociocultural association of the Indian doctors in the State of Kuwait. Registered with the Indian Embassy of Kuwait, IDF is a recipient of the prestigious Pravasi Bharatiya Samman Award in 2013, in recognition of its community service by the Government of India. One of our dedicated member has been awarded "Nari Udhyami Award"by Government of India in 2019. IDF was established in 2004 as a platform for Indian doctors, to socialise with their peers, participate in community health initiatives and foster friendly relationships with the local population. The founding President the late Dr Narayanan Nampoory, blazed a glorious trail for other presidents to follow.

IDF is serving the community from the day of its inception by undertaking various activities; Health camps for people unable to access formal health care services, awareness campaigns at community level on various topics like tobacco, alcohol, drug abuse, importance of healthy lifestyle, adolescent health, CPR, cancer awareness and screening, to name a few.

Indian Doctors Forum has been publishing a health guide every year, for the last 17 years, and these have been extremely successful. The articles are contemporaneous and are written in simple language for everyone to follow. The release of the Annual Health Guide is one of major events during our annual Docfest. Our theme this year is "Global Health Challenges", and this topic was chosen by a team of doctors to address major current health issues, with an eye on the changing environment in a post-pandemic world.

Health Quiz for 10th to 12th Students of all Indian curriculum schools is another event pioneered by IDF, with a dual purpose- entertainment as well as health awareness among school children. The IDF Oration is a biennial event, where eminent medical experts from India are invited as keynote speakers to showcase India's achievements in the field of Health care.

I am proud to say that IDF has always stepped up in times of crises. During the pandemic, doctors from the Indian community worked tirelessly in informal settings to ease the burden on formal health-care sector by participating in remote consultation, collecting funds for distribution of essentials for people affected by lockdown here in Kuwait. IDF has also aided its motherland in many ways, like dispatching oxygen cylinders to cover the shortage during the pandemic, and monetary contribution to relief efforts during natural disasters.

I take this opportunity to extend our heartfelt gratitude to His Excellency, the Amir of Kuwait for providing a warm, safe, and prosperous home in this country for the expatriates. The IDF is also deeply indebted to the Indian Embassy and H.E Dr. Adarsh Swaika, the Ambassador of India to Kuwait for his support and encouragement. I also thank all our esteemed IDF members, my office bearers and the editorial board team for their cooperation and hard work in keeping our banner flying high.

Jai Hind, Jai Kuwait

Dr. Diwakara Chaluvaiah
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GEN. SECRETARY'S MESSAGE

Indian Doctors Forum[IDF], Kuwait is the premier socio-cultural organization of Indian doctors in the State of Kuwait. The organization consists of more than 500 members who work at various hospitals and clinics in the Ministry of Health and in private hospitals all over the country.IDF is the only association in Kuwait to be bestowed with the prestigious PRAVASI BHARTIYA SAMMAN Award by the Government of India in recognition for the community services it renders.

The IDF has the privilege of functioning under the auspices of the Kuwait Medical Association[KMA], an organization of the Kuwaiti Government. All our activities have always had the guidance and support of the KMA for which we continue to be thankful.

That Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, as per the WHO, is the credo that IDF lives by. We have always been at the forefront of initiatives that promotes the awareness of health in the community.

Towards this effort, the IDF is proud to present to the community the 18th volume of its Health Guide, the focus being on 'Global Health Challenges". The Covid-19 pandemic has humbled the medical fraternity as we realized that even the best healthcare facilities, globally, struggled to cope with the magnitude of this illness. The world has a long way to go to address the various challenges to health and we believe that this topic is vital for both medical professionals and the public at large.

I thank the Chief Editor, Dr Hassan Ali Khan, and the members of the editorial team for dedicating so much of their time to this Health Guide. All the articles are written by our eminent members, working in various medical specialties, in easy-to-understand language as this guide is for everyone.

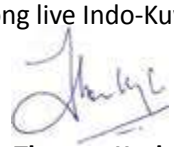
Our efforts will not end with the release of this volume but we will continue to conduct regular Health Camps for the lesser privileged, Health seminars andSchool health programs. As a real time intervention, we will also manage an active website to answer any health-related queries.

I would like to express my sincere gratitude to the former Presidents of the IDF and all its founding members, who have contributed greatly to make IDF what it is today. The success of all our programs , be it social, cultural or community service, lies in the commendable efforts of our office bearers, executive committee and the sincere support by all our members. I extend my appreciation to the IDF fraternity for their commitment and active participation in all the IDF activities.

I would also like to thank the sponsors who have supported us in all our activities.

None of this would be possible if it wasn't for the leadership of the State of Kuwait that allows us an opportunity to serve this great nation. We extend our gratitude to His Highness the Amir of Kuwait, the Crown Prince and the Government for their vision for a healthy Kuwait.

Long live Indo-Kuwait friendship. Jai IDF. Jai Hind.



Dr. Thomas Koshy George

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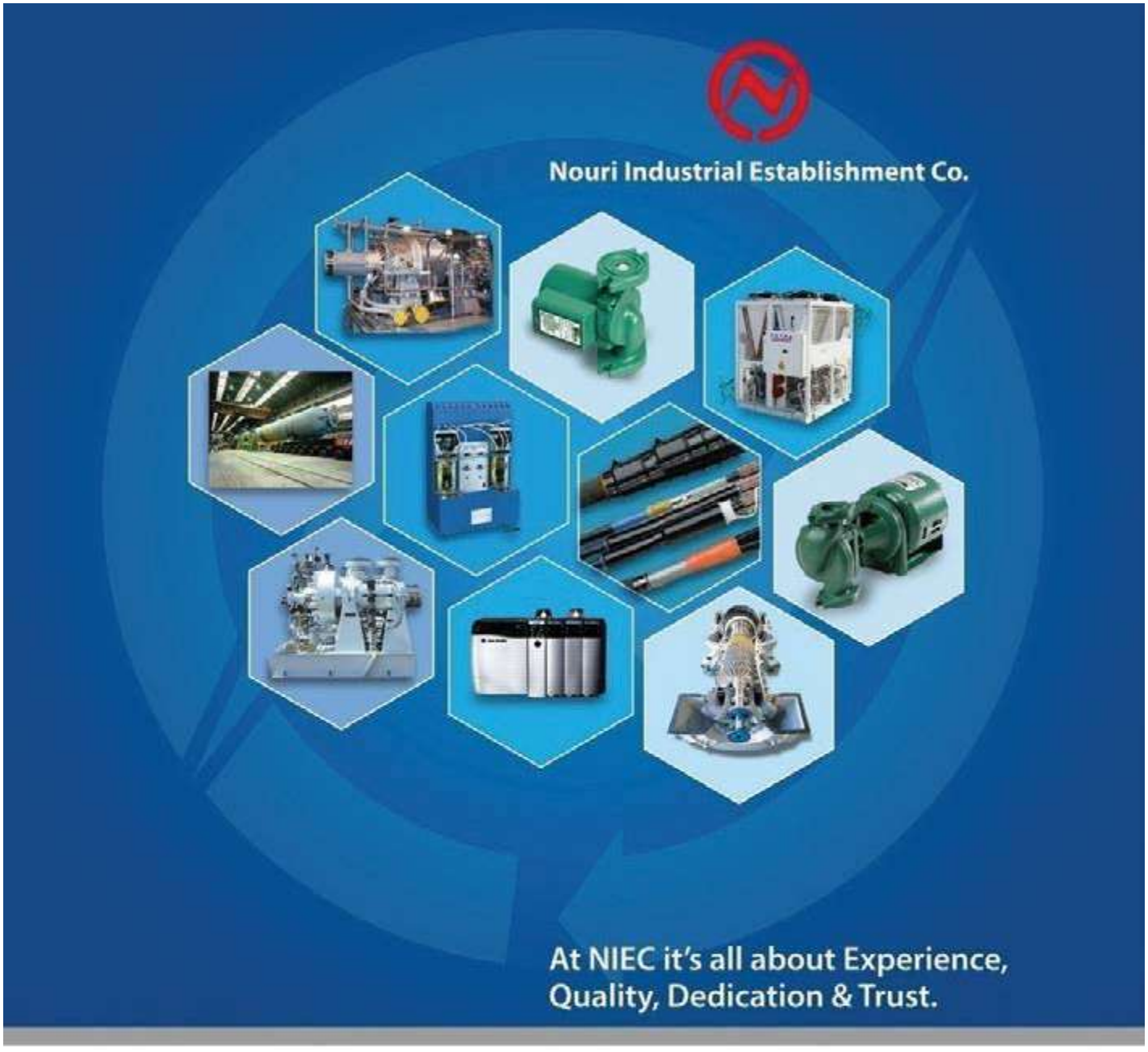

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The Making of The "Health Guide 2023"

From: Dr. PSN Menon, Advisory Editor.

Preparing a health guide for IDF is a challenging task. Most shy away from this obligation. My sympathies lie with the Editor-in-chief, as after appointment he is told that you are on your own from now and there is less than a month to complete the task! He has to choose a coherent editorial team from the members, who are willing to spare prime time from their busy work schedules and help to decide a new theme for the year with a catchy short title. To get the manuscripts related to the main theme from experts and volunteers is another grueling task. It takes time to read, understand and edit the manuscripts, especially when they do not belong to their specialty.

We were blessed to have Dr. Hasan Ali Khan as the Chief Editor with a unanimous choice – an erudite scholar, writer of his recently published Autobiography and many medical publications to his account. He has a pleasing smile and charming manners.

The scientific committee had suggested a contemporary theme which covered all specialties, reflecting the modern-day global health challenges and issues of concern to the general public including climate, environment, lifestyle, emerging new infectious diseases and a host of non-communicable diseases. After long and intense discussions, the theme of "Global Health Challenges" was chosen. The editorial team was formed; we were fortunate to have two experienced resourceful Advisory Editors and four energetic and enterprising young Associate Editors.

We started the process by an open invitation to all IDF members to contribute a topic in their own specialty covering the theme of global health challenges and submit a short abstract. In a short time, we received around 40 manuscripts covering the vast spectrum of medical sciences! A few experts were invited to plug in some missing links. All credits to the editorial team, especially the associate editors who read through the manuscripts, edited, retitled, classified and grouped them under 5 major headings and willingly wrote editorials for each major category.

All through this grind, we have tried to make it readable for the public avoiding much of the scientific and medical jargon and hype, yet providing a taste of what is in store if we do not take the current health challenges. We hope that you will enjoy reading the new IDF Health Guide 2023.

From: Dr. Abhay Patwari, Advisory Editor.

Dear Reader, I was asked to be associated with this years' IDF Health Guide as an Advisory Editor by the Chief-Editor, Dr. Hasan Ali Khan, a very good friend and my immediate neighbor. This was based on my past experience as chief editor for the health guide on 'Medical Emergencies' and my stint as the President of IDF in 2016-2018. The task was tough as the theme was on "Global Health Challenges" and the time available was short. Dr. Hasan got working from the minute of his appointment and quickly assembled a team of very competent and enthusiastic associate editors to assist him in this task. My senior colleague Dr. PSN Menon was also drafted to be another advisory editor – he being the academic director of IDF, a past chief-editor and a former Professor at the All India Institute of Medical Sciences, New Delhi.

Dr. Hasan quickly prepared a tentative list of potential subjects. he held the first meeting with two of us, the Advisory Editors. A framework on the subjects was prepared. A message was circulated on our IDF groups inviting abstracts from any of our members and it was reposted every day for the coming five days (a new feature introduced). Many abstracts were received from interested contributors to the Health Guide. Once the authors were confirmed a deadline was provided to submit their completed articles. Within three weeks we were lucky to have most of the articles ready for editing.

Email IDs and WhatsApp groups of the authors and the editorial board were formed for instant communication. All of us got to work in earnest.

The printer, to our luck, chosen by the IDF office bearers, happened to be located close to us. This was an added convenience in completing our project. The work was completed well before the deadline. Dr. Hasan divided the articles into sections. He requested the associate editors to write sub-editorials for their respective sections. This was another new feature of this health guide. Asking us to pen a few words, coming directly from the chief editor was very welcoming. This was yet another novel idea. All in all, it was a pleasure to be in the team and complete the task in a limited time.

I am sure this health guide will be very informative and unique. Happy reading,

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From the Editor in Chief's Desk

"The world cup is the greatest prize in football and the greatest prize in life is good health and well- being. Health is not a luxury for the rich, but a fundamental human right. It is the foundation of a peaceful, prosperous and sustainable economies and societies" said Dr. Tedros Adhaom Ghebreyesus, the WHO Director General.

There is a day set up by the WHO called the Universal Health Coverage Day (UHC day). It teams up football icons to urge governments and people across the world to contribute towards "achieve health for all". UHC ensures that every one, everywhere can access the support they need to be and stay healthy without being driven into financial hardships. A meeting with the Heads of State at the UN general Assembly in 2023 will highlight the UHC and they strongly remain committed to achieve UHC by 2030.
The Health Guide published every year by the Indian Doctors Forum, an association formed years back by the Indian Doctors working in Kuwait in 2004. The first Health Guide with an intention of giving medical knowledge to the non-medical community was soon in the making. From then on, it has been like "people waiting for the release of a new movie". Every year a new idea is born. We have nearly covered most of the subjects in the past years. Yet, in our field there is nothing called "an end to medical progress" and "an end to newer diseases". So, every year we bring something new to update our readers.

This year the topic chosen is "Global Health Challenges" and the field was wide open to select the topics and prepare the articles. There are challenges in every field but the burning issue is "Climate changes and Global warming". We have covered matters related to this and other health challenges dividing the health guide into five sections. I had two eminent Advisory Editors with me and four Articulate, Active, Academic (Triple A) Associate Editors. Each Associate Editor was given his role to play with a separate Sub-Editorial written by them for their section. Challenges are in the field of Medicine, Surgery, Women and child health and even in the field of investigative medicine and we have endeavored to cover them all.

The coming decade 2020-2030 will be the decade of "Healthy Ageing". The earlier decade focused on Musculoskeletal Diseases with an aim to better manage the various conditions which can prevent "Healthy Ageing", without affecting a longer "life". Therefore, a new measure of life expectancy has been suggested. This is called the Health Adjusted Life Expectancy (HALE), or "Healthy Life Expectancy". It quantifies years expected to live in good health. The gap between Life Expectancy and HALE points to a period of living in poor health. This gap is more obvious in the Low and Middle Income, Countries (LMICs) and is mainly being observed due to Non-Communicable Diseases (NCDs). The Major NCDs are Cardiovascular diseases (Heart attacks and Strokes), Cancers, Chronic Respiratory diseases and Diabetes. To achieve these goals, we need to work at three levels within a health system.
At governance level, at health facilities level and at the health force efficiency level.

Thus, in this Health Guide we have done our best to give our esteemed readers the extended source of knowledge and we will continue to do so in the coming years too through our selfless organization. I thank the President and the Office bearers of the IDF for giving me this opportunity to be its Chief Editor. I have done my best to keep it factual, simple and informative. My thanks to my Editorial team without whose cooperation the work would have been incomplete. My Thanks to our printers who were 24/7 with us to complete our endeavour. If certain errors, in spite of all efforts by our team have been overlooked, it is regretted. Enjoy the health guide. My gift of tulips to my readers.

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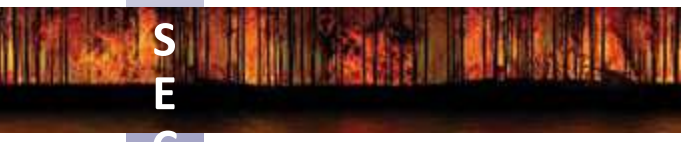
Cover Story

The cover of our IDF Health Guide 2023 was conceived keeping the theme of 'Global Health Challenges' in mind. The center shows our mother earth under a magnifying glass meaning a world in crisis due to global warming reflected through climate change. The maple leaf and greenery below, signifies our hope for a clean and green planet. The flat line of an ECG tracing above means a serious global health crisis and the recovery of normal ECG rhythm and pattern and the ubiquitous heart and stethoscope indicate the role of medicine in saving lives. The clear blue sky represents our hope that if we act now we can make our planet safe for our future generations.

Concept: Dr Hasan Ali Khan

Script: Dr Abhay Patwari



SECTION ONE

ASSORTED CHALLENGES
Section covered by the chief editor

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MEDICAL & ALLIED HEALTH CHALLENGES

SURGICAL & ALLIED HEALTH CHALLENGES

SECTION THREE

WOMEN & CHILD HEALTH CHALLENGES

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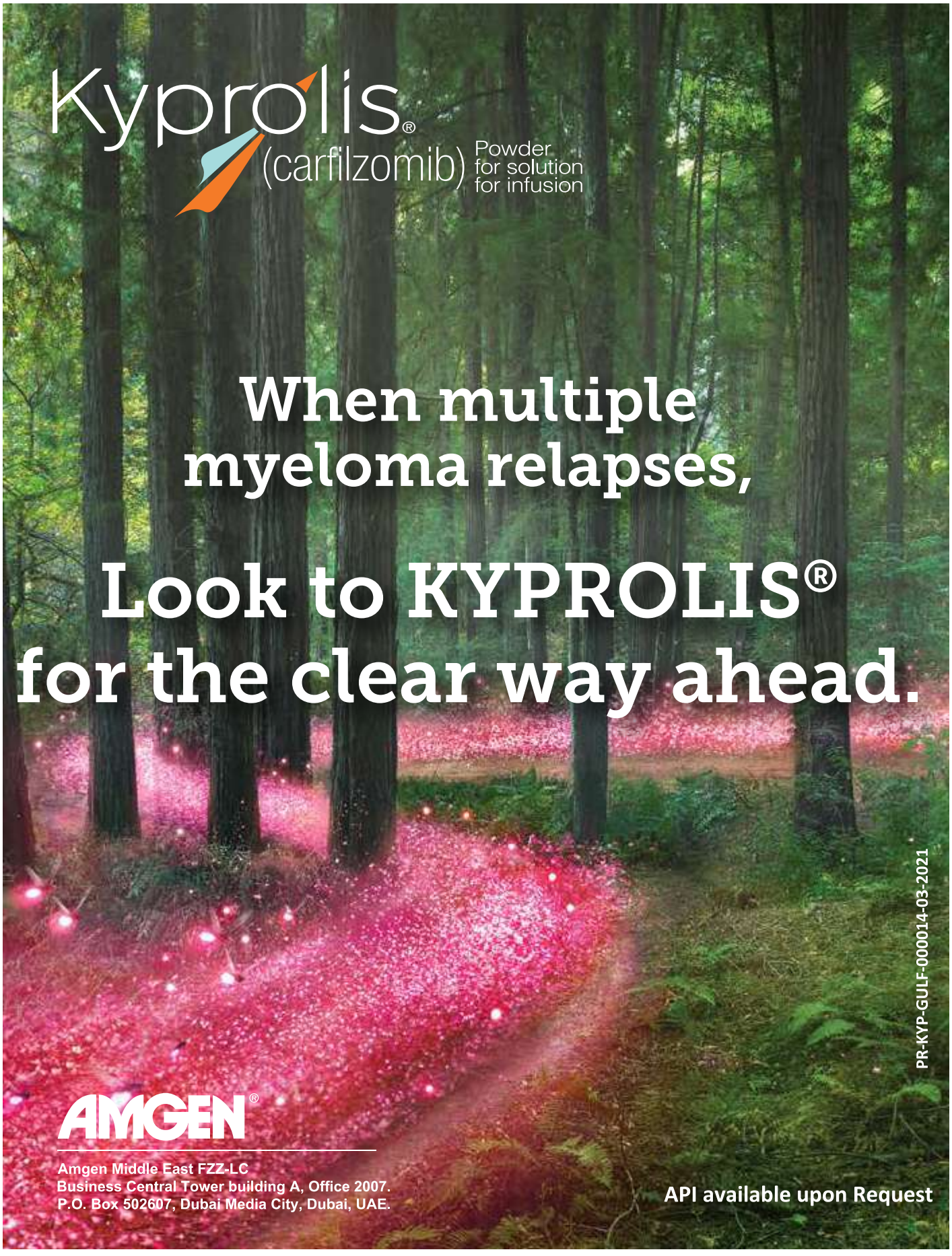
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ASSORTED CHALLENGES

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Climate Cardiology

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Dr. Hasan Ali Khan
Cardiologist
Jarallah German Specialized Clinic

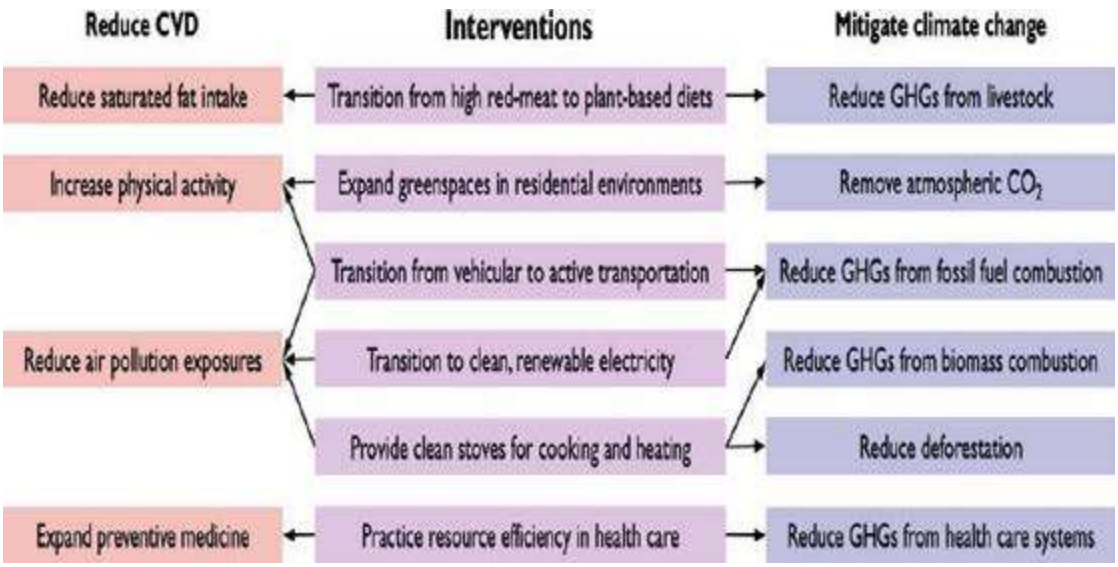
■ The heart is a well-designed, beautifully colored, hard-working yet delicate structure which needs to be cared for from every angle throughout one's life. During this "era of hot discussions" all over the world on climate change it would be unwise not to cover this aspect while a Health Guide is being prepared on "Global Health Challenges". In my Editorial, which I had to script as its Chief Editor, I have tried to connect these three words. I did a Google search relating the topic and the heart. I was glad about my search results.

The atmospheric environmental changes if not taken care of, particularly now, we might be too late in dealing with increased cardiovascular disease. As stated so aptly in the literature, "Just as we are passionate about controlling lipids and blood pressure, we should feel passionately about controlling climate-related risk". Based on the rapidly evolving climate changes and the expected exponential rise in cardiovascular disorders, a new sub-specialty of cardiology is in the making called "Climate Cardiology".

Climate Cardiology

The best way to understand why climate will make an Increased impact on the occurrence of heart diseases in the near future is to give a few minutes to understand the below given Table 1. We as individuals can help our grandchildren enjoy the benefits of a healthier life if we understand the three parts of this table. The term 'CVD' refers to 'Cardiovascular Diseases' (heart diseases in common terms). The term 'GHG' indicates 'Greenhouse Gases', which I will explain in simple terms as 'gasses that trap heat in the atmosphere'. If these gases increase in the atmosphere, they absorb the emitted heat from the earth's surface and cause 'global warming'. A few examples are water vapor, carbon dioxide, methane, nitrous oxide and ozone. The CO2 in the table is carbon dioxide. What is 'fossil fuel'? It is the natural fuel such as coal, oil or natural gas formed in the geological past from the remains of living organisms. What is biomass combustion? It simply means burning organic material, wood is the commonest example along with other materials related to wood like haystack, straw etc. Cutting down forests is 'deforestation'. If we have understood the "Mitigate climate change" part of the table then we need to understand the "Interventions'' we need to individually care for. From reducing high red meat consumption, using clean stoves to resource efficient health care machines every mentioned intervention makes

sense to reach our goals. The ultimate aim is to "reduce CVD" as detailed in the first part of the table (Table 1).



(Table 1). CHANGES AND CVD EXPLAINED

The window is closing to prevent the worst effects of climate change. The healthcare sector must take urgent action to prevent the worst crisis from undermining cardiovascular health. This is initiating the concept of the new field of 'Climate Cardiology', which would be able to formulate and help in the implementation in order to reach our goals.

Heart healthy cities:

"Genetics loads the gun but the environment pulls the trigger". (Fig 1).

Fig.1. The concept of a Healthy Heart or Green cities.
The known risk factors for heart disease are diabetes and hypertension. They are genetically related. But factors like smoking and other environmental pollution are becoming the new triggers in the causation of CVD.

How does the environment play a role in the causation or triggering of increased CVDs?

There are three types of environments -natural, social and personal. All three play an important and equal role in a direct or an indirect way. A good example being: A city that is polluted (social) does not see the sunlight (natural) as it should again due to global climate changes and as a result, the population of the city does not have the ability to perform the physical activities (personal) required. In addition, people may smoke their time out, which affects their balanced nutrition leading to an increase in CV diseases. Extremes of climate, especially cold, is known to cause increased cardiac events called the "Shovel deaths". In extreme colds, when people at risk go out to clean the snow, unprepared, heart attacks are very common. Thus, all put together, the environment plays and will play a major role unless an earnest effort is made at controlling the rising global temperatures (Fig 2).

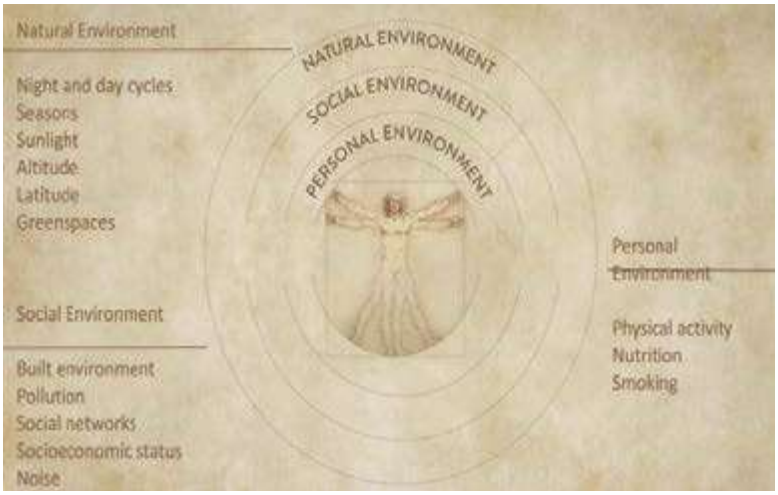


Fig 2. The inter-linked Environments.

The world's population is estimated to roughly reach 10 billion by 2050. Seventy five percent of this population will live in cities. Two-third of the European population already lives in urban areas and this proportion continues to grow. Between 60% and 80% of the global energy use is consumed by urban areas. Seventy percent of the greenhouse gas emissions are produced within urban areas (Fig 3).

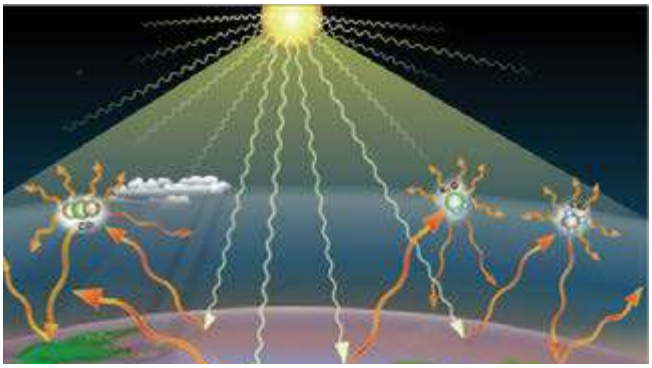


Fig3. The Three major Gases, Carbon dioxide, Nitrous Oxide and Methane along with the water vapor are the major sources of heat absorption causing climatic changes and global warming.

As pointed out in the above diagram there are three gasses emitted causing global warming. They are carbon dioxide, nitrous oxide and methane. In order to save the planet and reduce the CVDs we need to work together to reduce these gasses going into the atmosphere.

There are communicable diseases which have their own underlying connections to the environment. Then there are non-communicable diseases, like cardiovascular disease. Their connection to the urbanization process in relation to environmental risk exposures like noise, air pollution, temperature, and outdoor light is very strong. We are encouraging 'heat islands' to develop in urban areas. We need to work on making our cities greener and improve public health. The concept of 'Healthy Heart Cities' needs to look into the climate concerns leading to sustainability and livability.

Under the scanner of the 'Global Health Challenges' there are various subjects under discussion in order to improve and make cities more and more "Heart Friendly". The climate change and the healthcare sector, climate hazards for CV health, and the effects of extreme weather events lead to disturbances in balanced diets, and shortages of nutritious foods. This would further lead to rising poverty and the increase in "Climate Refugees".

If today I have to switch off a light bulb while leaving my room or If I turn off the running water tap when not needed while shaving my beard or I can find a way of planting new trees then I am planning a better future for my great grandchildren. Climate change and a bad future for CVD is a reality and not a myth, therefore let us join forces to work towards a healthy city where we live and a better healthy heart. Thus, it is a global issue on health and is a challenge for the current generation to focus on the coming generations.

The projected increase in CVDs manifold by 2030, relates to Hypertension, Coronary Artery Disease, Heart Failure, Strokes, Irregular heart rhythms, Rheumatic heart diseases, Pulmonary Heart diseases and also Viral heart diseases.■

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HEAD-TO-HEAD DATA: CALQUENCE vs. IBRUTINIB

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References
1. Calquence. Summary of Product Characteristics. **2.** Byrd JC et al. N Engl J Med. 2016;374:323-332. **3.** Sharman JP et al. Poster Presented at: ASCO; June 3-7, 2022; Chicago, Illinois. **4.** Barf T, Covey T, Izumi R, et al. Acalabrutinib (ACP-196): a covalent Bruton tyrosine kinase inhibitor with a differentiated selectivity and in vivo potency profile. J Pharmacol Exp Ther 2017; 363 (2): 240-252. **5.** Byrd JC et al. J Clin Oncol. 2021;39(31):3441-3452.

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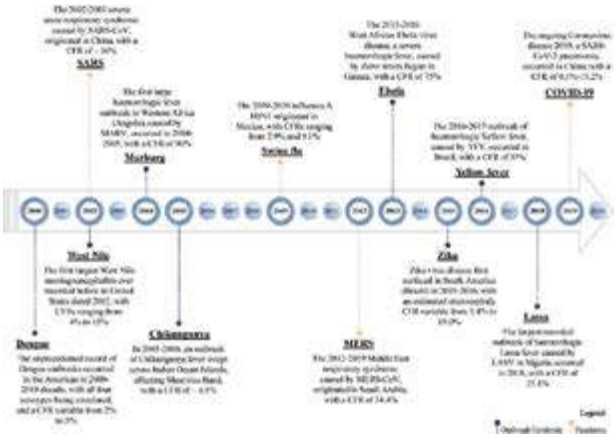
Emerging & Re-Emerging Infectious Diseases

"A Global Challenge"

Dr. Saroj Bala Grover
Physician
Infectious Diseases Hospital

■ Epidemics of infectious diseases have played a crucial role in altering human communities and cultures over the course of history. Pandemics and epidemics have affected humanity throughout history, with some of the worst examples being the bubonic plague, yellow fever, cholera, typhus, and influenza. A large fraction of the infectious disease epidemics that have claimed thousands of lives throughout history are caused by emerging infectious diseases (EIDs)

The World Health Organization warned as early as 2007 that infectious diseases are Emerging at a rate that has not seen before The twenty-first century has witnessed a wave of severe infectious disease outbreaks, not least the COVID-19 pandemic, which has had a devastating impact on lives and livelihoods around the globe. The 2003 severe acute respiratory syndrome coronavirus outbreak, the 2009 swine flu pandemic, the 2012 Middle East respiratory syndrome coronavirus outbreak, the 2013–2016 Ebola virus disease epidemic in West Africa and the 2015 Zika virus disease epidemic and recently COVID- 19 pandemic 2020 resulted in substantial morbidity and mortality while spreading across borders to infect people in different countries



(fig. 1) CFR Indicates Case Fatality Rate of Different infections.

The pandemic of HIV / AIDS has been with us with four decades. It can truly be described as an infectious disease that has recently emerged and judging from its global spread, it leaves no doubt that it is one of the greatest health threat mankind has to contend with.

What are Emerging and Re-emerging infectious diseases?

According to the National Institute of Allergy and Infectious Diseases, emerging infectious diseases are commonly defined as:

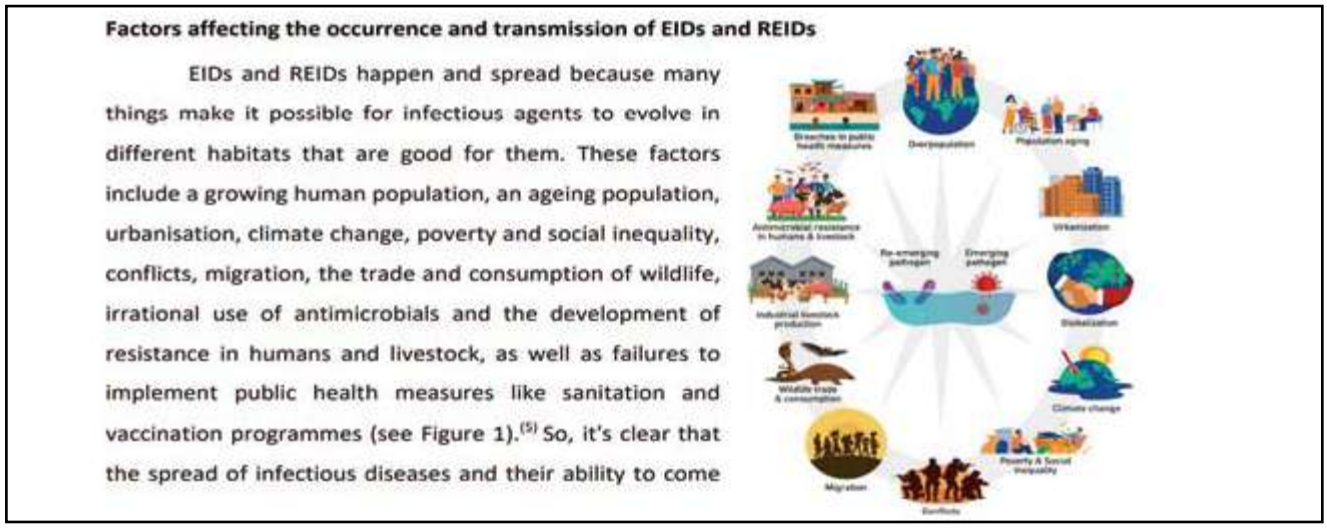
- Outbreaks of previously unknown diseases
- Known diseases that are rapidly increasing in incidence or geographic range in the last 2 decades
- Persistence of infectious diseases that cannot be controlled.

Emerging diseases include HIV infections, SARS, Lyme disease, Escherichia coli O157:H7 (E. coli), hantavirus, dengue fever, West Nile virus, and the Zika virus. (fig. 2)
Reemerging diseases are diseases that reappear after they have been on a significant decline. Reemerging diseases include malaria, tuberculosis, cholera, pertussis, influenza, pneumococcal disease, and gonorrhea. (fig.2)

Eid's and REIDs happen when things make it possible for infectious agents to evolve in different habitats that are good for them. These factors include a growing human population, an aging population, urbanization, climate change, poverty and social in equality, conflicts, migration, the trade and consumption of wildlife, irrational use of antimicrobials and the development of its resistance in humans and livestock, as well as failures to implement public health measures like sanitation and vaccinations programs. Global travel is increasingly becoming an important factor for the recent renewal of many infectious diseases in the world.

These varied factors can be summarized as three major changes on the global level 1) change in human society / behavior 2) changes in environment and ecosystem 3) changes in microorganisms

Factors affecting the occurrence and transmission of EIDs and REIDs



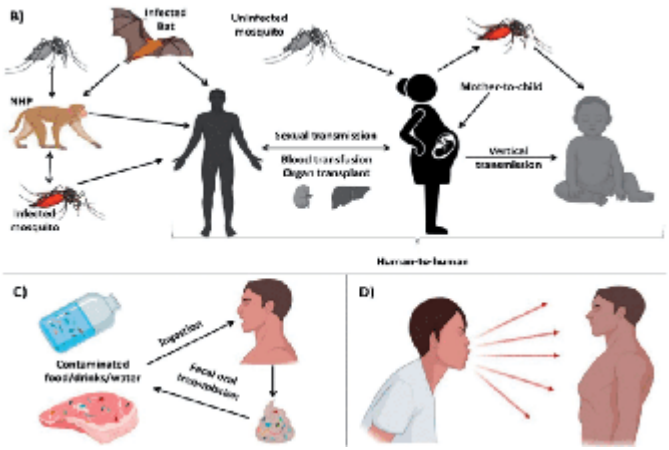
Modes of transmission of emerging and re-emerging infectious diseases

The majority of EIDs and REIDs are Zoonotic in nature meaning the organism grows in animals with random transmission to humans The animals could be pets but most are wild However all EIDs and REIDs are not Zoonotic EIDs associated with antibiotic abuse and overuse include infections caused by a number of multi drug resistant organism.
Infectious agents are transmitted through either direct or indirect contact. Direct contact occurs

when an individual is infected by contact with the reservoir (any person, animal plant or a substance in which an infectious agent normally lives and multiply), for example, by touching an infected person, ingesting infected meat, or being bitten by an infected animal or insect. Transmission by direct contact also includes inhaling the infectious agent in droplets emitted by sneezing or coughing and contracting the infectious agent through intimate sexual contact. Some diseases that are transmitted primarily by direct contact with the reservoir include ringworm, HIV (AIDS), trichinosis, influenza, rabies, and malaria.

Indirect contact occurs when a pathogen can withstand the environment outside its host for a long period of time before infecting another individual. Inanimate objects that are contaminated by direct contact with the reservoir (for example, a tissue used to wipe the nose of an individual who has a cold or a toy that has been handled by a sick child) may be the indirect contact for a susceptible individual. Ingesting food and beverages contaminated by contact with a disease reservoir is another example of disease transmission by indirect contact. The fecal-oral route of transmission, in which sewage-contaminated water is used for drinking, washing, or preparing foods, is a significant form of indirect transmission, especially for gastrointestinal diseases such as cholera, rotavirus infection, cryptosporidiosis, and giardiasis.
These modes of transmission are all examples of horizontal transmission because the infectious agent is passed from person to person in a group. Some diseases also are transmitted vertically; that is, they are transmitted from parent to child during the processes of reproduction (through sperm or egg cells), fetal development, or birth. Diseases in which vertical transmission occurs include AIDS and herpes encephalitis (which occurs when the infant contracts the herpes simplex type II virus during vaginal birth)

Transmission modes of diseases



Impact of emerging and re-emerging infectious diseases

The emergence and reemergence of infectious diseases pose a critical threat to Global Health Security with morbidity, mortality, and health care cost.

For centuries man has continuously witnessed the insurgency of different kind of infectious diseases with varying devastating impacts. Across the globe millions of lives have been lost to these incidences, most importantly in the developing nations with poor and inadequate health systems (figure below). Besides this threat to mankind, one of the key paradoxes associated with infectious diseases is often the impact on economy. The economic burden of controlling emerging infections estimated from six major outbreaks between 1997 and 2001 amounted to at least $ 80 bn according to an extensive study by world bank Diseases included Nipah virus, West Nile fever, SARS, Avian Influenza, bovine spongiform encephalitis. The devastation caused by the ongoing COVID-19 globally is truly historic. As of December 2022, there has been 650,879,143 confirmed cases of COVID-19, including 6,651,415 deaths reported to WHO. The International Monitory Fund sees the cost of Covid pandemic rising beyond $12.5 trillion through 2024.

The impact of any pandemic on mental Health cannot be underestimated Mental Health effects are a pandemic within a pandemic and this is so evident in the current COVID - 19 pandemic. Countless people have died or lost their livelihoods. Families and communities have been strained and separated. Children have missed out on learning and socializing. Businesses have gone bankrupt Millions have fallen below poverty line as people grapple with these health, social and economic impacts mental health has got widely affected A great number of people have reported psychological distress, symptoms of depression, anxiety or post-traumatic stress and increased suicidal behavior.

Strategies for prevention and control of emerging and re-emerging infectious diseases

Despite the massive health and economic risks posed by infectious Diseases with pandemic potentials, the global health community has largely failed to take a proactive approach to coping with outbreaks so far EIDS need to be attacked on multiple fronts.

- Strengthening the Health Systems in the form of epidemiological surveillance and the development of new microbial agents and of faster, cheaper and more targeted diagnostics
- Development of new vaccines to provide a frontline defense against disease transmission
- Research - It is a crucial part of the response to new and emerging diseases a sustained forward thinking applied response to programs would enable scientists to identify the weak links in the armor of emerging microbes, create novel ways to fight microbial foes and evaluate the preventive power of new approach We also need to find the best and most efficient ways to transfer knowledge from the labs to the field and to translate it into the realm of public policy and public health
- One Health

One Health is a collaborative, multisectoral, and transdisciplinary approach — working at the local, regional, national, and global levels — with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment.

One Health issues include emerging, re-emerging, and endemic zoonotic diseases, neglected tropical diseases, vector-borne diseases, antimicrobial resistance, food safety and food security, environmental contamination, climate change and other health threats shared by people, animals, and the environment.

The foundation of One Health is communication, coordination, and collaboration among human, animal, environmental health and other relevant partners.

Successful public health interventions require the cooperation of human, animal, and environmental health partners. Professionals in human health (doctors, nurses, public health practitioners, epidemiologists), animal health (veterinarians, paraprofessionals, agricultural workers), environment (ecologists, wildlife experts)

The One Health approach can:

- Prevent outbreaks of zoonotic disease in animals and people.
- Improve food safety and security.
- Reduce antimicrobial-resistant infections and

improve human and animal health.
- Protect global health security.
- Protect biodiversity and conservation.

By promoting collaboration across all sectors, a One Health approach can achieve the best health outcomes for people, animals, and plants in a shared environment.

To summarize, "One Health" is seen as a transformative approach to improved global health. ■

It ain't over till it's over. Clearly, we can now extend that axiom: when it comes to emerging infectious diseases, it's never over.
A. Fauci

Travel Guidelines.

TRAVEL ASSOCIATED INFECTIOUS DISEASES – USEFUL HINTS from The Johns Hopkins Hospital.
Information provided by Dr. Saroj Bala Grover.

Travelers should be aware that some diseases thought to be under control in their home country may be experiencing an outbreak in other countries. Ask for information and take precautions before being exposed to one of these diseases.
What is the risk of emerging infectious diseases?
Traveling abroad can put you at risk for infectious diseases endemic in the area of travel. All people planning travel should become informed about the potential hazards of the countries they are traveling to. Learn how to reduce their risk of getting these diseases.

Why are travel-related infectious diseases on the rise?
It is believed that increased global travel is the reason for the recent renewal of many infectious diseases in the world. The number of people traveling internationally is increasing every year, and more people are taking trips to remote parts of the world (fig-1). These often have unfamiliar health problems as well as underdeveloped healthcare services. Many travelers are also unaware of potential hazards in different parts of the world and do not take the necessary precautions. These include getting necessary vaccines or taking preventive medicine.

Many of the newly discovered infections have actually been in existence for a long time, but healthcare providers have not seen them in areas where new outbreaks happen. With people›s ability today to travel anywhere in the world within 36 hours or less, formerly little-known infections are picked up and rapidly spread to areas where they previously did not exist.
How can travelers reduce their risk from infectious diseases?

Traveling abroad does not need to result in an illness from infectious diseases. Taking these measures can help reduce the risk to people traveling internationally:
Seek information as far before traveling as possible, even if the destination is one you have previously visited. Health conditions can change quickly in certain areas of the world. Get as much information as possible about current health risks for the country or countries you are visiting and learn about special risks for children, pregnant women, people with chronic diseases, and people with weakened immune systems who might be traveling with you.

For specific recommendations, see a travel medicine specialist or a healthcare provider familiar with the area you will be visiting at least 4 to 6 weeks before your trip. If you are pregnant or plan to become pregnant, make certain to ask a travel medicine specialist about any pregnancy-specific concerns in your travel area.
Make sure your routine vaccines, including the seasonal flu vaccine, are up to date.

Get the immunizations and take the preventive medicines recommended by your healthcare provider. Since some of these must be given or taken weeks before travel, contact your healthcare provider as early as possible to make sure that the effectiveness of these measures.
If medicine is needed for prevention of malaria, be sure to take it as prescribed. Follow dosage instructions carefully. Malaria preventive medicines must be started before your trip to make sure that protective levels in your body before any exposure to mosquitos at your destination. Check with your healthcare provider or pharmacist to be sure you begin them early enough. They must be continued throughout your trip and for a specific number of days after you return. The amount of time depends on which medicine you are prescribed.
Put together a traveler›s first aid kit with specific items geared to your destinations. Add enough extra medicines and supplies to last a few days past the duration of your trip. Your healthcare provider can help you identify what should be included in your kit.

Research emergency medical care during your trip and what medical evacuation services are available in case of serious illness. Contact your health insurance plan to find out what is covered in other countries. Take 2 copies of your medical insurance information with you and keep them in separate areas. If you are traveling as part of an organized tour, contact the agency regarding medical services available and any additional insurance that might be available.
If you have any infectious disease symptoms e.g. fever, cough, vomiting, diarrhea, when you return home, contact your healthcare provider and describe where you have traveled. Symptoms can include fever, rash, joint pain, diarrhea, belly pain, and red eyes. However, each person is unique and your symptoms may be different. If you become ill when you return home, it is best to check with your healthcare provider.

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Healthcare and its Future

"Hoping For A Heathier Decade"

Dr. Rajendra C Mishra
Pediatrician
Royale Hayat Hospital

COVID-19 has revealed how vulnerable the healthcare industry is to change and its need for structural and technological transformation. The traditional boundaries of the industry will dissolve and new roles will emerge in the future of health as exponential innovation propels the industry towards 2040. In the future of health these key areas, namely data sharing, interoperability, equitable access, empowered consumers, behavior change, and scientific breakthrough, will collectively transform the existing health system from treatment-based reactionary care to prevention and well-being. The life sciences and health care industry are on the brink of large-scale disruption.

In a future of health that's defined by radically interoperable data, open yet secure platforms, and consumer-driven care. There will be a fundamental shift from "health care" to "health." And while disease will never be completely eliminated, through science, data, and technology, we will be able to identify it earlier, intervene proactively, and better understand its progression to help consumers more effectively and actively sustain their well-being. The future will be focused on wellness and managed by companies that assume new roles to drive value in the transformed health ecosystem.

Driven by greater data connectivity; interoperable and open, secure platforms; and increasing consumer engagement, changes are likely to emerge and will replace and redefine today's traditional life sciences and health care roles to power the future of health. These will be based on

- **Data and platforms:** These will be the foundational infrastructure that form the backbone of tomorrow's health ecosystem. They will generate the insights for decision making. Everything else will build off of the data and platforms that underpin consumer-driven health.

- **Well-being and care delivery:** These will be the most health-focused of the three groupings, made up of care facilities and health communities—both virtual and physical, and will provide consumer-centric delivery of products, care, wellness and well-being.

- **Care enablement:** These will be connectors, financers, and regulators that help make the industry's "engine" run.

Private healthcare is defined as any type of healthcare that is not provided by the government. This can include everything from for-profit hospitals to insurance companies. In many cases, private healthcare providers are able to offer lower prices than their public counterparts thanks to their leaner operation costs. The healthcare industry is ever-changing, and that means that the future of private healthcare is always in flux.

The rising cost of healthcare is one of the most pressing issues facing our society today. The first thing to understand is that the rising cost of healthcare isn't just affecting those with private insurance. It's becoming more and more difficult for everyone to afford quality healthcare. The cost of health insurance, deductibles and co-pays has risen faster than wages for eight years in a row. This puts private healthcare providers in a unique position to help those who are struggling. By offering quality care at a lower price point, private healthcare providers can attract patients who are looking for a more affordable option. In addition, by partnering with other businesses in the community, private healthcare providers can offer discounts and perks that appeal to patients and families

It's also important to understand that not everyone wants—or needs—the same type of healthcare. Some people are perfectly happy with the care they receive from their local clinic or hospital. Others prefer the convenience of an urgent care center or the personalized attention of a privately-owned doctor's office.

There are a number of advantages to using private healthcare providers.

- First and foremost, they are often able to provide care at a lower cost than public hospitals.
- Private healthcare providers typically have shorter wait times for appointments and procedures.
- Because they are not bogged down by bureaucracy, they are often able to be nimbler and more responsive to the needs of their patients.
- One of the main arguments in favor of private healthcare is that it provides people with more choices. When you have private healthcare, you are not limited to the choices provided by your local government.
- You can choose from a variety of different providers, and you can pick and choose the services that you want to pay for. This flexibility can be a major advantage, especially if you have specific healthcare needs.
- Another argument in favor of private healthcare is that it usually offers better quality care than public healthcare. This is because private healthcare providers can invest more money in research and development.

As a result, they are usually able to offer more innovative and effective treatments than public hospitals.

On the forefront of technology, here are some major visions of change and expectations around the healthcare trends of the future.

1. Online Visits

Thanks to video calling, there has been an influx of online doctor's visits. In crises where people cannot make it to doctor's, online visits have become the new house call. The convenience of online visits also extends accessibility to doctors in rural areas that are lacking medical care.

2. Group Visits

As the population expands, there's an increased demand for doctors. If the supply can't keep up, what's the next best thing? Group visits are becoming more popular. Group visits are when doctors see multiple patients with similar symptoms at the same time. Group visits are also likely to occur with patients who share chronic conditions like diabetes.

3. Team Approach

To optimize healthcare, providers may leverage a team approach to treatment. This teamwork approach places the patient in the middle and relies on each professional to contribute knowledge to optimize care.

4. Artificial Intelligence

Artificial intelligence will continue and expand its presence in healthcare. Medical uses of AI can be witnessed in the case of deep learning. This is when robots can use data to learn and respond to different situations without human interaction. In the medical field, real-time diagnosis and even prescriptions have been handled by AI. From a tangible sense, robots will also be used to aid healthcare professionals with physical tasks.

5. Virtual Reality

There are many uses for virtual reality in the healthcare field. They can put on a virtual reality headset and escape into a virtual oasis that can help to alleviate the pain. For medical school students, virtual reality is a way to simulate a surgical environment and practice before a student becomes a doctor and enters the OR.

6. Healthcare Trackers, Wearables, And Sensors

Data and technology are playing a massive role in personalizing healthcare. New healthcare trackers from the Apple Watch to diabetic sensors like Dexcom are helping people take control of their own health and wellness. From managing weight to stress levels to blood sugar, patients can also easily share health data with their doctors to help diagnose and prevent problems.

7. Personalized Healthcare

One of the biggest changes in healthcare is predictive medicine. Smart machines and devices can share healthcare data with professionals to predict problems before they even arise or become life threatening. This proactive model of healthcare is inherently personalized because patients' data is being sent from their bodies, in essence, to their healthcare teams for plans and treatment.

8. Genome Sequencing

The ability for researchers and medical scientists to conduct whole genome sequencing is opening the door to understanding major diseases. Genome sequencing helps to discover how DNA and genes can cause diseases. For example, whole genome sequencing has given scientists new insight into the heritability of schizophrenia.

9. Drug Development

Medical professionals are finding new and faster ways to develop drugs since the current process is lengthy and costly. They are using the power of artificial intelligence and in silico trials to do so.

10. Nanotechnology

Nanotechnology can help with wound treatment and healing. Companies are creating nanotechnology in the form of patches, for example, to monitor wounds and even stimulate healing.

11. 3D Printing

3D printing allows the creation of something from nothing. The medical world can use 3D printers to make artificial limbs, blood vessels and even bio tissues. There have even been cases where pharmaceutical companies have 3D printed

medicine. As time progresses, experts believe that the uses for 3D printing in healthcare will continue to expand.

12. Robotics

Robots have been used to help patients heal from surgery and can also make for great companions to those who are suffering from an illness. Startups are even creating ways in which robots can help kids with illnesses to monitor medication.

Implementing strategies to improve the healthcare systems is not a one-shot effort. It is a multifaceted value plan that involves the hospital management, the medical authorities, and the commitment of the healthcare staff. In general, the collaborative efforts of other fields also significantly impact the journey towards better healthcare. Society needs to adopt multiple goals in parallel, merge them steadily with the ongoing culture, and work on them together as an open-ended commitment. Hospitals can administer a more incredible patient care value system with visionary leadership and a patient-first attitude to deliver sustainable improvement.■

1. What makes glass frogs transparent? "The Holy Grail of hematology ".

The see-through amphibians have an amazing strategy for hiding while asleep—one that could advance our understanding of blood clotting.

Native to forests of Central and South America, glass frogs in the family Centrolenidae get their name from their translucent skin and muscles that blend them seamlessly into their jungle environment. Flip the amphibians over, where the effect is most impressive, and you'll see their hearts, livers, and squiggly coils of intestines—no dissection needed.

When fleischmanni's glass frogs (Hyalinobatrachium fleishmanni) go to sleep, they siphon off 89 percent of their brightly coloured red blood cells into crystal-lined sacs in their liver, which reflect incoming light and make the frogs appear nearly invisible. With their red blood cells out of view, the frogs become two to three times more transparent—a trick scientists believe helps the animals avoid predators. (Related: "These see-through frogs are full of surprises.")
Sleep secrets

Many aquatic creatures, like krill and salps, are see-through, but it's exceedingly rare on land—which is why scientists have been long been intrigued by the glass frog's ability to blend into its surroundings.
But before this study, no one had noticed the red blood cell phenomenon, perhaps because it only occurs while the frog sleeps throughout the day. (See more beautiful photos of frogs.)

What's more, because glass frogs are nocturnal, those who study them tend to become nocturnal, too. "I worked at night, and so all the [wild] frogs I would see were awake,"
The sound and the froggy

While the glass frog's trick is so impressive that it can be seen by the naked eye, understanding how it works requires an imaging technique known as photoacoustic microscopy. "When pigments absorb light, part of the light that is absorbed then produces heat," says study leader Carlos Taboada, a biologist at Duke University. "And that heat creates a local change in pressure, which creates sound waves."
"It's happening all around you, constantly," adds Delia. "Everything that's absorbing light, in theory, is also generating sound waves."

The team found that sleeping fleischmanni's glass frogs had an average of 96.6 percent less oxygenated hemoglobin in circulation than when they were active.
A boon for people?
Not only are the findings fascinating and bizarre, but the researchers say they could lead to advances in human medicine.

That's because many red blood cells in one place usually form a clot, which can block a blood vessel and lead to a potentially life-threatening condition, such as thrombosis. But the frogs can seemingly condense and expand their red blood cells at will—without any negative effects.
"And indeed, the animals can still clot normally when they're wounded," Taboada says.

This may mean the animals already possess what medical researchers have been seeking for decades: A biological mechanism that prevents excessive bleeding while also preventing excessive clotting.
"It's been called the Holy Grail of hematology," he says—and it may be hidden in plain sight, through the see-through skin of a tiny rainforest frog.

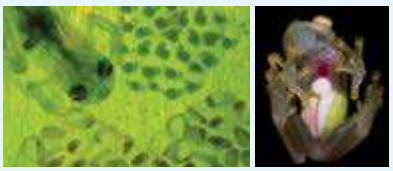


photo 2
Photo 1. A male glass frog, H. alerioi, guards three egg clutches Photo 2. The organs and developing eggs of a female glass frog, Hyalinobatrachium mashpi, are seen in a photo taken on glass. The National Geographic Society, & Science

Contributed By: Dr. Hasan Ali Khan

Global Challenges For Anesthesia, Critical Care and Pain Management

"Behind The Curtain Workers"

Dr. Abhay Patwari
Anesthesiologist and Intensivist
Armed Forces Hospital

Anesthesia

Whenever a person requires a surgical procedure, he needs anesthesia. This can be local (affecting only the part to be operated upon), regional (affecting lower half of the body or a limb) or general anesthesia (affecting the whole body with the patient being unconscious). The process of anesthesia is akin to death but it is reversible. All anesthetic drugs are potential killers if not used correctly. The risk of anesthesia and surgery varies with age, co-morbidities (associated diseases like diabetes, high blood pressure, heart disease etc.,), and the complexity of the surgical procedure. The paramount consideration for the specialty of anesthesia is patient safety and this has been steadily improving over the past hundred years. From a death or disability rate of 1:10,000 surgical procedures, advances in safety have reduced this rate to 1:300,000 operations. Most advances have come in the last 50 years helping patients worldwide to undergo very advanced surgical procedures (heart transplant, neurosurgery) with safety. This success has come as a result of research into making drugs and devices safer and better, use of the WHO safe surgery checklist, use of information technology, big data, machine learning, excellent training of manpower and a mindset to continuously innovate better ways of doing things. The risk of undergoing a surgical procedure can never be 'zero' but it is now as safe as taking a flight. Over the past 35 years an NGO named Anesthesia Patient Safety Foundation has been working tirelessly to educate and inform all stakeholders (patients, anesthesia professionals and healthcare services including the hospital, pharma and device manufacturers) with emphasis on patient safety and how it can be improved further.

Fig 1. A Patient under Anesthesia in the operation theater. We confidently make them unconscious and then make them conscious once the surgeon completes his work.

Critical Care (ICU)

Anesthesiologists have been pioneers in the development of critical care or ICU care. ICUs began as a response to the polio epidemic in Denmark in the 1950s. As patients were unable to breathe, they had to be given artificial respiration. As there were no ventilators, patients were intubated and manually ventilated. Even medical students were paid to do an eight-hour shift manually ventilating patients using a self-inflating manual resuscitator (an AMBU bag). This epidemic gave impetus to the specialty to develop mechanical devices that can ventilate patients with respiratory failure (those who cannot breathe for themselves). Early ventilators were very crude and difficult to use. They tried to apply negative pressure to the chest to draw air inside the lungs (Iron tank ventilators). Later, ventilators that could pump air into the lungs via a tube inserted into the windpipe (positive pressure breathing) were introduced. From the initial primitive respiratory care units, critical care today has developed into a very sophisticated ICU with ability to support various organ systems artificially and sustain life until the primary threat has been treated.

The complexity of current day critical care is so vast that it has now become a specialty itself. Most critical care physicians or intensivists come from anesthesiology background followed by physicians and pulmonologists (chest physicians). An ICU is a specialized unit in the hospital where patients with life-threatening illness are cared for. These patients have failure of one or more organ-systems that needs to be supported. People are now very aware of ICUs, pulse oximeters, ventilators etc., due to the recent COVID pandemic.

ICUs can be general medical or surgical or they can be very specialized (ICCU for heart patients, NICU for new born babies, PICU for children under 12 years of age, cardiac or neurosurgical ICU, burns ICU etc,). Since their dawn in the 1950s, care in the ICU has been continuously improving and innovating to improve outcome. This means early discharge from ICU, early discharge from the hospital and return to earlier quality of life as much as possible. But all this comes at a very high price and successful outcome cannot be guaranteed. The downside of ICU care is keeping very sick and elderly patients alive without the possibility of cure or returning to functional capacity. ICU care should be offered only to those who have potentially reversible illness and have a reasonable chance of full recovery. Importantly, patient's relatives should discuss with the intensivist regarding their patients' chances of meaningful recovery and sometimes refuse ICU admission and allow their patient a dignified exit from this world in the company of his/her near and dear.

Fig 2. An ICU looks scary but saves many lives.
The doctors always do their best, the final result is with the Almighty.

Pain Management

Pain has been the bane of mankind since time immemorial. Opium and alcohol were used to get some pain relief. But the real revolution came on 16th of October, 1846 when WTG Morton, a dentist used ether to provide anesthesia for a surgical procedure at Massachusetts General Hospital in Boston, USA. The patient felt no pain and the surgeon declared "Gentleman, this is no humbug". This day is celebrated all over the world as 'World Anesthesia Day'. The specialty of anesthesia was born and mankind could be relieved of pain. A year

later, the most famous chloroform was introduced. It has not been in use for the past 100 years but common people still associate chloroform with anesthesia. In the last 30 years, many new drugs and therapies have been discovered to conquer pain and again anesthesiologists have been in the forefront with pain management developing into a specialty of its own. The most difficult feature of pain is that it is subjective and there is no objective way of measuring the intensity of pain. Pain sensitivity and tolerance differs in individuals. The most popular methods of **assessing the severity of pain** are:

1. Verbal Rating Scale – mild, moderate or severe

2. Numerical Rating Scale – decide the severity of pain by indicating a number between 1 and 10 where 1 is no pain and 10 is maximum possible pain

3. Visual Rating Scale – indicate the severity of pain by facial expressions corresponding to your severity of pain.

Pain is so important that it has now been designated as the fifth vital sign. When you are admitted into a hospital, the nurse comes to you at regular intervals to record your temperature, heart rate, blood pressure and respiratory rate. It is now expected that the nurse also records the severity of your pain by using one of the rating scales above. This will also help us to know if the medications used for relieving your pain are effective or not.

Pain can be of different types.

1. **Acute pai**n – that which comes on suddenly and the cause is obvious -postoperative pain, trauma etc.,

2. **Labor pain** – that which a woman experiences during childbirth

3. **Chronic pain** – that which has been there for more than 3 months, not relieved by usual analgesics and for which the cause is not clear. This could be due to cancer or non-cancer causes.

Acute pain can be relieved by treating the cause and by oral analgesics like Panadol, Brufen and similar drugs. If pain is severe, then weak or strong opioids like tramadol, morphine or pethidine might be used. The WHO has suggested the use of the 'analgesic ladder' to prescribe appropriate anti-pain medication to minimize side effects and avoid addiction. Many hospitals have 'Acute Pain Service' under the leadership of an anesthesiologist and pain nurse to optimally manage pain in the pre-operative and post-operative period.

It is well-known that pregnant ladies suffer severe pain during labor. Only anesthesiology has been able to make the process of labor pain-free and pleasurable by the use of 'Lumbar Epidural Analgesia'. This service is now available 24x7 in all Ministry and private hospitals in Kuwait and in India too.

Chronic pain is that which has been unrelieved for more than 3 months, not clearly defined and has not responded to the usual treatment. Such patients are referred to a pain specialist – who is generally an anesthesiologist with a fellowship in pain medicine. He correctly identifies the cause of pain and treats it by using medication, physiotherapy, exercise, medication, deep brain stimulation, radiofrequency ablation and interventional blocks as appropriate. There may not be 100% relief but he tries to restore as much functionality as possible. If the cause is terminal cancer, he can use oral morphine or fentanyl or buprenorphine patch to relieve the suffering as much as possible.

Palliative care is an interdisciplinary medical care giving aimed at optimizing quality of life and

mitigating suffering among people with serious complex and often terminal illnesses and also includes end of life care. Anesthesiologist are important members of such teams and provide relief of pain to large number of patients.

Disaster Management

Rapid response to disasters (natural or manmade) is important. Anesthesiologists are important members of such teams. Providing anesthesia at the disaster site is very challenging. Local, spinal, sedation and anesthesia using Ketamine are methods of choice. Triage or identifying patients who need immediate care and those who are beyond help or can wait is also very important. Experience and standard protocols help in providing best care.

CPR and Teaching BLS

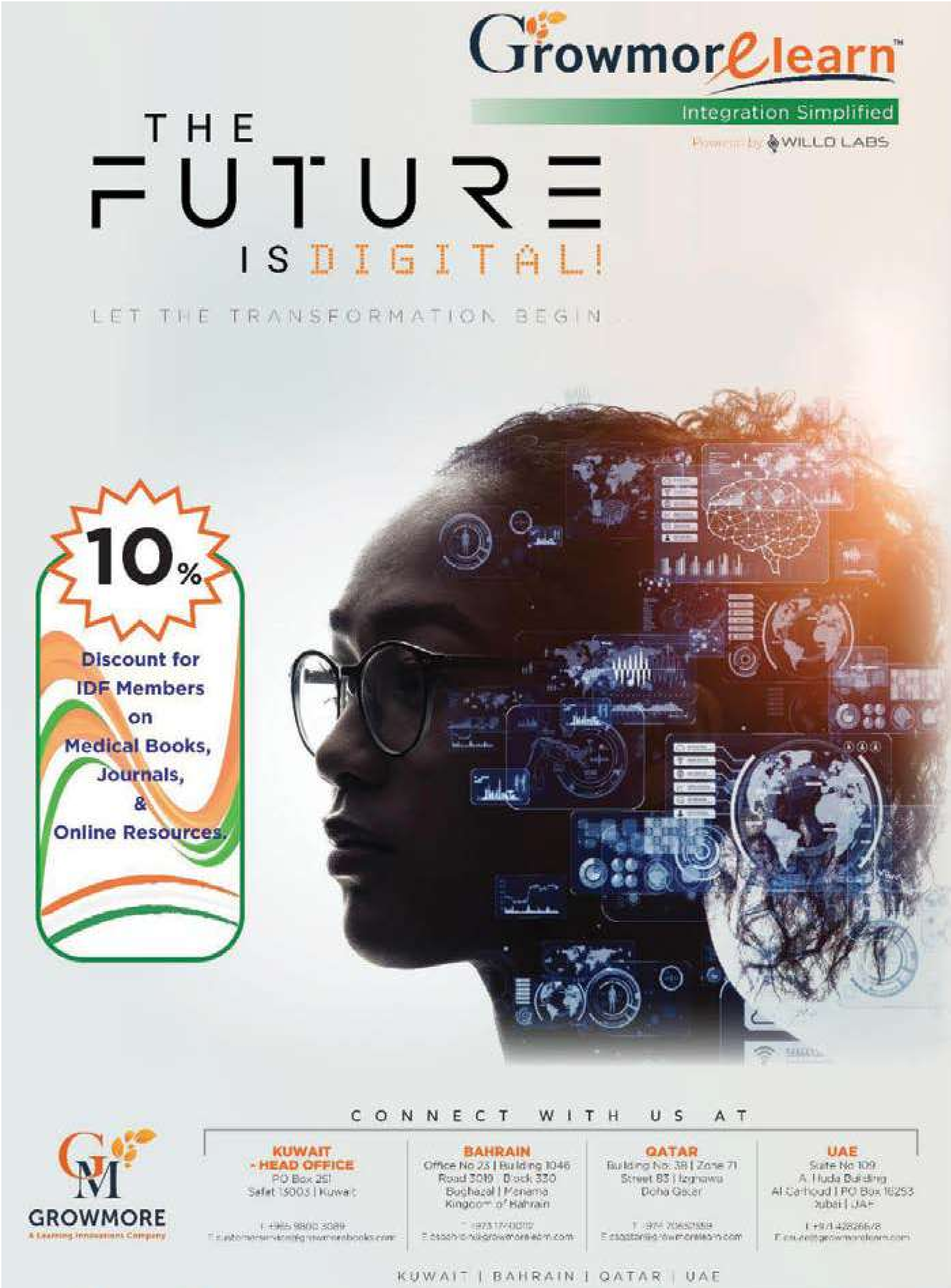
Anesthesiologist take care of unconscious patients and serious patients as a part of their daily activity. They are experts in airway management and acute medicine. As a corollary, they are the best medical professionals to treat persons with cardio-pulmonary arrest (CPA - sudden stoppage of breathing and / or heart). The treatment for this condition is cardio-pulmonary resuscitation or CPR. This is a life-saving first-aid technique for reviving persons with CPA. CPR is of two kinds – Basic Life Support (BLS) and Advanced Cardiac Life Support (ACLS). BLS should be learnt by as many citizens as possible because it can be given anywhere without the help of equipment or medication. ACLS is for medical professionals. They too are required to update their knowledge and skills by taking ACLS courses and CMEs periodically. Anesthesiologist are well-suited to teach this BLS to the general population. The Indian Resuscitation Council, part of the Indian Society of Anesthesiologists has given the slogan 'Every Citizen a Life-Saver' and aims to teach BLS to one million citizens in 2023. Performing BLS at the site of the event increases the chance of survival for the victim. Kuwait has many accredited agencies who teach BLS and ACLS. People can take advantage of this opportunity. The Indian Doctors Forum too, conducts such programs for organizations on request.

Manpower Shortages

The specialty of anesthesia is in great demand and their sphere of work is not limited to the operation theater but extends outside to all areas of the hospital. However, there is critical shortage of professionals worldwide. In USA, it is estimated that there will be a shortage of 120,000 physicians across all specialties by 2030. This could include around 20,000 anesthesiologists. In India the doctor-patient ratio is very low. The government is opening new medical colleges to meet this need. At the same time, we are training anesthesia technicians to assist anesthesiologists in performing the very critical task they do.

Conclusions

There are many global challenges facing anesthesia, critical care and pain management professionals but the specialty is working hard to meet the expectations of its consumers – the people of this world.■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From the Associate Editor's Desk

Health is increasingly recognized as something requiring collaboration and solidarity across traditional boundaries, so we have begun to think of health as truly global. Health problems have remained challenges eons since. Many communicable diseases and environmental issues defy national borders, resulting in serious global health challenges from pandemics and others.
Poverty, hunger, climate change, pollution, health inequity, refugee crises, stress, substance abuse—all impact human life tremendously. The same way of life that deteriorates our physical condition often prompts decline in our state of mind.

As doctors, we have a social responsibility to lead by example. With this special edition of Indian Doctors Forum (IDF) Health Guide, an expert IDF panel have focused on sharing accurate information to people and on addressing the most pressing challenges related to medicine and allied specialties. The authors disseminate great thoughts and ideas scrutinizing the strengths and weaknesses of facts rather than established paradigms.

Dr. Noble Zachariah has brought attention to the pros and cons of using insulin in the management of diabetes.
Dr.Syed Mohammed has given an overview of non-surgical management of obesity, which clearly is a lifestyle related problem worldwide. Lifestyle also plays a role in the causation of many common skin disorders as succinctly described by Dr. Arun Joshi. Despite the reduction in mortality rates from the COVID pandemic, thousands of patients suffer from its multi-system sequelae. Dr Solomon has provided a comprehensive review of the post COVID neurological sequelae, an often under recognized condition. Dr.Vandan has outlined the implications of undergoing surgery and anesthesia after COVID.

Alzheimer's disease is increasing at an alarming rate and Dr. Sharafudeen has presented a simplified overview of this dreadful disease. Newer research and technological advancements have helped us unravel the mysteries of aging which has been lucidly explained by Dr.Ruchira in her article. Dr.Abdul Rasheed has provided a comprehensive review on stem cell transplant, a much-debated topic nowadays.

The contents of this health guide have been written eloquently in a simplified manner. We hope that this collection will inform and inspire the readership to identify needs and intervene on problems early, leading to better healthcare outcomes. Moreover, the COVID 19 pandemic has taught us over and over again that no one is safe until everyone is safe! Therefore, let us all act in solidarity to close the cracks in our defenses on which health issues thrive. Health must be considered an investment for both human and economic development. EVERYONE can make a difference!

There are exciting times ahead in the field of medicine and thank you for joining us on this journey!

Dr. Sajna Mohammed

MEDICAL & ALLIED HEALTH CHALLENGES

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The Blessing and Bane of Insulin Treatment

"Still Learning"

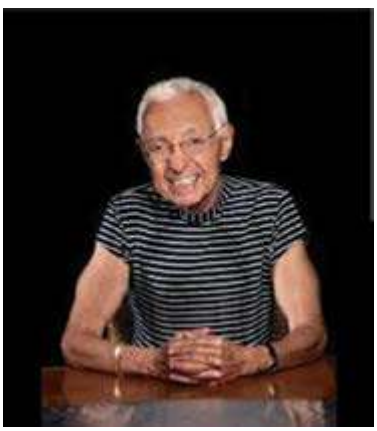
Dr. Noble Zachariah
Internist/Diabetologist
Dar Al Shifa

Insulin, the hormone produced in the beta cells of the pancreas is essential for blood glucose regulation and for survival. In its absence, Type 1 diabetes occurs and the people afflicted by it did not survive before insulin treatment. Type 1 diabetes accounts for up to 90% of children with diabetes and 10% of adults with diabetes.

The picture below is that of the first patient to be given insulin injection which was harvested from the pancreas of animals sacrificed for the same.

Patient JL, 15 pounds December 15, 1922 Patient JL, 29 pounds February 15, 1923

The difference in nutrition and health is obvious and this is the miraculous blessing of Insulin. Now animal extracted insulins are not used in most countries and either insulin similar to the human insulin synthesized in the bacteria or various insulin analogues which act the same way as natural insulin are used. This first patient survived for 13 years but now the longevity in Type 1 insulin is much more. Dr. Richard Bernstein who is an engineer turned doctor, is the longest living person with Type 1 diabetes and is 88 years old. He developed Type 1 diabetes at the age of 12 years. He is very successfully treating himself with a low carb diet and multiple insulin injections and is in good health.



Insulin Injections are the most powerful way of reducing blood sugar. So apart from Type 1 diabetes, it is used short term in Type 2 diabetes

with very high sugars with or without ketoacidosis when the blood sugar has to be quickly lowered, in hospitalized patients with labile blood sugars, post major surgeries and also in diabetes of pregnancy uncontrollable with Metformin alone.

Type 2 diabetes which accounts for 90% of the adults with diabetes and up to 30% of adolescents and young people with diabetes is different from Type1. It is primarily due insulin resistance and not due to insulin deficiency. There are multiple factors like obesity, visceral fat, lack of exercise, high GI food, stress, depression and hyperinsulinemia that perpetuate insulin resistance. Insulin resistance is associated with other conditions also.

Many people with diabetes and some health care professionals believe that Insulin is better than tablets for control of Type 2 diabetes and avoiding complications.

Let us examine if this belief is true.

Does insulin treatment lead to less complications or better blood sugar control?

UKPDS, the longest study on Type 2 diabetes, showed that insulin treatment does not reduce the vascular complications of diabetes when compared to oral medications. On insulin treatment, the number of people under control with HbA1c less than 7% decreased with time. It was 47% at 3 years to 37% at 6 years and 27 % at 9 years. This decrease in control is similar to sulphonyl urea, the oral medication. So, to achieve satisfactory control the dose of insulin has to be increased with time.

What are the side effects of Insulin treatment?
In addition to the pain and local reactions at the injection site, Insulin treatment can produce serious side effects.

Hypoglycemia and increased mortality

Studies as well as continuous blood glucose monitoring have shown that the prevalence of severe hypoglycemia is more than what is generally thought of, in people treated with insulin as many episodes are hypoglycemia unawareness. The mortality rate is also increased with intensive insulin treatment and is more with insulin injections with each meal than with once a day or twice a day insulin injection. In an analysis of a UK General practice database of nearly 50,000 patients, those who were on Insulin had a higher mortality rate than those on tablets alone.
Weight Gain

Weight gain is common with insulin treatment. Depending on the insulin regimen used weight gain varied from 6.7Kg in 6 months to over 10 kilograms over 3.5 years. Weight gain is associated with intra-abdominal fat deposits, insulin resistance and increased cardiovascular risk. Weight gain also affected illnesses like arthritis, fatty liver (NAFLD) and others.

Risk of Cancer

Patients with Type 2 diabetes have higher incidence of pancreatic, breast, colon and hepatobiliary cancers than the general population. Multiple factors like obesity, insulin resistance, hyperinsulinemia (increased insulin in the blood) may influence the

development of cancers as insulin increases cell mitosis. In an analysis the prevalence of liver cancer was significantly more in people treated with insulin or sulfonylurea (which increases insulin production in the body) than those treated with Metformin which makes the insulin work better (insulin sensitizer) without increasing the amount of insulin in the blood. In the case of pancreatic cancer, the risk was 4.99 times more in people treated with insulin when compared to those who never had insulin treatment.

Conclusion:

Insulin is a blessing for people with Type 1 diabetes and is essential for their survival.

Being the most powerful agent to reduce the blood sugar, its short-term use is warranted in conditions like diabetic ketoacidosis, severe hyperglycemia with glucotoxicity, peri surgical management, in hospital management of sick patients especially with infections and in pregnancy related diabetes not controlled with Metformin.

In Type 2 diabetes, it is more important to treat the causes that lead to high blood sugars like high GI food, sedentary habits, stress related issues, infections, medicines like steroids and others. Use of insulin early in the disease without paying attention to these factors is the bane of insulin treatment. It leads to weight gain, increased insulin resistance leading to loss of blood sugar control, need for increasing the dose of insulin with time, dangerous hypoglycemia and increased mortality. It also increases the risk of certain cancers.

Insulin treatment is required in Type 2 diabetes if and when its production in the pancreas does not meet the requirement.■

For those interested in knowing more: Diabetes Care 2011 May 34 (Supplement 2) S 225- S230) - American Diabetes Association.

Detecting sepsis by observing neutrophil motility

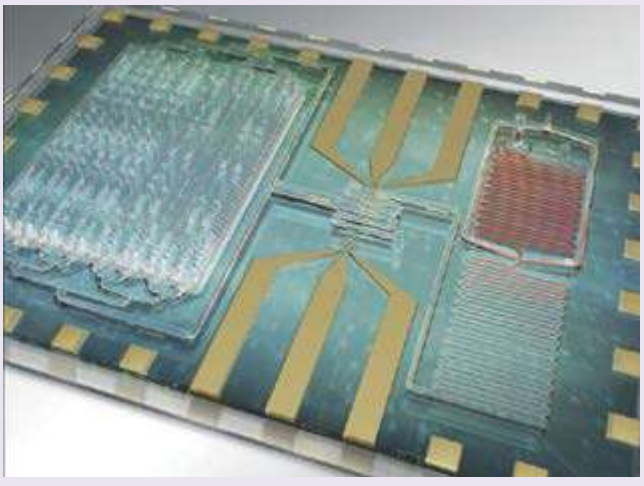
A microfluidic device for assaying neutrophil motility in blood samples from sepsis patients and a machine-learning algorithm trained with the motility data enable a faster and accurate sepsis diagnosis.

Researchers from the University of Illinois and physicians at Carle Foundation Hospital in the US have developed a new portable device to rapidly detect signs of sepsis infection from a single blood drop.

The small, lab-on-a-chip device is expected to enable detection of the infection at onset, while it is able to monitor infected patients and provide a prognosis. The new device involves point-of-care measurement of the immune system's response.

"We think we need both approaches: detect the pathogen but also monitor the immune response."
In addition to the total number of white blood cells, the device specifically counts neutrophils and measures CD64 protein markers present on the neutrophils' surface, as enhanced CD64 level is associated with increased immune response. The results from the device were found to be comparable to the findings from the standard tests and with the patients' vital signs.

New small, lab-on-a-chip diagnostic device for sepsis



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Relation of Body Mass Index to Mortality

The medical rationale for weight loss in people with obesity is that obesity is a disease associated with a significant increase in mortality and many health risks, including type 2 diabetes mellitus, hypertension, high cholesterol and coronary heart disease. The higher the body mass index (BMI), the greater the risk of morbidity and mortality. The relationship between BMI and mortality is likely to be similar for all races and ethnicities but the minimal BMI where excess risk is seen may differ. These risks are reviewed in detail below:

Identify candidates - Assessment of an individual's overall risk status includes determination of the degree of overweight (body mass index [BMI), the presence of abdominal obesity (waist circumference), and the presence of cardiovascular disease (CVD) risk factors (e.g. hypertension, diabetes, dyslipidemia) or other comorbidities (e.g. sleep apnea, nonalcoholic fatty liver disease). The relationship between BMI and risk allows identification of patients appropriate for weight loss intervention.

Dietary therapy - Many types of diets produce modest weight loss. Options include balanced low-calorie, low-fat/low-calorie, moderate-fat/ low-calorie, or low-carbohydrate diets, as well as the Mediterranean diet. Dietary adherence is an important predictor of weight loss, regardless of the type of diet chosen. Thus, we advise tailoring a diet that reduces energy intake below energy expenditure to individual patient preferences, rather than focusing on the macronutrient composition of the diet. The addition of dietary counseling may facilitate weight loss, particularly during the first year

Metabolic studies using state-of-the-art techniques have concluded that most adults will lose weight when fed <1000 kcal/day. Thus, even subjects who are concerned that they are "metabolically resistant" to weight loss will lose weight if they comply with a diet of 800 to 1200 kcal/day. More severe caloric restriction might be expected to induce weight loss more quickly, but a comparison with 400 versus 800 kcal/day diet formulas showed no difference in weight loss, presumably due to slowing of resting metabolic rate. We thus advise diets consisting of >800 kcal/day.

In addition, because of the body's hormonal adaptation to perceived starvation, it is difficult to

maintain a very low-calorie diet long-term. However, these diets may be used in certain conditions when rapid weight loss is needed (eg, to obtain metabolic control in uncontrolled type 2 diabetes mellitus or hypertension or in preparation for a surgical procedure such as joint replacement, bariatric surgery, or organ transplantation.

Other dietary patterns, such as intermittent fasting (e.g. alternate-day fasting or time-restricted feeding) are sometimes used to promote weight loss, although the evidence of their efficacy is mixed.
No matter which diet or dietary pattern is chosen, continued surveillance by both clinician and patient are essential for treatment success. Return visits with the clinician, dietician, or behaviorist should be scheduled at regular intervals to assess barriers, discuss next steps, and offer encouragement. If weight loss is less than 5 percent in the first six months, something else should be tried.

Exercise - Although less potent than dietary restriction in promoting weight loss, increasing energy expenditure through physical activity is a strong predictor of weight loss maintenance. In addition, physical activity can attenuate the loss of lean mass (e.g. muscle) during active weight loss. Physical activity should be performed for approximately 30 minutes or more, five to seven days a week, to prevent weight gain and to improve cardiovascular health. There appears to be a dose effect for physical activity and weight loss, and much greater amounts of exercise are necessary to produce significant weight loss in the absence of a calorically restricted diet. Therefore, when weight loss is the desired goal, a calorie-restricted diet should be combined with less sedentary time and increased physical activity; the activity should be gradually increased over time as tolerated. A multicomponent program that includes aerobic and resistance training is preferred. Existing medical conditions, age, and preferences for types of exercise should all be considered in the decisions.

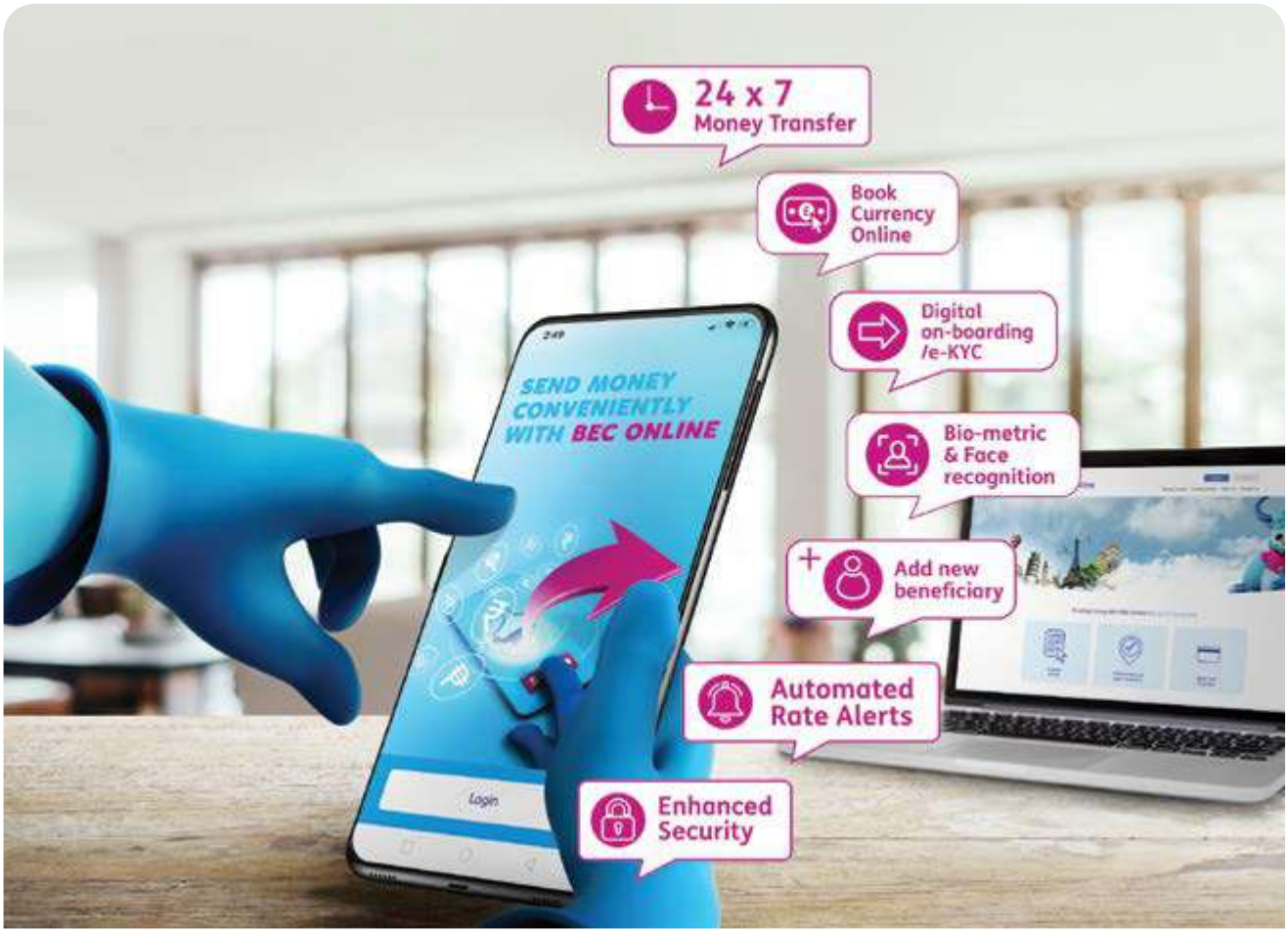
Behavior modification - Behavior modification or behavior therapy is one cornerstone in the treatment for obesity. The goal of behavioral therapy is to help patients make long-term changes in their eating behavior by modifying and monitoring their food intake, modifying their physical activity, and controlling cues and stimuli in the environment that trigger eating. These concepts are usually included in programs conducted by psychologists or other trained personnel as well as many self-help

Pharmacologic therapy - single agents are preferred over combination therapy. In addition, the choice of anti-obesity drug depends upon not only the patient's comorbidities but it also on the patient preferences, adverse effects, and insurance coverage and costs. For most patients, a glucagon-like peptide 1 (GLP-1) agonist (e.g. Semaglutide) is preferred first-line pharmacotherapy.

If there is an inadequate response to semaglutide or it is not tolerated, and treatment with a different drug is considered, we switch to orlistat, although side effects often limit its use. Phentermine (as a single agent) is preferred over combination therapy. In addition, the choice of anti-obesity drug depends upon patient comorbidities and patient preferences, adverse effects, and insurance coverage and costs.

Devices: Intragastric balloon systems. With these techniques, saline filled balloons are placed in the stomach to take up space and produce a sensation of satiety.

They are indicated for weight reduction in conjunction with diet and exercise in adult patients with a BMI of 30 to 40 kg/m2 and one or more obesity-related comorbid conditions, or for adult patients with obesity.■



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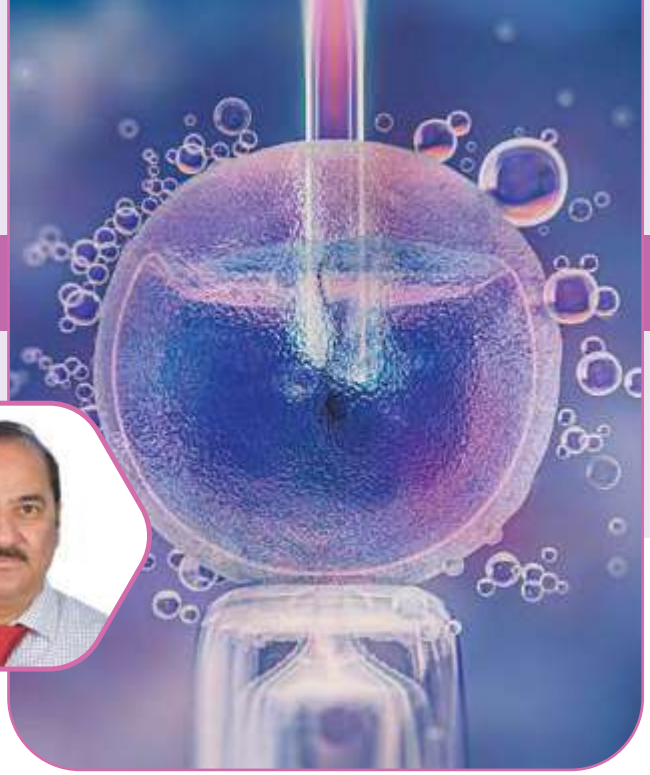

Dr. Abdul Rasheed
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KCCC Hospital

Introduction:

Hematopoietic stem cell transplantation also known as Bone Marrow Transplantation is an established curative modality for a range of hematological disorders both benign as well as malignant. Stem cells are multipotent and have capability of self-renewal and differentiation, first identified in the Hematopoietic system and likely present in many other tissues. The major therapeutic uses are, Transplantation of Allogeneic stem cells to reconstitute hematopoiesis in patients with bone marrow failure, genetic diseases or in those who will benefit from intensive radio chemotherapy like malignant hematological disorders.

The source of stem cells could either be Autologous or Allogeneic, from either Bone marrow or peripheral blood.

When the first hematopoietic stem cell transplant (HCT) was performed six decades ago, it was used as a last-resort therapy in an attempt to deliver high doses of radiation, chemotherapy and stem cell infusion to patients with incurable malignancies. HCT has become a life- saving procedure for millions of patients since then. In the US alone, there were almost 14,000 Autologous-HCTs and more than 8,000 Allogeneic HCTs performed in 2015 and the number of HCTs is steadily increasing. The success of HCT has resulted from continuous advances in the field. The recent advances of greatest impact can be grouped into three major categories: 1) reduction of transplant-related morbidity and mortality, 2) expansion of donor options, and 3) reduction of post-transplant relapse.

There has been a substantial reduction in mortality after Allo- HCT owing to a decrease in organ damage, better prophylaxis and treatment strategies for infectious complications and improved techniques for the prevention and management of graft versus host disease (GVHD), despite the increasing number of older patients with more comorbidities undergoing Allo-HCT in recent decades.

Procedure:

Hematopoietic stem cell transplantation involves administration of healthy hematopoietic stem cells in patients with dysfunctional or depleted bone marrow function either to destroy tumor cells or generate functional cells that can replace dysfunctional cells depending on the disease being treated. For both autologous and Allogeneic stem cell transplantation you need to collect stem

cells from either patient (Autologous) or donor (Allogeneic) by a process called mobilization and collection and infusing these cells into the patient after his diseased bone marrow is ablated by high dose chemotherapy/irradiation, A process known as conditioning.

This follows by recovery of bone marrow known as engraftment which takes two to three weeks from stem cell infusion depending on type of transplant. During this inpatient process, supportive treatment with blood products, fluids and electrolytes, various prophylactic agents as cytopenias make it vulnerable to infections are needed. After engraftment patients are monitored for Acute Graft versus host disease (aGvHD) which may involve skin, liver, GI tract, lungs and other organs. Sinusoidal Veno-occlusive disease (VOD) is a rare complication (5%) especially in Myelo-ablative Allogeneic transplantation.

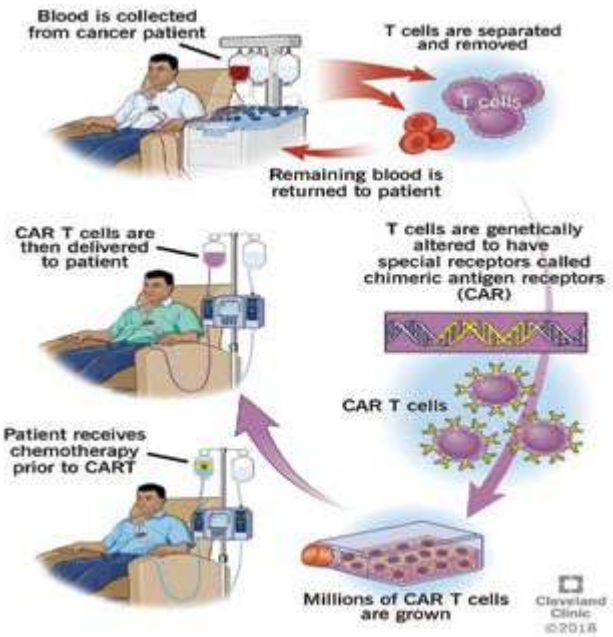
A Donor for all

HLA matching has been a requirement for Allo-HCT for decades. The transplant outcomes have ranged from poor to suboptimal, depending on the degree of mismatch, being substantially at greater risk for GVHD and infections owing to impaired immune reconstitution. Limited availability of suitable HLA-identical donors has been a significant barrier for Allo-HCT eligibility for decades. High-resolution donor-recipient HLA matching for HLA- A, -B, -C, and -DRB1 alleles was shown to be associated with improved survival after Allo-HCT from unrelated donors by minimizing complications related to HLA mismatch. More accurate HLA typing led to a decreased availability of HLA-matched donors for a significant number of patients needing Allo-HCT. Recent developments lead to exploration of other sources like Haplo-identical, Matched unrelated and cord blood with equal efficacy and cure rates.

Disease relapse remains the main challenge for both Auto and Allo-HCT. According to Center for International Blood and Marrow Transplant Research data, primary disease is responsible for almost two-thirds of deaths after Auto-HCT. Relapse-related mortality is less common after Allo-HCT because of GVT activity and a higher risk of early non-relapse mortality, The relapse risk can be decreased by inducing deeper responses to anti-tumor therapy prior to HCT, by enhancing the cytotoxic potential of a conditioning regimen and by using maintenance therapy. In Allo-HCT recipients.

Future developments

Many challenges remain, particularly in minimizing disease relapse and the severity of GVHD. Further research is needed on how to enhance the ability of donor immune cells to eradicate malignant cells without significantly increasing GVHD. This will be possible with the development of novel adaptive immune cells and targeted therapies, recent identification of GVHD biomarkers, the development and clinical testing of biomarker- based scoring algorithms to permit risk-adapted therapy for acute GVHD. Recently, novel key targets and signaling pathways have been identified in the pathogenesis of chronic GVHD, including Bruton's tyrosine kinase (BTK), Janus kinases (JAKs), spleen tyrosine kinase (SYK), and many others. These insights have led to clinical testing of the BTK inhibitor ibrutinib, several SYK inhibitors and JAK1/2 inhibitors, including ruxolitinib with very promising results in early studies. Changes in transplantation practices with less-toxic conditioning regimens have allowed many patients of more advanced ages to be considered for HCT, and currently no strict upper age limit exists for this procedure. However, more studies are needed to better define the most optimal donor and patient selection and conditioning regimens, particularly for elderly patients with comorbidities.



2. Cellular Therapy a paradigm shift and its future in Hematological cancer management:

The number of cancer cell therapies has increased considerably over the last few years. There are several different types of cellular therapies, including Chimeric antigen receptor (CAR) T cells, multiple tumor-associated antigen specific T cells (TAA-T), Natural killer (NK)-based and T-cell therapies based on novel technologies like CRISPR. Amongst the different types of cell therapies in development, approximately 50% are CAR T-cell therapies for various hematological malignancies and solid tumors having cured cancers in some patients who failed chemotherapy.

The development of CAR-T cells has been a decades-long journey from late 1980s to the Food and Drug Administration (FDA) approval of Tisagenlecleucel in 2017. The first CAR was reported in 1993, when Eschar et al successfully combined the cytotoxic potential of a T cell with the specific targeting of an antibody in a single gene transfer. The earliest clinical trials with first-generation CAR-T cells in solid cancers were disappointing. Optimization of the basic construct over time has crucially included the addition of costimulatory domains leading to improved T cell activation and survival, and the identification of favorable target antigens, most prominently CD19. These developments have led to positive clinical outcomes, including reports of cure in patients with B cell malignancies.

Optimizing CAR-T cell design and delivery raises the hope of a cure for many more people with malignancies and heralds an exciting new era in cancer treatment. While researchers, physicians, patients, and investors are excited by such potential therapy, there are still several major hurdles to overcome. For the vast majority of patients with blood and almost all solid cancers, CAR-T cells are not yet proven to be effective, are too toxic, or are not available due to expense or geography.

Current therapeutic range of Cellular therapy:

Multiple Myeloma B cell maturation antigen (BCMA) is expressed in nearly all cases of myeloma and is not present on hematopoietic stem cells or non-hematological cells. Among small numbers of very heavily pretreated patients, overall response rates of over 80% have been reported. As there remain no curative chemotherapy options in myeloma despite recent progress, there is significant potential for CAR-T cells to disrupt the treatment landscape. Non- Cellular immunotherapies, such as antibody-drug conjugates and bispecific antibody therapies, seem to provide alternatives and may prove to be less expensive.

Myeloid malignancie. The curative potential of Allogeneic hematopoietic stem cell transplantation in acute myeloid leukemia (AML) and myelodysplastic syndrome (MDS) has established proof of T cell-mediated immunotherapy, but there are issues in extending this concept to the application of CAR-T cell therapy.

There are several proposed strategies to overcome these obstacles, including (1) identification of AML-specific antigen pairings required for initiation and maintenance of leukemogenesis that can be exploited by combinatorial antigen targeting; (2) early termination of CAR-T cell activity once remission is achieved with suicide constructs or transient CAR expression techniques and (3) myeloablative CAR-T cell therapy followed by rescue allogeneic hematopoietic stem cell transplantation. Target antigens explored thus far in preclinical models include CD33, CD123, Lewis-Y, CD44v6, FLT3 receptor, CLL-1, and the folate receptor β.

B Cell malignancies CD19 expressing blood cancers appear most conducive to CAR-T cell therapy. High levels of tumor expression of the target antigen, ease of physical access to tumor cells through the blood and lymphatics, and the tolerability of the on-target off-tumor effect of B cell aplasia make CD19 a unique target. However, <5% of all new cancer diagnoses are CD19 expressing malignancies targetable by licensed products. The innovative strategies developed in CD19 expressing diseases to abrogate antigen-negative relapse, improve efficacy of tumor killing, improve CAR-T cell persistence, and increase control of activity and toxicity, are in parallel being pursued in efforts to bring CAR-T cell therapies to bear against other diseases.

T cell malignancies Developing effective CAR-T cells against T cell malignancies, for which chemotherapy is rarely curative, will be a huge challenge. Particular obstacles include contamination of the autologous CAR-T cell product by malignant T cells carrying the CAR, as well as unwanted CAR-T directed death of fellow CAR-T cells (fratricide) and of healthy T cells owing to shared target antigen. Among the proposed solutions are alternative cellular vehicles for the CAR, of which CAR-NK cells appear to be gaining most attraction in early phase clinical trials against both T cell malignancies and other cancers.

Solid tumors While immune checkpoint inhibitors have established proof of activated T cell efficacy against solid cancers, outcomes with first, second and third-generation CAR-T cell products targeting single antigens have been very disappointing compared with blood cancers likely owing to: (1) CAR-T cells face difficulty gaining access to target cells sitting within poorly vascularized tumor masses, walled-off by inflammatory cells and connective tissues. (2) On gaining access, CAR-T cells face a hostile, hypoxic and anti-inflammatory tumor microenvironment, attenuating their potential cytotoxicity. (3) CAR-T cells that do manage to penetrate a solid tumor and retain cytotoxic potential, the lack of ideal single-antigen targets and specificity with commonality of antigens on tumor and counterpart and nonmalignant tissue.

Next-generation CAR-T cells There have been a variety of innovations in the technical design of CAR-T cells, to improve efficacy and reduce toxicity in hematological malignancies and solid cancers. On-target off-tumor effects can be minimized by adding gated circuits requiring both antigens to be present for CAR activation or not gated circuits which will activate in the presence of one antigen only. Targeting one antigen or another can eradicate multiple clones and reduce antigen-negative relapse by either infusing 2 separate populations of CAR-T cells, transducing 2 CARs into the same cell or by the novel tandem CAR, common combination being CD19 and CD22.

Conclusion: It is evident that the future of cellular therapy is very bright for patients with hematological malignancies, as not only one, but multiple different strategies are under clinical investigation and show promising activity. CAR-based treatments remain at the center of cellular immunotherapy with new variations and adaptations being developed to tackle some of the associated toxicity and logistical hurdles seen with traditional CAR T-cell therapies. ■

Lifestyle and Skin

"Beauty of health is in the Skin"

Dr. Arun Joshi
Dermatologist
Farwaniya Hospital

■ Skin diseases are not just skin deep. Over the last decade or so, a number of common chronic lifelong, controllable but not curable skin conditions like psoriasis are increasingly found to be associated with conditions such as high blood pressure (hypertension), diabetes, heart diseases etc. sharing common predisposing lifestyle factors.

Co-morbidities are two or more chronic conditions present in a patient from beginning or developing over a period of time. Co-existence of these has increased the risk to the health of patients, lack of response to established treatments, limiting treatment options, impacted quality of life and escalated the costs of treatment.

Modern lifestyle factors such as obesity, smoking, high calorie diet, lack of physical activity have emerged as important risk factors for chances of developing Psoriasis, Hidradenitis suppurativa, Acne, Polycystic ovarian syndrome (PCOS) and Acanthosis nigricans. Obesity, a modern pandemic due to overconsumption is a common underlying condition in all of them, with resultant serious comorbidities linked and driven by the chronic inflammatory state in the skin lesions in these conditions, and their counterparts in blood vessels and internal organs.

Mental health issues (anxiety, depression and suicidality) are also more common in all of them compared with the general population. This is due to misconception about the nature of their skin condition among people, their avoidance and rejection by causing isolation because of the stigma, adverse comments, un-involvement, unemployability, and poor sexual health.

Common comorbid conditions in Psoriasis, Hidradenitis suppurativa, Acne, PCOS and Acanthosis nigricans:

- Obesity,
- Metabolic syndrome: all components or individual elements
- Combination of central obesity (increased waist circumference), hypertension, insulin resistance, and dyslipidemia **(abnormal lipid profile: ↑triglycerides, ↓HDL cholesterol),**
- Diabetes mellitus
- Major adverse cardiac event (MACE): All or individual components
- Myocardial infarction (MI; heart attack), cerebrovascular accident (stroke), & death due to heart disease

- Sexual dysfunction,
- Serious mental health issues like anxiety, depression and even suicidal tendency.
- Substance use disorder: chronic opioid use, alcohol dependence.
- More severe & longer duration the skin disease, higher the risk and severity of co-morbidity (1.5 to 4 times for most of them)

PSORIASIS:

- is a chronic lifelong persistent/recurrent immune mediated inflammatory skin disease affecting skin, nails, scalp and joints, prevalent in 2-4% of the world population (approximately 125 million people worldwide). (Fig. 1)
- Impact on quality of life of patients =/> than in those serious diseases such as cancers, diabetes or heart disease.
- Psoriatic arthritis (5 types) affecting joints of hands, feet, knees, lower back severely impacting daily physical activities: 30 to 70% of all psoriasis patients.
- Presence of psoriasis is an independent risk factor for
- Major adverse cardiac event (MACE),
- Chronic and end-stage renal disease (ESRD),
- Independent of traditional risk factors such as body mass index (BMI), smoking, hypertension, diabetes, and dyslipidemia.

Additional comorbid diseases in psoriasis:

- Inflammatory bowel diseases (Crohn's disease and ulcerative colitis)
- Cancers (lymphomas esp. cutaneous T cell lymphoma (CTCL),
- Serious infections requiring hospitalization such as pneumonia.

Hidradenitis suppurativa (HS)

- A very distressing, chronic, inflammatory, painful condition of the hair follicles, affects young adults and also children, incidence is increasing.
- Painful nodules (firm, hard swellings <1 cm), abscesses (pus filled swellings), foul smelling discharge draining sinuses (tunnel like tracks) and scars in the armpits, groins, buttocks and inframammary (below the breasts) areas. (Fig. 2)
- The burden of disease (number of co-morbidities, approximately 30 diseases) is highest in HS than in any other condition including higher suicide and death rates.
- Obesity and smoking are recognized significant preventable risk factors.
- Many patients resort to substance use (alcohol/ drugs etc.) because of the painful debilitating nature of the condition.
- Additional comorbid conditions associated with HS are:
- Acne, dissecting cellulitis of the scalp, pilonidal disease, pyoderma gangrenosum, inflammatory bowel disease and spondyloarthritis (painful stiffening of spine).
- Down syndrome patients are 2.1 times more likely to have HS.

Acne:

- The most common skin disease for which people seek consultation (90% of all teenagers are affected).
- Adult onset acne (acne appearing later in the 3rd or 4th decade of life) is increasing.
- Can be induced by drugs such as steroids (topical, oral, anabolic).
- Characterized by whiteheads, blackheads. red bumps, boils, nodules, cysts, scars and marks affecting face, chest and back.
- Profound effect on the self-esteem, confidence, quality of life, social interactions, emotional and psychological health of the affected teens during their most formative impressionable years under scrutiny and pressure from peers and society.
- Major co-morbidity is effect on mood (depression, anxiety, suicidal ideation), isolation from the society, avoiding physical activities (like sport, swimming etc.)

Lifestyle risk factors for acne:

- Excessive calorie intake, high glycemic index, high fat content processed foods, dairy products, chocolates, milk, bakery, fried non-veg and veg snacks are important risk factors for acne besides family history, and self-medication (steroids).

PCOS: A very distressing condition among young and middle-aged females presenting with acne, excessive coarse hair on face, chest, irregular menses, infertility and multiple cysts in the ovaries, producing hormonal imbalance causing significant cardiovascular, and psychological co-morbidities. Obesity is a major preventable and treatable risk factor. Lifestyle modification with weight reduction is one of the corner-stone of treatment.

Acanthosis nigricans (AN): Dark velvety rippled patterned thickening of skin over neck, armpits and sometimes in groin and in front of the elbows is a common finding in people (including children with obesity). Facial AN on cheeks, forehead, side of the face in front of ears, and acral AN on fingers are increasingly being noticed in people. They are a marker of obesity, insulin resistance and future risk of diabetes and associated conditions in these.

Conclusion: Treating dermatologists/physicians should not just focus on the skin of patients with these and other common chronic conditions but proactively look for and detect comorbid conditions early as part of management, as they can have serious consequences. Advising patients and the general public to follow a healthy lifestyle by maintaining healthy weight by physical activity, yoga, low calorie, low fat, low dairy, less processed, plant-based diet, meditation, and avoiding smoking can reduce the risk of getting these burdensome skin conditions and their associated morbidities.■

First Successful Implantation of Revolutionary Wireless Visual Prosthesis Brain Implant

While there is currently no cure for blindness, a first-of-its-kind artificial vision system has undergone its first successful implantation, bringing with it the potential to restore partial vision to people who have lost their sight.

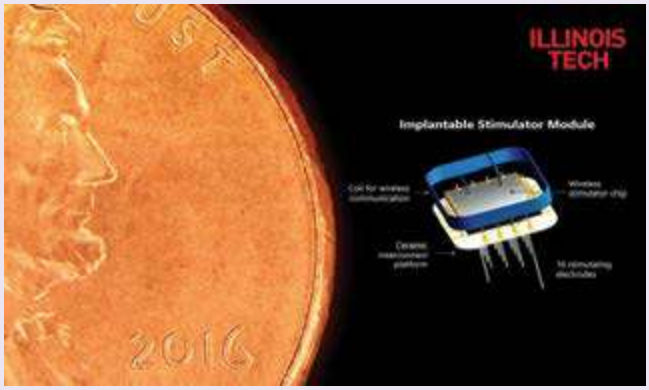
The Intracortical Visual Prosthesis (ICVP), an implant that bypasses the retina and optic nerves to connect directly to the brain's visual cortex, has been successfully surgically implanted in the ICVP study's first participant at Rush University Medical Center this week. This surgery is part of a Phase I Feasibility Study of an Intracortical Visual Prosthesis for People with Blindness due to eye disease or trauma. This visual prosthesis system allows devices to be permanently implanted, which is a unique advantage that provides researchers ample time to explore how the device can effectively work, and for the recipient to learn how the device can be useful.

Since many individuals affected by total blindness do not have intact retina or optic nerves but retain the visual cortex—the area of the brain that allows people to see—an intracortical visual prosthesis may be the only possible advanced visual sensory aid from which they can benefit.

While the brain works as a powerful processing system and receives millions of nerve signals from the eyes, if the eyes are no longer able to communicate with the brain, Troyk says that researchers can "intervene by bypassing the eye and optic nerve and going directly to the area of the brain called the visual cortex."

Illinois Tech is collaborating with Rush University Medical Center, The Chicago Lighthouse; the Wilmer Eye Institute at Johns Hopkins; the University of Texas at Dallas; Microprobes for Life Science; Sigenics, Inc.; and The University of Chicago on the initiative, with Troyk serving as the principal investigator.

"For people who are completely blind, gaining even a little bit of light perception can make a huge difference,"



Contributed By: Dr. Piyush Bafna

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Post Covid19 Neurology

"Unexpected Sequelae"

Dr. Soloman Thilak Davidson
Neurologist
Mubarak Al Kabeer Hospital

■ Covid19 Though primarily an Acute Severe Respiratory syndrome it affects the immune system causing local inflammation of the respiratory or Gastrointestinal system depending upon the site of entry.

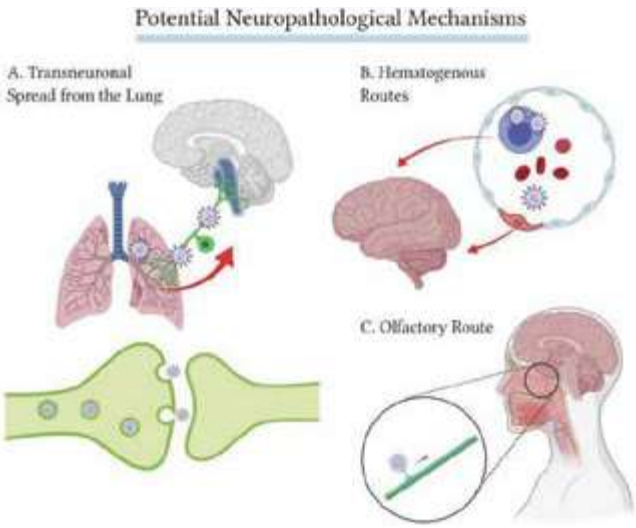
Throughout the world the unusual neurological presentations affecting the central and peripheral nervous system had presented challenges to the treating physicians. Common among them are seizures, strokes and acute flaccid muscle weakness. Neuropsychological affections are under recognized and Post covid19 Neurological syndromes (PCNS) include mood disturbances, fatigue, and depression especially among medical workers. This article highlights some of the neurological disorders encountered.

"Ironically, it was not the flu that actually killed people but the way in which it weakened them in ways that allowed pneumonia or meningitis could set in."

— Charles River Editors, The 1918 Spanish Flu Pandemic

A wise quote applicable to the present Covid19 pandemic too! New investigations proved this to be true as the virus ravages the immune system, in fact the immune system overreacts and inflicts damage to the lung and the brain. The buzz word "cytokine storm" — a cascade of systemic pro-inflammatory signaling — that may induce much of the tissue and organ injury seen in patients with severe COVID-19. Accumulating evidence indicates that COVID-19 patients commonly develop neurological symptoms, such as headache, altered mental status, anosmia, and myalgia.

In this article we have summarized the most common neurological manifestations reported. Common symptom being severe muscle pain, loss of smell(anosmia), loss of sense of taste (Ageusia) but severe cases affect the central nervous system causing altered sensorium (Encephalitis) and can involve the peripheral nerves causing progressive weakness of muscles (Guillain-Barré syndrome). It is reported that 42% of hospitalized patients had neurological manifestations. The infamous spike protein of SARS-CoV-2 has a stronger affinity than Cov-1, being the reason for its neuro-invasiveness and its devastating effects on the brain and other tissues.



Encephalitis:

Neuro-invasive Covid19 -2 has caused nervous system affection. Although encephalitis is an uncommon complication of COVID-19, when present, it results in significant morbidity and mortality. After recovery it can lead to memory impairment and mood disturbances. Severely ill COVID-19 patients are at higher risk of suffering from encephalitis as a complication of the infection.

Guillain-Barré syndrome:

Experience suggests both the absence of safety concern for GBS with mRNA-based COVID-19 vaccines and an increased risk with adenovirus-vectored COVID-19 vaccines. Apart from vaccination the disease itself has been known to produce this severe disease affecting all the muscles of the body especially the breathing and swallowing muscles. This disease is treatable and causes severe disability if not recognized.

Cerebral venous Occlusion:

Akin to leg vein blockage the veins in the brain can clot due to the inflammation of the endothelial layer of the veins causing blood to clot. This produces severe swelling and stroke like features. If recognized early, effective treatment with blood thinners can be lifesaving.

Post-Covid19 Effects on the brain:

About 20% of adults have long term effects of CoV-19, like long lasting headaches, poor concentration and sleep problems. Although there has been considerable speculation as to the likely deleterious effects of COVID-19 infection on mental health, some types of mental health symptoms may be especially anticipated to occur in people who have been severely infected.

Studies in China have identified high rates of PTSD symptoms in COVID-19 survivors. Especially in patients who have lost close family members to Covid19.

One third of post covid19 patients recovered well. The other two-thirds of participants reported persistent neurological symptoms, though most had diminished in severity. The most prevalent symptoms at six months were memory impairment and decreased concentration. None of the above patients has neurological problems prior to the Covid19 infection.

Conclusion

Neurological complications caused by COVID-19 are more frequent than thought of and compromises the functional capacity and the life of patients. The rehabilitation of these patients remains a challenge. The nightmare of the sounds of ambulances, fear of death and separation from a loved one seems to be over, but the long-lasting effect on the psychological aspect of a Covid19 survivor is truly a personal experience.

The medical fraternity has pulled up their socks to fight this curse and humanity will still find ways to face the future challenges.■

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Global Health Challenges for Anesthesia

"A Paradigm Shift"

Dr. Vandan D. Ward
Anesthesiologist/Intensivist
Kuwait Hospital

Several World Health authorities have recognized Post Covid-19 Syndrome and Climate Change among the top 10 Global Health concerns. This article is a curtain raiser on 2 related topics.

Post-Covid19 Syndrome & Implications for Anaesthesia

The Covid-19 pandemic is recognized as a continuing major global health threat, as even mild cases may have long-term health consequences. It has been found that 76% of previously hospitalized covid-19 patients, have experienced at least one residual symptom, 6 months after the diagnosis. This 'group' of symptoms is called as Post-Covid19 Syndrome [PCS], as summarized in Table 1. In addition, Malhotra and group found that consequences of kidney injury suffered during covid-19 illness may be found even 6 months after discharge, besides many reports of malfunctions of thyroid, adrenals and pancreas. They also report psychiatric symptoms including post-traumatic stress disorder, worsening of depression and anxiety in these patients.

There is considerable variability in the presentation and sequelae of PCS and knowledge and experience of which is still emerging. More so regarding the comprehensive anesthetic management of such patients who are posted for an operation. This has significant implications for safe anesthetic and perioperative management. Table 1 Symptoms of patients who recovered from Covid-19

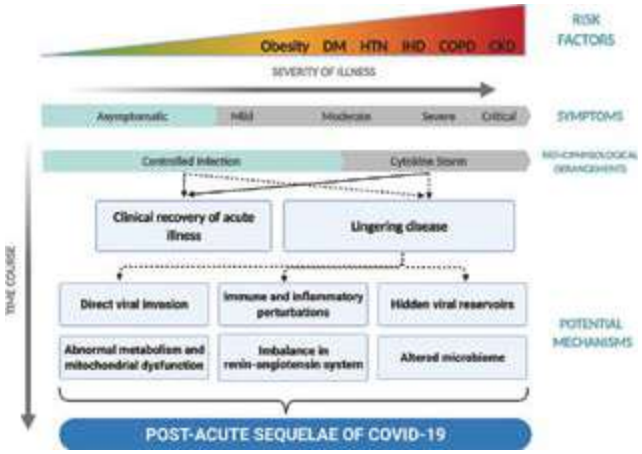

Table 1.

Fatigue, Myalgias (muscle pains), Joint Pains, Sleep difficulties, Anxiety
Palpitations, Tachycardia (high heart rate) Chest pain, Chest tightness
Headache, Smell disorder (especially loss of smell), Taste disorder, Dizziness
Hair loss, Rash, Low grade fever
Decreased appetite, Diarrhea, vomiting, sore throat
Persistent cough
Clots in legs or other parts of body

It is highly desirable to optimize the functional status of patients with PCS before the surgery involving multidisciplinary inputs from various other relevant specialties. Patients awaiting surgery are recommended to get vaccinated unless contraindicated, if possible, several weeks before planned surgery. Advise stopping of smoking, chest physiotherapy and probable use of bronchodilators, correct hydration status and control of blood sugar and treatment of complications of diabetes. Medications and/or doses of Antiplatelet and anticoagulants (blood thinners) will have to be altered for the period surrounding the surgery. A plan for resumption of these must be put in place.

A full detailed discussion of a comprehensive perioperative management plan is beyond the scope of this article. Advice to general public who have unfortunately suffered post Covid-19 or Long covid-19 syndrome:

1 Do not minimize the implications of your symptoms and the treatment [if you are on] on anesthesia and perioperative period.

2 Inform your Surgical and Anesthesia doctors of your post-covid19 symptoms as well as treatments you are on.

3 Understand that the knowledge of this entity is still emerging and hence its implications on various organs and systems of the human body are fully unknown currently. Therefore, a careful risk assessment for anesthesia and planning of its safe management is essential. And your involvement in this is significant.

4 Due considerations of above will be an influencing factor to determine the timing of your surgery, especially if it is a planned [elective], urgent or emergency procedure.
The American Society of Anesthesiologists and the Anesthesia Patient Safety Foundation recommend, for patients undergoing any planned [elective] surgery, a delay at least

a. 12 weeks for patients who had critical covid19 illness.
b. 10 weeks for patients with diabetes or hospitalized or immune-compromised
c. 6 weeks for symptomatic patients not requiring hospitalization
d. 4 weeks for an asymptomatic individual or person who had only mild non-respiratory symptoms.

Nevertheless, this decision will be influenced by the nature of surgery and potential risks of delaying the procedure, which should be discussed with the surgical and anesthetic teams [5].

Environmentally-Sustainable Anesthesia.
The Earth's mean surface temperature has been estimated to be approximately 1.1deg C higher as compared to pre-industrial levels and further rise (estimated to be more than 1.5 deg C by 2050) will make global adaptation to consequent changes difficult and less possible. Globally, healthcare contributes to about 5% of total global greenhouse gas emissions and other fractions of harmful air pollutants. Practice of Anaesthesia contributes to this especially due to the use of inhalational anesthetic agents (anesthesia drugs administered as gasses like Nitrous oxide, Desflurane, Sevoflurane etc); These gasses when released into the atmosphere directly contribute to global warming and cause ozone depletion. Operating theaters produce 25% of all hospital waste, of which anesthesia care contributes about 25%. Nitrous Oxide, a commonly used inhalational agent, is 230 times more potent as a greenhouse gas than carbon dioxide, takes 120 years to break down and contributes 0.1% to the greenhouse effect on the environment. Hence a Working Group of 45 Anesthesia providers was formed to agree on principles of environmentally sustainable anesthesia that are achievable worldwide. The Working Group recognized three fundamental directives:

1 Patient safety should not be compromised by sustainable anesthetic practices
2 High, middle and low-income countries, should support each other appropriately in delivering 'Green Healthcare (including Anesthesia)
3 Healthcare systems should be mandated to reduce their contribution to global warming.

They came up with the following seven principles that Anesthesia providers should practice:

1 Minimize the environmental impact of their clinical practice
2 Use environmentally preferable medications and equipment when clinically safe to do so.
3 Minimize the overuse/waste of medications, equipment, energy and water.
4 Incorporate environmental sustainability principles within formal anesthesia education
5 Embed environmental sustainability principles within anesthesia research and quality improvement programs
6 Lead environmental sustainability activity within their healthcare organizations.
7 Collaborate with industry to improve environmental sustainability.

On the same lines in their Guide to Green Anaesthesia a publication of the Association of Anaesthetists [UK] suggests Anesthetists on the same lines. Scientists suggest meaningful measures for all doctors intending to fight climate change in their article titled Ten practical actions for doctors to combat climate change.

The Centre for Sustainable Healthcare runs the Nitrous Oxide Project, Desflurane Reduction Project and Anaesthetic Gas Scavenging System Project towards combating environmental damage control. The practice of single-use medical devices was based on infectious risk due to pathogen transmission and was chosen by health care facilities over the past few decades; but there has been no scientific evidence to support this. On the other hand, greenhouse gases, energy consumption, water, amount of waste and raw materials of disposable medical devices are well demonstrated, besides financial cost. And a suggestion has been made to revert to use of reusable devices.

A long time ago, noble gasses like argon, xenon, krypton and helium were being investigated for use in humans. About 50 years ago Xenon was clinically tested and its safety and efficacy as an anesthetic gas was demonstrated to be unequaled. It is found to have remarkable Cardiovascular stability, neuroprotection, profoundly analgesic quality and a beneficial pharmacokinetic profile. In comparison to Nitrous oxide, Xenon appears to be environmentally safe; Xenon's relatively high cost has precluded its more widespread clinical use. These concerns are being dealt with technological developments in the delivery and recycling of xenon that will hopefully lead to a much less total gas to be used for each anesthetic.

Thus, Health Care systems throughout the world are working towards curbing the harmful effects on the environment resulting from their practice, and the Specialty of Anaesthesia is taking a very active role in achieving this aim.■

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Antiaging & Aging Healthy: The Science of Gerontology

"Aim To Live Heathy"

Dr. Ruchira Vasudeva
Dermatologist
YIACO Medical Center

Humans are in quest of the fountain of youth since times immemorial. Alchemists of ancient Chinese, Greek and Indian civilizations among others have fostered dreams of discovering the elusive magical elixir. What has changed in the recent decades is the leap of scientific research in fields of cellular and molecular biology, genetics and technology. As we understand the aging processes better we are attempting, more realistically, the goal of eternal youth.

Need for Anti-aging

Gerontology is a multidisciplinary science that deals with the various aspects of aging. Its aim is to increase the length of healthy life span, that is, life free of disease and debility. From year 1900 to 2010, population of 65 year olds and above in USA alone has increased from 3.1 million to 40.3 million. This, on one hand reflects the triumph of science, while on the other, increases the burden of diseases like cardiovascular diseases, cancer, type 2 diabetes and neurodegenerative diseases like Alzheimer's, in the aging population. Thus, a lot of people spend their last decades in misery, combating disease.

So far deemed inevitable, aging has now been declared by W.H.O. as a "treatable condition" as scientific re- search attempts to find a "cure" for it.

Why do we age?

One of the established markers of cell longevity is the length of telomeres. Telomeres are caps at the end of DNA molecules which keep them intact. Telomeres progressively shorten as we age and reach a point when they are unable to protect the DNA, which then uncurls and is destroyed.

There are other theories of autophagy and cellular death which may all contribute to cell demise.

The "somatic mutation" theory assumes DNA mutations in cells accumulate as we age and lead to cell destruction. "Wear and tear" and build-up of harmful substances deteriorate cellular function as well. "Immune reaction" theory suggests immune responses go haywire and start attacking the individual. "Cross linking" of collagen leads to stiffening and loss of elasticity of arteries, joints and skin. "Glycation" of proteins and lipids by simple sugars like glucose renders them nonfunctional. Ultimately, "oxidative damage" by ROS (reactive oxygen species) generated by cellular stress disrupts the cell function leading to inflammation and aging diseases.

How can we reverse and prevent aging?

Today most of us are aware that for healthy aging we should exercise regularly, eat healthy, get a good night's rest, restrict alcohol, refrain from smoking, attenuate stress and take care of mental health. Also recommended are regular health checkups and activities to improve cognition and delay mental decline. In a small group of patients, adopting a healthy lifestyle including plant based low fat diet, exercise, stress management and social support increased the telomere length by 10% in 5 years. Mediterranean diet and endurance exercises (walk, run, swim) in other studies have also been found to increase telomere length.

Calorie Restriction is emerging as a reliable way to prolong longevity. CR is a dietary regime that restricts total energy intake without malnutrition. CR inhibits TOR gene signaling and lowers protein turnover, increasing longevity as has been demonstrated in yeast. Rodents with lifelong CR in labs have a 60% more lifespan. Calorie restriction is also shown to increase lean muscle and reduce fat and body water, increase youthful soluble collagen and improve reproductive health, thus preventing and reverting senescence and its disease.

It is increasingly being recognized that targeting the aging process as a whole rather than treating individual diseases is a viable process. This means that someday a single intervention might be able to prevent decline in health and advent of disease. Various genetic, dietary and pharmacological interventions have been shown to increase life spans in yeasts, worms, flies, mice and even monkeys. Data from humans is still flimsy.

Lengthening of telomeres has been attempted through gene therapy. One of the approaches is to revive telomerase enzyme that elongates telomeres by injecting virus loaded TERT gene.

Cellular reprogramming introduces a group of genes into an aging cell to convert it into a stem cell, which is capable of growth and regeneration. Recently cellular reprogramming has reversed aging of retinal cells and restored previously lost vision in mice.

Besides gene modification, some nutrients, hormones and drugs are being projected as antiaging

interventions. Nicotinamide riboside (Niagen) is marketed as an NAD booster (NAD is a key player in cell energy generation). HGH (Human Growth Hormone) and IGF1 or insulin like growth factor play an important role in homeostasis and growth and have been the subjects of intense research. Antioxidants like Resveratrol, C60 Fullerine, Curcumin, micronutrients like zinc and copper, vitamins A, D and K as well as drugs like Metfomin, Aspirin, Rapamycin and Spermidine are some of the others. Though touted as safe and life-transforming, many of these claims are not yet backed by solid research.

More than 2000 genes have been associated with longevity and more than 400 compounds that can modulate lifespan are currently being researched. We would need incredible advances in human sciences before we can fully prevent human aging. However, there is reason for optimism more than ever before.■

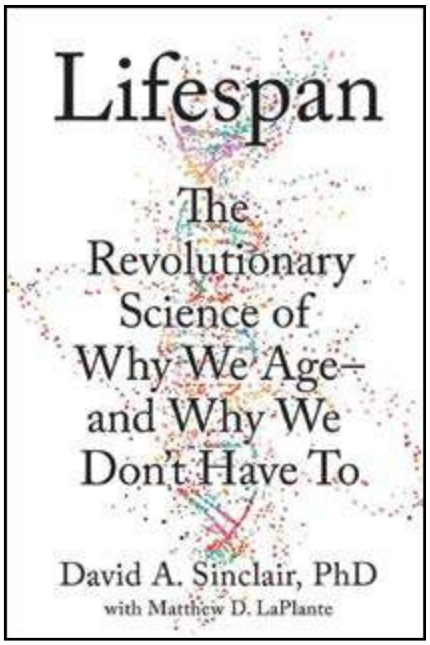
Suggested Reading

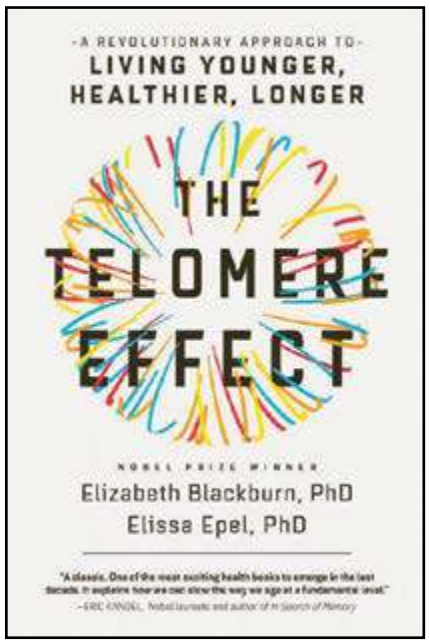
Britannica.com/science/aging life-process/anti-aging and longevity research

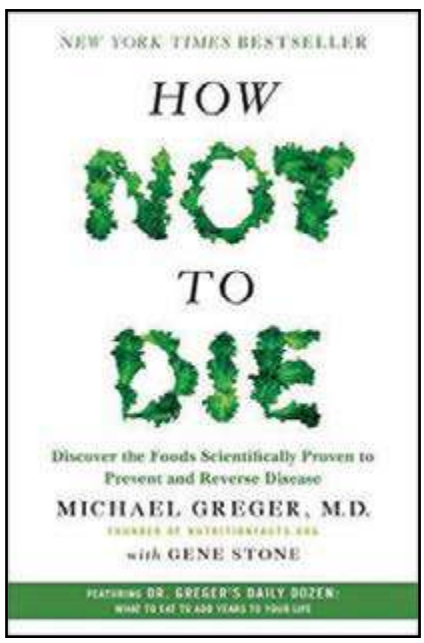
Harvard.edu/Gazette/2019/3/Anti-aging research: prime time for impact on the globe

Stem cells/Nov 2020/GATA6 regulates aging of mesenchymal stem/stromal cells

Aging Res Rev/Dec2019/Anti-aging gene therapy: Not so far away?







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Reconciling with The Ravages of Alzheimer's Disease

"Live Long Live Healthy"

Dr K.M. Sharfuddin
Neurologist
Ibn Sina Hospital

When brain functions decline over the years and one develops difficulties in autobiographical memory, struggles in problems solving, loses his way, can't plan nor achieve goals in life, especially after the age of 65 years, she or he may be stuttering their way towards Alzheimer's Dementia or Disease! (AD).

The Alzheimer's disease International estimates that there are over 55 million people worldwide living with Dementia and that; Alzheimer's disease is the commonest cause of Dementia. The incidence of this illness is increasing fast and it is estimated that by 2050 it could affect 139 million people worldwide, the greatest increase in the low and middle income countries.

Alzheimer's disease usually afflicts people more than 65 years of age and the incidence increases with age. More women than men are affected, likely because their lifespan is more.

They are brought to the Neurologist by their carers with the story that they are progressively misplacing things, forgetting their routines like missing appointments, forgetting to pay bills, forgetting names of objects and people and repeatedly asking the same questions!
They may start to forget their way to their destinations and gradually get confused about the topography of their own homes!

They lose their ability to set goals and cannot plan their completion. They may not be able to use daily instruments such as the remote of TV's, nor they would be able to use mobile phones.

Their Personality and Behavior could change and their language and vocabulary suffers. They may forget to write, read, draw, change their clothes or they would be able to use common essentials like toothbrushes, nail cutters, soaps, knives, spoons, etc:.

In short by this time they are fully dependent on their caregivers for all of their activities of daily living.

Eventually they may forget how to walk, how to chew and swallow food, and may become bedridden.
These attributes of Alzheimer's disease are terrible and mostly unfathomable.

The question is why? What is happening in their

brains? Can we prevent such disastrous events from occurring or at least can we postpone their onset! Let us analyze!

1. AD is a progressive Neurodegenerative disease and the most common cause of Dementia worldwide.

2. In those patients who carry the common Genetic mutation called APOE epsilon4, the risk of developing AD is 10 times more.

3. However there are another more than 30 genetic loci that have been currently identified which can lead to AD, when there are additional multiple risk factors.

4. Other risk factors are 1. Diabetes Mellitus.2. Hypertension.3. Obesity.4. Orthostatic Hypotension.5. Head injury.6. Depression.7. Stress.8. Coronary artery Bypass surgery.9. Age.

5. What is happening pathologically in the Brains of AD patients: Deposition of beta Amyloid in multifocal areas starting from those which control memory. Within the neurons there is alteration of TAU protein that starts to form clumps and proves to be toxic to them, leading to neuronal death.

6. Neurotransmitter deficiencies of Acetylcholine, Serotonin and Norepinephrine. All of these are essential for memory processing, learning, and well being.

7. Preventive Measures: a) Exercising the brain and continuing educational activities. (b). Physical fitness and regular physical exercise. ©. Control Diabetes, Hypertension, (d), Hyperlipidemia, (e), control Hypothyroidism and other Endocrinopathies. (f), stop smoking, (g), avoid Alcohol, (h), Mediterranean diet, (I), Maintain a normal sleep schedule of 8 hours per night. (j), Get Neurological evaluations if there is suspicion of Cognitive problems.

8. Pharmacological Treatment: US Food and Drug Administration has approved few cognitive enhancing therapies which increase the deficient neurotransmitters such as Acetylcholine, Norepinephrine and serotonin. For moderate AD there is an NMDA blocker which has been approved.These medications lead to modest symptomatic improvement and are not disease modifying.

9. In June 2021, injection Aducanumab, a monoclonal antibody with anti Amyloid beta activity was approved for early AD patients. These patients need an amyloid beta PET scan to document the abnormal protein deposition in the brain beforehand. It leads to removal of the abnormal beta Amyloid from the brain. However the clinical benefits of Aducanumab remain controversial.

10. There are other antiAmyloid drugs in the pipeline, such as Lacanemab, Gantenerumab, Donanemab, which are exciting steps in the journey to develop new treatments to slow down and stop Alzheimer's Dementia.

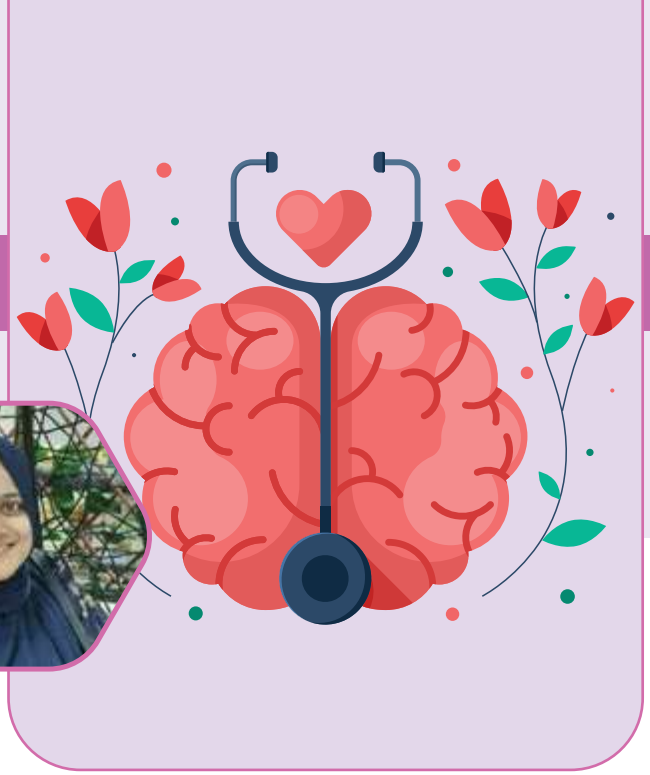
11. Neuropsychiatric manifestations associated with Alzheimer's disease, such as Depression, agitation, Psychosis etc; need full evaluation before management.

In conclusion: "We as a human race have to solve fathoms of dark clouds of uncertainties, in the management of human sickness and Alzheimer's disease is no exception".■

Mental Health and Substance Abuse

"The Chicken or The Egg First"

Dr. Jazla Safarulhaque
Psychiatrist
KCM Hospital



■ X, is a 19 year old boy, who is a brilliant student scoring A's in all his subjects. His parents send him to their native place for higher studies. Parents observed that there is a noticeable change in his behavior over the last 6 months. He is more isolated, sleep is disturbed, showing irritable mood and at times aggressive towards the family members and also academic decline. The parents suspect that he is taking some drugs but they are not sure about it. Above is a routine presentation in our Psychiatric Outpatient Department. The above boy is suspected to abuse some drugs but at the same time, he also has symptoms of mental disturbance which needs further evaluation.

Mental health problems and substance abuse can occur in the same person together or one after another. It is not necessarily that one is caused by the other. Many studies in the past have found out that the prevalence of mental disorders like anxiety disorder, Depression, personality disorder, ADHD and psychotic illness are common among people abusing drugs like alcohol, amphetamine, cannabis, heroin, nicotine and so on. Sometimes both the problems in the same person can be just simple co-occurrence. Below is the possible explanation for both the Mental disorder and Substance use problem occurring in the same person:

1.Individual with mental disorder may abuse drugs as a form of self-medication like

- Using alcohol to relieve anxiety and depressive symptoms
- Smoking nicotine to decrease hallucination and to improve concentration among schizophrenics
- Abuse of Alcohol to prolong the pleasurable state of mania.

Although some drugs may temporarily help with symptoms of mental disorder, overtime they make the symptoms worse.

2. Run in families: suggesting that certain gene may be risk factor

3. Substance abuse over the time can contribute to development of mental disorder by triggering changes in brain structure and function with no previous history of mental disorder.

Clinicians working in mental health settings often encounter patients who present with psychiatric complaints and heavy drug use .Abuse of Some drugs cause psychological problems for example, abuse of alcohol over the time can cause depressive state, amphetamine and cannabis abuse can cause

psychotic reactions. So it becomes difficult for the psychiatrist to know if the problem is due to drugs or the patient's previous mental condition. There is some evidence suggesting that a person has a mental disorder even before the onset of drug abuse.

- Onset of psychological problems before the use of drugs
- Persistence of psychological symptoms even after stopping abusing drugs or during extended periods of abstinence from the drugs.
- Family history of psychiatric illness

Y is 45 years old, male, taxi driver, married, Indian. He is diabetic and hypertensive with a history of excessive use of alcohol, he has alcohol related physical complications like fatty liver. He was brought by wife with complaints that her husband being very suspicious about her, he is constantly checking on her and sometimes aggressive with her and children. He has numerous job changes and now he is sitting at home watching on her. He has erectile dysfunction on evaluation and history suggestive of family history of bipolar disorder.

The above presentation is an example of how individuals with both problems are associated with poor outcomes.

OUTCOMES OF BOTH PROBLEMS INCLUDE:

1.Risk of relapse of psychiatric illness
2.Risk of relapse of drug abuse after abstinence
3.Repeated hospitalization
4.Suicide, violence
5.Medical complications
6.Family problems
7.Economic burden

Clinicians working in mental health setting should be suspicious of drug abuse if any patients presenting with, Medical problems associated with drugs (GI conditions, HIV, HCV, High uric acid, liver disease, macrocytic anemia).There is past history of substance abuse, Family history of substance abuse, Chronic pain complaints, Numerous job changes, Multiple relationship problems and Legal problems. The above is also a warning to the general public that any person with the above problems, the possibility of drug abuse to be kept in mind.

Few challenges of Psychiatrist

- Stigma and discrimination among the general public making someone's mental health problems worse and delay them from getting help.
- Lack of knowledge, negative attitude and beliefs about mental health problems.
- Teaching the public about the symptoms of mental health problems and getting help at the earliest as earlier the treatment better the prognosis.
- Teaching the adverse effects of abusing drugs
- Teaching the public that the youth are vulnerable for both problems.

Any person can be sad, irritable, worrying, stressed, suspicious, overthink and so on. These are common emotions that we are going through as a normal person. But if the emotions are not in your control and are affecting your overall functioning and productive life, causing problems at work and home, social relationships, academic deterioration, family relationships that means that the person needs help and that too at the earliest.

First priority of treating any such patients is abstinence, that is stopping the use of drugs that they are abusing. Some patients need admission in hospital, as the withdrawal symptoms from drugs may be severe. After detoxification, then we treat the underlying illness. It is important to follow up and monitor a patient's course, because usually symptoms and signs of drug use usually resolve within the first 2-4 weeks of abstinence. If the symptoms are persisting even after prolonged abstinence there is a possible primary mental disorder.

Given a high rate of co-occurrence and association with poor outcome. It is mandatory that a careful psychiatric assessment must be conducted in any person with substance use problem. At present scenario, presence of both problems is an expectation and not an exception.■

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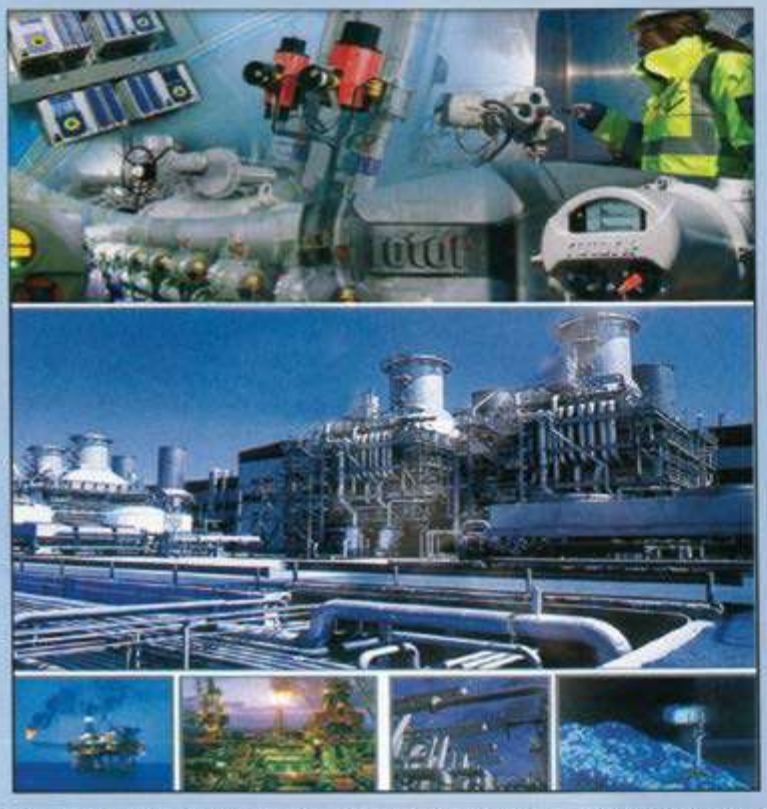

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A Wonderful World

From the Associate Editor's Desk

Globalization has shown potential positive impacts by minimizing the gaps in health inequalities between rich and poor, the South and North. Thus, it is improving healthcare for all. It has its disadvantages as well, like the rapid spread of diseases among nations.

The focus of this section of the 18th volume of Indian Doctor's Forum (IDF)Health Guide-2023 covers contemporary topics relevant to the surgical and allied health challenges in the advancement of science in the coming decade.

All Topics have been chosen by our own doctors keenly interested in helping the non-medical expatriate and Kuwaiti diaspora in gaining general knowledge. The articles are written in simple and lucid language. These authors have vast academic and clinical experience in their respective fields. This makes it easily understandable and beneficial to the readers.

Some of the important topics of my section like Plastic Surgery: Past, Present and Future, by Dr Amit Bhatnagar, Challenges in eyecare from 2000 to 2030 by Dr. Niranjan Kumar, Technology and hearing loss by myself, Role of Robotics in the field of Cardiology and Cardiothoracic Surgery by Dr. Christus Singh Thomas, Challenges in management of knee pain by Dr.Srikanth Gollamudi, Cancer treatment –challenges and role of artificial intelligence By Dr. Susovana and on the topic of Cardiac Surgery by Dr. Gaurav, are highly informative for both the medical fraternity as well as others.

We have taken the utmost care to present the current facts, yet the regular updates due to a process of continuous research has baffled even the medical community when new things evolve so quickly in time. In the coming decade we expect even more changes with the advent of a rapid progress in Artificial Intelligence (AI). The future is unknown and nothing should surprise us if we will be governed by AI in making our decisions in diagnosis and management of disease.

However, as is said "Behind every successful man there is a woman", so also "Behind every AI advancement there will always be a human hand and brain". With this introduction I leave it for the readers to enjoy our Health Guide, wishing them good health.

Dr. Imtiyaz Nawaz

SURGICAL & ALLIED HEALTH CHALLENGES

SECTION THREE

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Technology and Hearing Loss

"Technology To Our Help"

Dr. Imtiyaz Nawaz
ENT Surgeon
Farwaniya Hospital.

■ Spending our life plugged into our iPods, iPhones and music players may make us feel like dancing in the streets, but it can take a toll on our ears. Between televisions, computers, smartphones, and music listening devices, most of us are usually surrounded by noisy modern technologies 24/7. In addition to constant exposure, we are often guilty of listening to our devices at far too loud a volume. Earbud use can cause hearing loss and tinnitus (ringing in the ears). The sensitive hair cells in our inner ear never grow back once they have been damaged.

According to the CDC, the maximum volume level for personal listening devices like radio, stereo, or television, is generally between 105 to 110 decibels. For reference, the CDC notes that noises above 85 decibels may begin to damage your hearing after a period of time, while noises above 120 decibels can cause immediate harm to your ears. At 105 to 110 decibels, hearing loss is possible in less than 5 minutes.

Thus, if you max out the volume on your device, you can experience hearing loss in less than 5 minutes!

In 2015, the World Health Organization reported that nearly 50 percent of teens and young adults between ages 12 to 35 were exposed to unsafe levels of noise from their personal music players and smartphones. Other studies have found a significant increase in young people with hearing loss compared to previous decades.

Several years have passed since those studies were performed and personal listening devices and smartphones have only grown in popularity. The technologies mentioned are common among all age groups, and as we plug in and boot up our devices, we need to be aware of how they affect our health.

Why does hearing loss occur due to loud sounds?

Exposure to loud noises overworks the hair cells in the inner ear. If you've ever been exposed to loud

noise and then heard ringing in your ears or had difficulty hearing afterward, the hair cells in your ear have been overworked. Sometimes, the hair cells recover and your hearing returns to normal, but that's not always the case.

When exposed to excessively loud sounds, the hair cells, at some point, will be damaged or destroyed. It's also possible for damage to continue occurring even after the noise has stopped. The end result is hearing loss.

How can we stay safe when using technological devices?

The easiest way to prevent hearing loss from your smartphone or listening device is to be mindful of the volume. You don't need to listen to music, television, or podcasts at a loud level to enjoy them. Many a times we have heard someone else's music even though they were wearing headphones or earbuds! That means they were listening to the device far too loudly.

If background noise is interfering with your ability to hear, move to a quieter area or turn off the device until you can appreciate your entertainment in peace. Do not compete with a noisy environment by sliding the volume knob up!

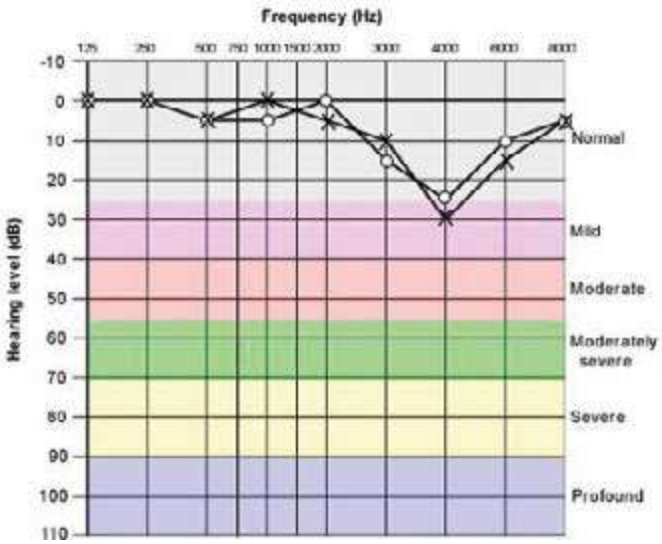
Also, we should take regular breaks from noise exposure to give our ears a rest and allow them time to recover.

If you are in a public place, like a music venue, and the music is blaring, use a form of protection, like earplugs, to safeguard your hearing. Earplugs are readily available, and you can keep them stashed in your vehicle, your purse, or even in your pocket so you can pop them in, if you need them.

What do we do if we've already y been exposed to loud noises?

Familiarize yourself with the first signs of hearing loss. If you are experiencing any of the below symptoms, you may have damaged your ears.

- Difficulty hearing in noisy areas. You may have a hard time understanding your dining companion in a busy restaurant or shopping area.



- Difficulty hearing high-pitched sounds. You may miss the ring of your telephone or leave a guest waiting outside because you didn't hear the doorbell. You might be late to work because you slept through your alarm clock, and voices in higher ranges may become more difficult to comprehend.
- Phone conversations may be more bothersome. You may need to ask the person on the other end of the line to repeat themselves often.
- Sounds may seem muffled to you, or you may experience ringing in your ears.
- You may begin experiencing hypersensitivity to certain sounds. The sounds may even become painful for you to hear. This condition is called Hyperacusis, and it may be a sign of injury to your ears.

It is important to know that the above signs mean you may have suffered damage due to loud noise, a condition called noise-induced hearing loss.

However, you don't have to wait for signs of damage to take action. Your doctor can examine your ears and test your ability to hear at any time.

If an exam or test shows that you have suffered damage, a hearing aid may be able to help you to hear again. If you have not suffered any damage yet, be careful to keep the volume lower henceforth and use hearing protection when in loud areas.

Solutions and Prevention/ Our recommendations:

- Turn it down. If other people can hear the music from your earbuds or headphones, the music is loud enough to damage your ears.
- Limit exposure. Brief exposure to the loudest sounds can cause damage, but even more moderate noise experienced on a regular basis can lead to damage. According to an article from Stony Brook University School of Medicine, just one hour a day of listening to your earbuds at level four could cause permanent damage.
- Give your ears a rest. Hearing loss is a huge loss, protect your important tool.
- Life is worth listening to, wear hearing protection(earbuds) to protect your hearing power! Hearing protection is a sound investment for hearing safety.■

It's a noisy world, protect your hearing

Bionic eye implant enables blind UK woman to detect visual signals

Breakthrough offers hope of restoration of sight to people suffering vision loss because of dry AMD.
An 88-year-old woman has told of her joy at becoming the first patient in the UK to benefit from a groundbreaking bionic eye implant that enabled her to detect signals for the first time since going blind.

The woman suffers from geographic atrophy. The condition is the most common form of dry age-related macular degeneration (AMD), which affects millions of people worldwide and can cause loss of sight.

The breakthrough, which experts say offers hope of restoration of sight to people suffering vision loss because of dry AMD, involves a revolutionary chip that was implanted behind her blind left eye. Hi-tech camera glasses she was given to wear this week captured the scene in front of her before relaying the data to the implant that sent an electrical signal to her brain – just like natural vision.

The implant works by surgically inserting a 2mm-wide microchip under the center of a patient's retina. The patient then wears special glasses, containing a video camera that is linked to a small computer attached to their waistband.
The chip captures the video provided by the glasses, and in turn transmits this to the computer, which uses artificial intelligence algorithms to process the data and guide the focus of the glasses.

The glasses then project this image as an infrared beam back through the eye to the chip, which transforms it into an electrical signal that travels back through the retina cells and into the brain. The brain then interprets this signal as if it were natural vision.
The guardian

The implant works by surgically inserting a 2mm-wide microchip under the centre of a patient's retina.
Photograph: Moorfields eye hospital

Contributed By: Dr. Piyush Bafna

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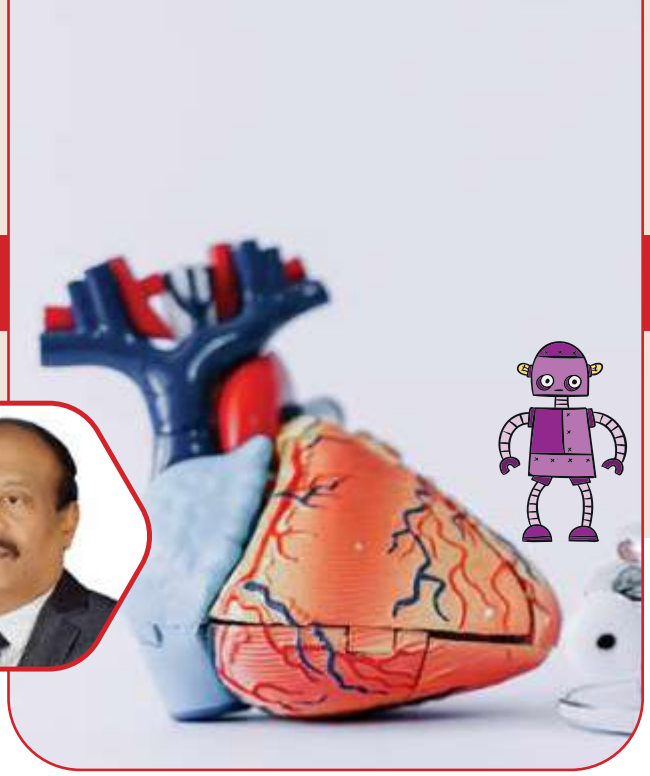
Role Of Robotics In Cardiology

"Behind A Successful Robot There Is Always A Human Hand"



Dr. Christus Singh Thomas
Cardiologist
Chest Diseases Hospital

What are robots?

Robots are electromechanical machines that can be used to perform repetitive or dangerous and skillful tasks in the place of humans and in a more efficient and skillful manner.

Are robots being used in Medicine?

Robots have been used in the field of Medicine since the mid-1990s.

What about the use of Robots in Cardiology and Cardiac Surgery?

Robots are being increasingly used in Cardiology, particularly in Cardiac surgery.

Robots are being evaluated in Cardiac surgery, endovascular surgery, Percutaneous coronary interventions and in the treatment of heart rhythm disorders (electrophysiology).

What are the treatment options available using Robots in the field of Cardiology?

Following are the options in Cardiac surgery: Coronary artery bypass graft surgery, Heart valve replacement or repair surgery, excision of cardiac tumors (new growths) and closure of holes (birth defects) in the heart. In electrophysiology it is being tried in the treatment of irregular heart beat (atrial fibrillation). In percutaneous coronary artery interventions, it is used in treating blocks in the coronary arteries using balloons and stents.

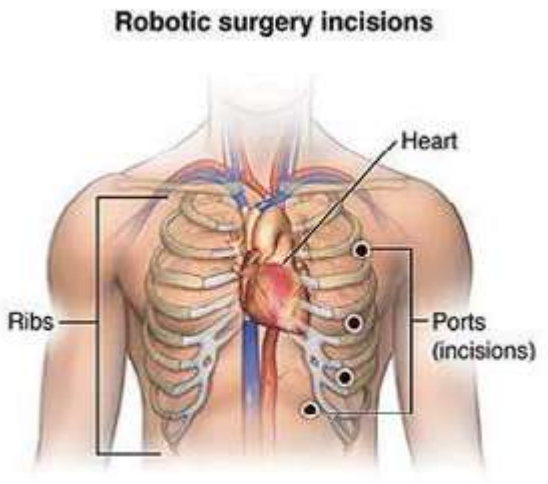
What are the components of a surgical robot?

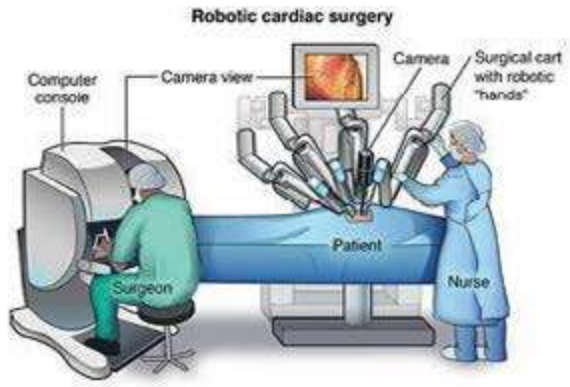
The main components of a surgical robot are the following; 1) surgical arm: This has tiny instruments with wrists at the tip. 2)special camera: The camera provides an enhanced magnified view of the surgical area.3) surgical console: This is the workstation where the surgeon controls the instrument and camera's every move.

How exactly is cardiac robotic surgery done?

Surgery is done under general anesthesia.

Instead of the traditional large incision, multiple small key hole size incisions are made. Through these incisions the surgeon places ports (thin tubes). Robots are attached to these ports and the instruments are placed through them. A long thin camera (endoscope) is inserted through one of the ports and provides high definition images in 3D during surgery. Surgical instruments are placed through other ports which allows the surgeon to do the operation. Surgeon controls the robotic arm while sitting at a console (control station) a few feet away. After the completion of the surgery the instruments are removed and the small wounds are closed.





What are the advantages of robotic heart surgery?

The surgeon doesn't have to cut open the breast bone (sternum). Only multiple small incisions (cuts) are made. Consequently, there is less pain during recovery and the recovery is very fast. Similarly, the risk of infection is less. There is reduced blood loss. Hospital stay is very short and the scars are small. There is greater precision during surgery as the movement of the robotic arms are more exact than with a human hand. Better visualization is achieved due to the fact that 3 D capability of the image is superior to the naked eye.

Are there any risks or disadvantages of robotic Cardiac surgery?

Overall risks in robotic cardiac surgery (RCS) are much less compared to open heart surgery (OHS). RCS still requires anesthesia and as with any kind of heart surgery there are risks of heart rhythm disorders such as heart block, stroke, infection and death. Disadvantages are that RCS is done only in special centers which can afford this technology. Surgeons need to be trained specially for RCS. There is a possibility of conversion to open heart surgery if required. There is risk of nerve compression or damage. Fortunately, robotic malfunction is extremely rare.

Why are robotics not commonly used in interventional cardiology?

Although the interventional community is aware of the potential hazards of exposure to higher X Ray doses by working close to the patient, there has been hesitancy to accept robotic technology due to concerns about learning curves and higher cost.

What is the future of robotic cardiac surgery?

Robotic technology offers an exciting alternative to conventional surgery. However, it would need to prove itself as non-inferior to conventional surgery with regard to the short and long -term outcomes in research (randomized control trials). Then it would further need to prove itself as an economically viable option.■

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Challenges In Eyecare From 2000 To 2030

"Our Vision is Brighter For 2030"

Dr. Niranjan Kumar
Ophthalmologist (Vitreoretinal Surgeon)
Al Bahar Eye Center, Ibn Sina Hospital

■ Eye care is an important part of global health care. People can have varying degree of visual impairment. Visual impairment or blindness can have profound effects on a person's livelihood and mental wellbeing. Take an example of a driver. If he becomes blind due to any reason, he will lose his job.

World population is estimated to be 8 billion currently. People with visual impairment are approximately 2.2 billion. Adequate measures could have prevented blindness in nearly half of this population. There are many factors responsible for this blindness burden on the society like economic inequality lack of awareness, lack of access to health care etc.

Common causes of blindness and visual impairment include cataract (safedmotia/ motiabindi), glaucoma (kalamotia/motiabindi), uncorrected refractive error, age-related macular degeneration, diabetic retinopathy, corneal opacity, and trachoma. These causes vary from region to region in the world. Incidence of different diseases also is changing from time to time. Trachoma was once prevalent in many countries and was one of the leading causes of blindness. This is not the case now. Diabetic retinopathy was not so common before but now the prevalence is increasing across the globe with changing lifestyle. Myopia (nearsightedness) was common in Japan before but now it is common everywhere.

This poses a challenge to the policy planners. They need to continuously monitor the changing pattern of the diseases, allocate funds adequately and improve health care access for the affected population.

Technological advancements have improved the outcome of diseases, but it also brings challenges to hospitals and doctors. Hospitals must keep on investing in newer technologies. This raises affordability issues. Doctors must keep on updating their knowledge and acquiring new skills. We take the example of cataract surgery. In the year 2000, the commonest procedure was extracapsular cataract surgery in most parts of the world. This needed minimum instrumentation. It was very affordable too. Now the standard of care for cataract surgery is phacoemulsification with implantation of foldable intraocular lens (IOL). It gives better outcomes, quick recovery, and prompt resumption of work. However, we need a good operating microscope (Fig. 1),

phacoemulsification machine (Fig. 2) and foldable IOLs. There are disposable surgical packs for each surgery. Then there are expensive premium IOLs. It warranted lots of investment for the hospitals/ doctors/ governments. Doctors must get trained for these newer technologies. Patients with diabetic retinopathy can have diabetic macular edema (swelling on the back part of the eye). Standard of care now for this condition is to give intravitreal injections. It is mostly given monthly. This causes economic challenges to patients, but it is a logistic nightmare for the hospital and care givers. Other problems with diabetic retinopathy are bleeding inside the eye and tractional retinal detachment. Vitrectomy surgery may help patients with these problems, but it needs lots of equipment (operating microscope, vitrectomy machine, laser machine, microsurgical instruments, silicone oil, heavy liquids, gasses etc.). Myopia can be corrected by refractive surgery, but it needs an expensive Excimer Laser machine (Fig. 3). On top of this, technology keeps on changing frequently. So, hospitals/doctors must change their surgical machines quite often. It involves cost and re-training.

Governments also must build infrastructure, equip them with current machines and trained manpower. Finding skilled human resources takes time and now-a-days attrition rate is also high. Issue of supply chain is also there for medicines and surgical supplies.
Exciting newer developments are taking place. By 2030, we may not need cataract surgery. Cataracts may be dissolved by injectable medicines. Age related macular degeneration may be reversed by topical medications. Bleeding and fibrosis may be dissolved by injections.

So, there is hope amidst all these challenges. ■

Suggested reading:

1. Flaxman SR et al. Global causes of blindness and distance vision impairment 1990–2020: a systematic review and meta-analysis. Lancet Glob Health 2017; 5: e1221–34.
2. Ramke J et al. Grand Challenges in global eye health: a global prioritization process using Delphi method. Lancet Healthy Longev 2022; 3: e31–41.

Figure 1: Operating microscope (Used for ocular surgeries such as cataract or vitreo-retinal surgeries. It provides excellent view of the structures being operated on.)

Figure 2: Phacoemulsification machine (Used for cataract surgery through a small incision)

Figure 3: Excimer Laser Machine (Used for refractive surgeries with extreme precision and safety)

Figure 3

Figure 2

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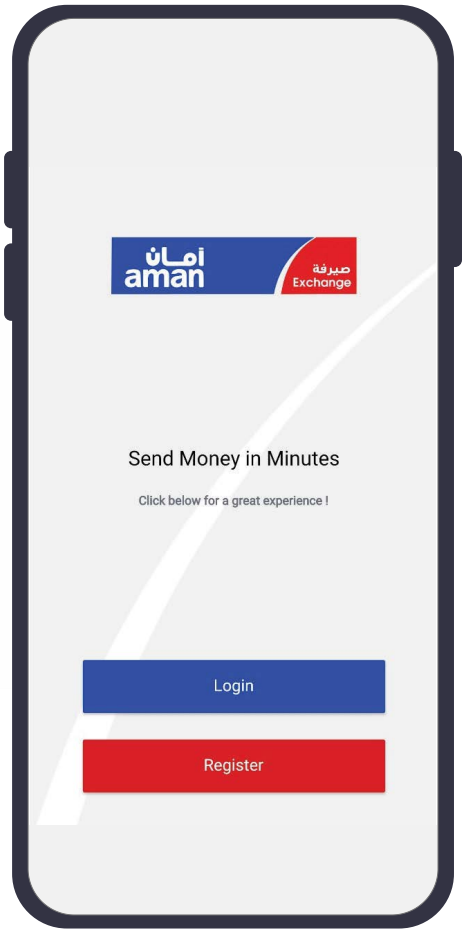

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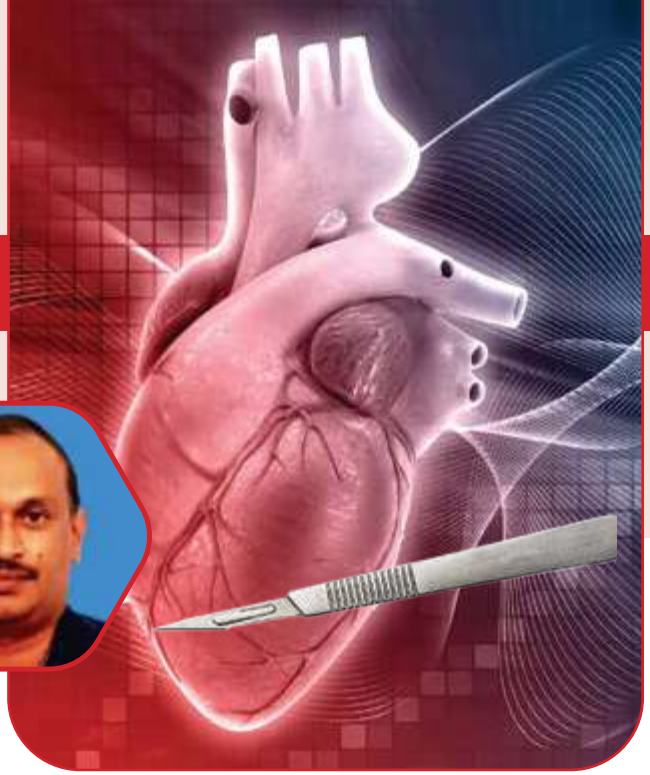
Global Challenges For Cardiac Surgeons

"Hard But Rewarding"



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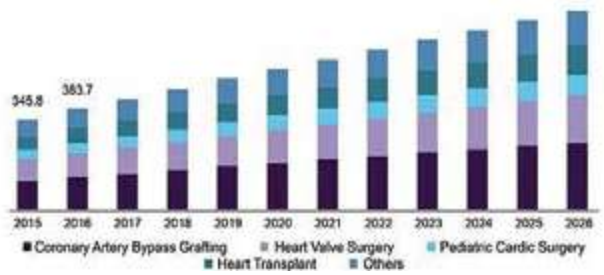
Cardiac Surgeon
Chest Hospital

We have nearly reached the 8 billion mark and needless to say with that the incidence of heart ailments in both adults and children has increased.

The number of people requiring treatment for conditions like coronary artery disease, valvular heart disease and congenital heart defects has shown a definite increase around the globe.



In adults, coronary artery disease has increased many folds with the disease now affecting younger age groups which is primarily attributed to high levels of stress, a sedentary lifestyle, unhealthy food choices and comorbid conditions like hypertension and diabetes. Valvular heart disease has shown an upward trend due to increasing longevity and increasing population of lower socioeconomic strata. An increase in the incidence of congenital heart defects might possibly be due to earlier and more accurate diagnosis assisted by better diagnostic tools in both pre and post natal period Cardiac surgeons all over the world face multiple challenges in treating patients, which involves a detailed discussion with the patient enabling them to understand the need for surgery and its various intricacies and the substantial financial implication of the same.

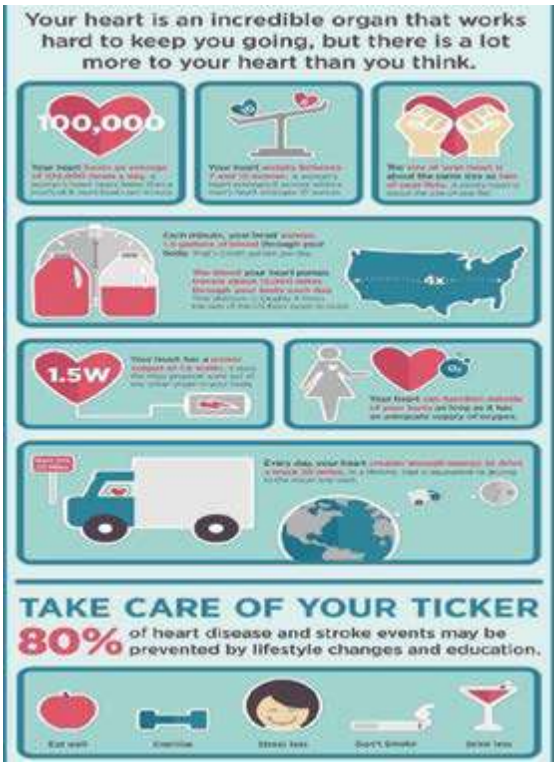
As an attempt to elaborate more on this issue and the challenges we face; when we first make our acquaintance with the patient, there is already a great degree of anxiety on his part regarding the procedure he needs to undergo. As surgeons we face a need to skilfully allay their fears while also making them understand that cardiac surgery is never risk free as the heart is the primary organ needed to support the whole body, and yet surgery would be the best option for them compared to a nonsurgical alternative which no doubt will have its own risk factors. A careful deliberation is a must when they are explained that the recovery process can differ in each person and each body reacts to a surgical procedure differently Very often many patients express concern about the recovery time and return to work. In most cases, work can be resumed in approximately 2 or 3 weeks if it's a sedentary job or about 6-8 weeks if its more physical

labour. It must also be stressed to the patient that a successful outcome to surgery only constitutes half of the recovery process and the other half involves lifestyle changes to prevent further disease in future.

A major deterrent to open acceptance of cardiac surgeries by the patients is the financial burden of the surgery. In order for them to accept that, it might be prudent to spend some time explaining the factors that contribute to the expense like preoperative & postoperative stay, long hours in the OT with multiple skilled personnel, expensive instruments and Intensive care stay. Many countries now have government schemes that support cardiac surgery. Although applauded for their foresight most of these schemes don't meet the expenses and as a result most hospitals are not willing to adopt these schemes. The surgeons themselves face myriad challenges both emotional and mental. It would suffice to say that his other requirements are many, like a skilled cardiac anaesthetist, a team of trained cardiac nurses, a cardiac intensivist and technical support (perfusionist) for the heart lung machine. Putting together a superlative cardiac team is no mean feat and it is this team that changes lives.

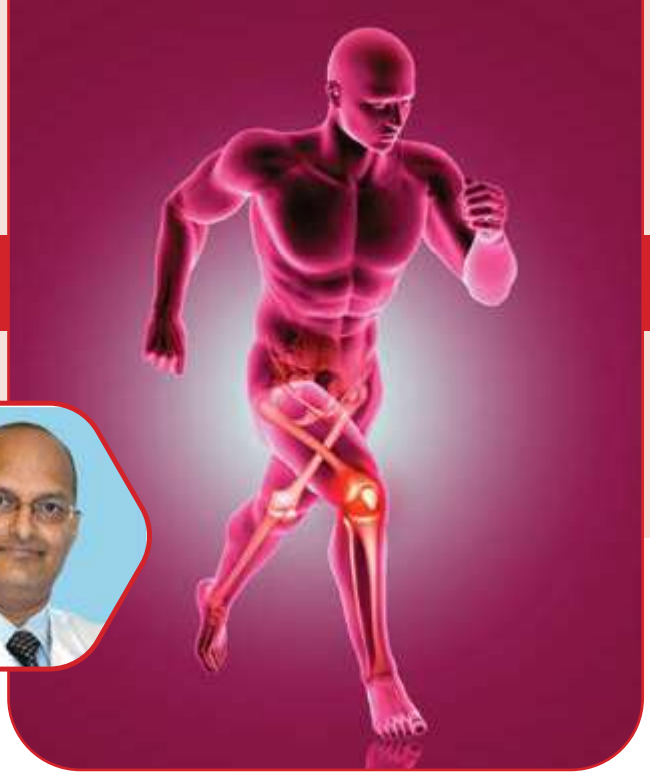
It is a common misconception that the brand of the hospital determines the outcome of Cardiac Surgeries. Although they have a big supportive role to play in providing the infrastructure, the determining factor is a fantastic core cardiac team. That said, unless the infrastructure is good, cardiac surgery cannot be performed.. The good news is that a lot of smaller hospitals also provide an excellent support system, but in many poor countries this is a major concern.

Surgeons have overcome the hurdle of complications like bleeding and infection by following stringent protocols. Different surgical approaches have reduced the incidence of strokes in the older age group. Competent anesthesia and icu teams have reduced lung and kidney problems in patients with co morbid diseases. Overall risk averages from 1.8 to 2.3 percent ,and is reducing with advances in surgical protocols and improving standards of care,a very small number for a major life saving procedure. The extraordinary skill level required, the mental and emotional strength, dedication and outstanding leadership qualities they possess are what make cardiac surgeons stand apart from other surgeons and are solely responsible for changing the lives of countless people, both adults and children giving them the gift of a better and healthier future.■



Challenges in Management of Knee Pain

"We Bear Your Weight, You Care For Us"



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Al Seef Hospital

Knee pain is the ubiquitous consequence of bipedal gait. The causes can be inflammatory and mechanical. In this article, I will focus on the mechanical sources of pain and its management. Knee pain can be experienced at all ages and for different reasons. Injuries and sports trauma happen in younger age groups and degenerative pain in the elderly.

The main causes of pain in the younger age group are mostly due to injuries of the ligaments, meniscus and cartilage. With increasing adoption of sports/exercise/fitness regimes, there is bound to be an increase in such injuries. The most common injury in sports is meniscal tear, anterior cruciate ligament injury or a combination of both.

Meniscal Tear: Meniscal architecture is designed to spread the load evenly across the flat tibial surface avoiding point loads on cartilage surface. A tear disrupts this function and is a source of pain on twisting motion. Treatment involves mainly a resection if the tear is more towards the thinner/inner aspect which is avascular. The peripheral more vascular tears are amenable to repair. Retention of meniscal tissue is important within the scope of vascularity/repair potential to preserve its function. Neglect of small initial tears may lead to tear propagation with the next twisting load injury. This may entail resecting a larger amount of meniscal tissue. A more devastating meniscal injury is the bucket handle tear. This is a large flap of meniscus which lifts off like a bucket handle and may be incarcerated in the intercondylar notch and may result in knee locking. Most bucket handles are repairable and need to be done as soon as possible. Meniscal repairs have been found to be more successful if done along with ligament reconstruction. Isolated meniscal repair outcome has been improved when combined with a microfracture/blood clot augmentation.

Takeaway: do not neglect a meniscal tear

Ligament Injury: Ligaments give stability to the joint. Knee has four- medial/lateral collateral, anterior/posterior cruciate ligaments. Together with menisci, they stabilize a fairly unstable joint of a near spherical femur on a relatively flat tibial surface. The commonest type of injury is a tear of the anterior cruciate / medial collateral ligament along with a medial meniscal tear (unhappy triad of O'Donoghue). Football, rugby, kabaddi and rarely volleyball are some of the sports that cause this type of injury. This type of severe injury usually results in

early surgical intervention and good results.

It is the neglected isolated anterior cruciate ligament injury which is usually the conundrum. It is not severe enough for the patient to show urgency in seeking treatment. Some isolated cruciate ligament injuries can be treated non operatively with the caveat that the patient maintains good quadriceps and hamstring strength. The goal here is to avoid a meniscal tear. But if the cruciate injury is diagnosed with a meniscal tear, it needs immediate reconstruction as the main focus is to retain as much meniscal tissue as possible.

The other important point to remember is the damage to cartilage sustained when the anterior cruciate is torn. The injury to cartilage may not be macroscopic in many cases. But with repeated episodes of instability there is increasing damage done to the cartilage. This may explain the incidence of osteoarthritis even after cruciate ligament reconstruction.

Takeaway: Isolated cruciate injury need not be reconstructed in select individuals with good muscle strength and no obvious rotatory instability. Early reconstruction prevents further damage to meniscus/cartilage which is of paramount importance for the longevity of the joint.

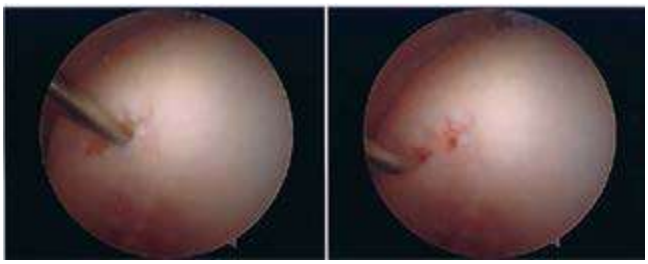
Cartilage injury:

Occasionally a patient presents with a cruciate injury and a cartilage defect which may be the result of the instability.

Cartilage defects can be assessed with special MRI sequences optimized to visualize cartilage. Further visual assessment needs to be made on arthroscopy. Surgical treatment depends on the size of the defect. Small defects up to 4 cm 2 can be treated with a Hungarian technique -mosaicplasty (Fig 1)- cylinders of bone with good quality cartilage are harvested from the non-weight bearing portion and transferred to defect.

Large defects more than 4 cm 2 may be treated with either microfracture or cartilage cell implantation. Microfracture (Fig 2) is a type of marrow stimulation technique which causes pluripotent cells to form a fibrocartilage-like layer. This is invariably soft and does not last long.

Fig 2. Small medial femoral defect in a 32 year old with partial menisectomy



Autologous cartilage cell implantation on the other hand provides excellent hyaline cartilage cover. In this technique, a small amount of cartilage is harvested, sent to the lab and chondrocytes are increased to 20-50 times(4-10 million chondrocytes) in a lab. They are placed, 6 weeks later, in the defect under a periosteal flap (originally described in Sweden) or more recently in a collagen matrix which is glued to the defect.

Takeaway: cartilage defects need aggressive management to avoid long term consequences, especially in the young.

Degenerative Pain:

Anyone above 45 years may experience this sort of non-specific pain. If aggressive investigation does not reveal any specific cartilage defect or meniscal tear as the source of pain, then management mainly focuses on weight reduction, build-up of muscle strength, regular non -impact exercises and analgesics.

Analgesics especially of the non-steroidal variety may impact renal function if taken for long periods. A judicious mix of NSAIDs for short periods and long-term paracetamol or weak opioid analgesia may be preferred.

Intra Articular injections of hyaluronic acid especially the high molecular weight type have been shown to have some effect in relieving pain for varying periods with negligible side effects. Platelet rich Plasma injections have also been shown to have pain relief with inadequate evidence. PRP preparation is quite varied with an inconsistent quantity of platelets. This may be the reason for the variability in response between different types of preparations, muddying the evidence.

Intra-articular steroid injections, while very effective in inflammatory conditions, should be reserved for end stage arthritis. Occasional injections may not have deleterious side effects on the cartilage that is not yet worn away. They are very effective for short to medium term pain relief. Ideally, they should be avoided in the three months prior to a planned knee replacement surgery due to an increased risk of infection.

Several procedures exist to prolong the life of an arthritic joint like High tibial osteotomy and Partial Knee Replacement.

High Tibial Osteotomy (HTO)

The common type of arthritis is varus where the lateral compartment is relatively well preserved. In such knees in the younger age group, instead of a total joint replacement, a high tibial osteotomy (Fig 3) can be considered with some caveats. The deformity should not be associated with instability or fixed flexion or varus deformities or inflammatory arthritis.

Fig 3. Pre/Post op HTO in 45 year old with bilateral varus knees operated one year apart with follow up alignment xrays showing 1-2 deg valgus alignment

The correction of the varus deformity with this medial open wedge osteotomy results in load transfer to the lateral compartment. With this a total knee replacement may be postponed by 10-15 years.

Valgus knees can be similarly treated with closed wedge supracondylar femoral osteotomy.

Uni-condylar Knee Replacement (UKR)

The alternative to HTO is UKR (Fig 4) where the medial compartment is replaced. The caveats remain similar to HTO. The result is often better pain relief and function as the offending degenerative compartment is replaced. These however require careful patient selection and specialist surgical training. Registry data from UK and Norway show very high survivorship rates of up to 20 years.

Fig 4. 51year old (2008) with medial OA with bilateral Oxford mobile bearing UKR
Lateral compartment UKR does not have the same success rates as medial UKR.

Total Knee Replacement (TKR)

TKR remains the operation of last resort and has been quite successful with survivorship of 15-20 years when well done and patient satisfaction rates of 90-95%. Survivorship depends on the type of polyethylene insert, alignment and soft tissue balance. Accuracy of the operation is enhanced when done with patient specific instrumentation/ implants and navigation/robotics. The longevity of the poly used in the insert has been enhanced by Vit E doping or crosslinking or a ceramised femoral component with an oxidized zirconium-niobium layer to reduce the coefficient of friction. Ceramic femoral implants are yet to become widely accepted due to lingering concerns of catastrophic fracture failure.

The choice of implants is also important. With the availability of the Orthopaedic Data Evaluation Panel (ODEP) database in the UK, surgeons are encouraged to use only those implants with a minimum 10A rating – i.e. good evidence of survivorship. There are several joint registries around the world. The earliest is the Swedish registry. Data from the Scandinavian, National Joint Registry(UK) and Australian registries have been very helpful in flagging implant failures early. The United States is an outlier as it does not have a nationwide comprehensive joint registry despite doing the maximum number of joint replacements. The presence of such comprehensive registries improves surgical practice and patient outcomes.■

Takeaway: With advances in ligament/cartilage surgery, the joint surfaces can be protected far longer.

New malaria vaccine is world-changing, say scientists

A malaria vaccine, R21, with "world-changing" potential has been developed by scientists at the University of Oxford, trials showing up to 80% protection against the deadly disease.
The charity Malaria No More said recent progress meant children dying from malaria could end "in our lifetimes".
It has taken more than a century to develop effective vaccines as the malaria parasite, which is spread by mosquitoes, is spectacularly complex and elusive. It is a constantly moving target, shifting forms inside the body, which make it hard to immunize against.

Last year, the World Health Organization gave the historic go-ahead for the first vaccine - developed by pharmaceutical giant GSK - to be used in Africa.

However, the Oxford team claim their approach is more effective and can be manufactured on a far greater scale. Trial results from 409 children in Nanoro, Burkina Faso, have been published in the Lancet Infectious Diseases. It shows three initial doses followed by a booster a year later that gives up to 80% protection.

The world's largest vaccine manufacturer - the Serum Institute of India - is already lined up to make more than 100 million doses a year.

Why is it so effective?
The currently approved vaccine - made by GSK - shares similarities with the one developed in Oxford.

Both target the first stage of the parasite's life cycle by intercepting it before it gets to the liver and establishes a foothold in the body.

The vaccines are built using a combination of proteins from the malaria parasite and the hepatitis B virus, but Oxford's version has a higher proportion of malaria proteins. The team thinks this helps the immune system to focus on malaria rather than hepatitis.
BBC

Contributed By: Dr. Piyush Bafna

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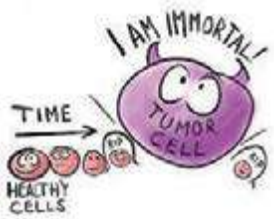
Cancer Breast - Latest with New Treatment

"Future Better Than The Past"

Dr. Susovana Sujith Nair
Oncologist
KCCC

■ Cancer Treatment – Challenges and role of Artificial Intelligence Cancer or malignant neoplasm is a genetic disorder that results from genetic or epigenetic alterations in the somatic cells. Research has shown that tumorigenesis in humans is a multistep process which involves various genetic or epigenetic changes which ultimately drive the malignant transformation of the normal cells.

Mutations which initiate the process of malignancy can be acquired gradually step by step during various stages of an individual's lifetime. These can be either acquired ones or may have hereditary origins and hence are involved in a hereditary form of malignancy such as the familial form of retinoblastoma. Studies over the decades have revealed that one in three people develop cancer during their lifetime and therefore it is still clearly considered the most feared disease globally. We are still not in a position to say that the existing treatments are effective enough to provide full protection from this disease.



With technological advancements, the development of sophisticated genomic, proteomic and bioinformatics techniques has made it possible for us to get a glimpse of the intricate interplay of numerous cellular genes and regulatory genetic elements that are responsible for the manifestation of cancerous phenotypes. However there are few success stories as far as the treatment of cancer is concerned. For instance the treatments of leukemia and lymphoma have been established and proved to be satisfactory. Despite occasional successes the treatment for most cancers is still a long way from reality. In this editorial, we have addressed several reasons for the difficulties in cancer treatment.

Various types of cancer causing genetic aberrations are well characterized such as mutations, gene amplification, translocation, structural deletion, chromosomal miss-segregation etc.

Apart from the various chemical and physical (ionizing radiation, UV light) carcinogens, several biological agents can also contribute to the development of cancer, for example viruses, bacteria and parasites can potentiate a carcinogenic process in humans.

With the aim of minimizing the incidence of cancer, several potential risk factors such as diet, lifestyle, smoking, alcoholism, viral infection etc. for cancer has been identified. Among these the most significant association was found between lung cancer and smoking.

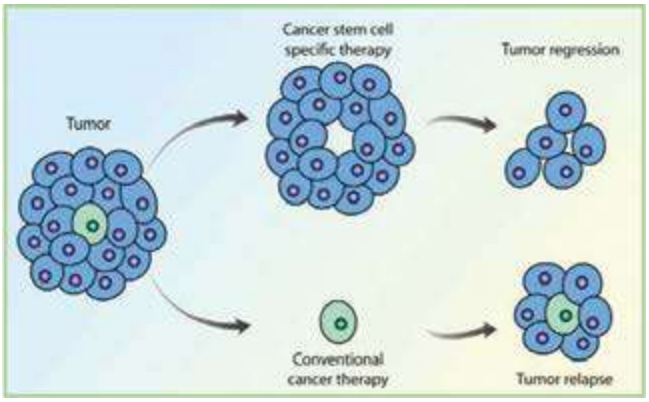
Challenges around cancer treatment.

Drug resistance properties of cancer stem cells make them immune to anticancer drugs Since normal cells have to undergo a repeated process of self-renewal and differentiation in the entire lifespan of an individual, they have developed certain unique mechanisms by which they can protect themselves from harmful carcinogenic agents. Cancer cells are believed to maintain this property since different types of drug resistant cancer cells were found to express this protein. The most notable example is the drug resistance protein expressed in breast cancer cells - Breast Cancer Resistance protein (BCRP) ABCG2, a specific ATP-binding cassette transporter.

They are also believed to be quiescent. This poses another problem in targeting the cancer stem cells by conventional chemotherapeutic drugs which exert their toxicity to rapidly dividing cells. As the cancer stem cells are not involved in vigorous cell division processes they are less likely to be affected by chemotherapeutic agents.

Targeting cancer stem cells (CSCs) is difficult

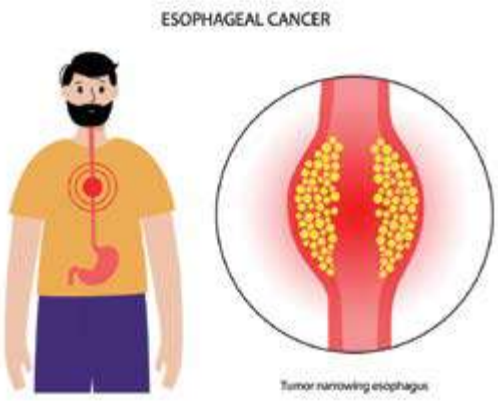
The growing body of evidence suggests that in many cases cancerous cells originate from a single cell with stem cell characteristics. These findings should have a profound effect on the treatment of cancer. Traditional cancer treatment is based on the assumption that all somatic cells possess a similar malignant potential. The lack of specificity in these strategies has made them ineffective to provide long lasting protection against cancer. In contrast the drugs that are more target specific can cause the regression of the bulk of the tumour but in most cases fails to eliminate the cancer stem cells and results are proved to be devastating as the recurrence of the tumour is commonly observed after the discontinuation of the drug administration.



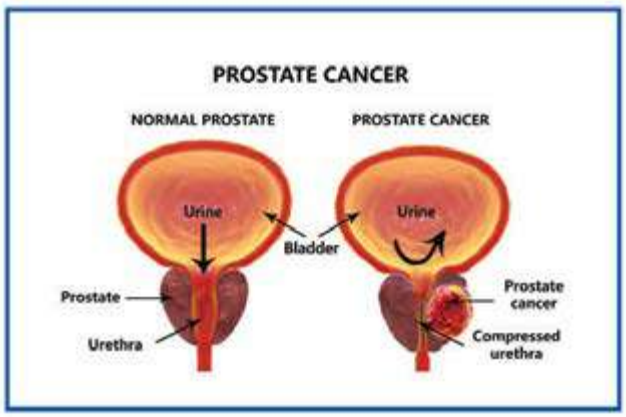
Problems associated with cancer diagnosis make it difficult to treat The non-specific nature of cancer symptoms makes diagnosis difficult. In certain cases the patient remains asymptotic. So these early signs and symptoms of cancer are often neglected by the patient which provides the opportunity for the

cancer to spread without any medical intervention. By the time the patient seeks medical help, it may be out of reach of available clinical treatment. Some examples of the diagnosis difficulties of certain cancers are given below :

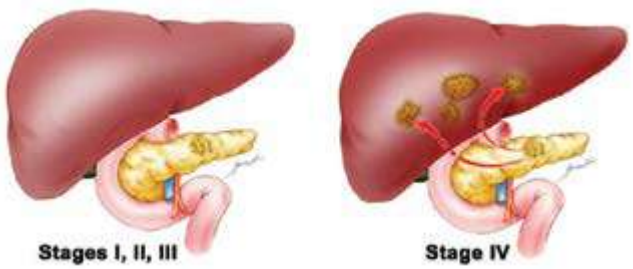
Oesophageal cancer - Oesophageal cancer is one of the most lethal cancers and it is difficult to treat. Unfortunately early detection of this cancer is very difficult simply because in the early phase of this cancer smaller tumours often cause few or no symptoms. But if undetected oesophageal cancer can spread into various parts of the body including the stomach, lungs, liver and lymph nodes. In the late metastasized stage the tumour is incurable and most of the treatment of late stage only focuses on extending life and relieving the symptoms.



Prostate cancer - Prostate cancer tends to occur in older people who are aged over fifty. It is one of the most prevalent cancers in older males. Like oesophageal cancer, the patient may not show any symptoms in the early stage. Since prostate cancer in most cases is slow growing and symptom free it remains undetected and often metastasizes from the prostate to different parts of body especially to the bones and lymph nodes. The presence of prostate cancer may be diagnosed by PSA (Prostate specific antigen) or biopsy. However there is some controversy about the specificity of the PSA test.



Pancreatic cancer - Pancreatic cancer is called the "silent" disease because it does not often show early symptom and also in the later stages patients with pancreatic cancer show nonspecific symptoms. Moreover the symptoms tend to vary and may depend upon the location of the cancer.

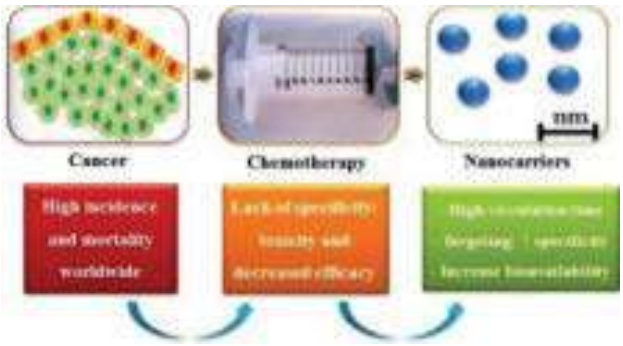


Unavailability of effective biomarkers for cancer diagnosis and prognosis

The unavailability of good biomarkers is another hindrance for cancer treatment. Biomarkers are not only important for diagnostic purposes but can also be of great prognostic value. With the identification of the right biomarker the cancer progression and effect of chemotherapeutic drugs can be evaluated in great detail. But unfortunately the hunt is still on to identify reliable biomarkers for different cancers.

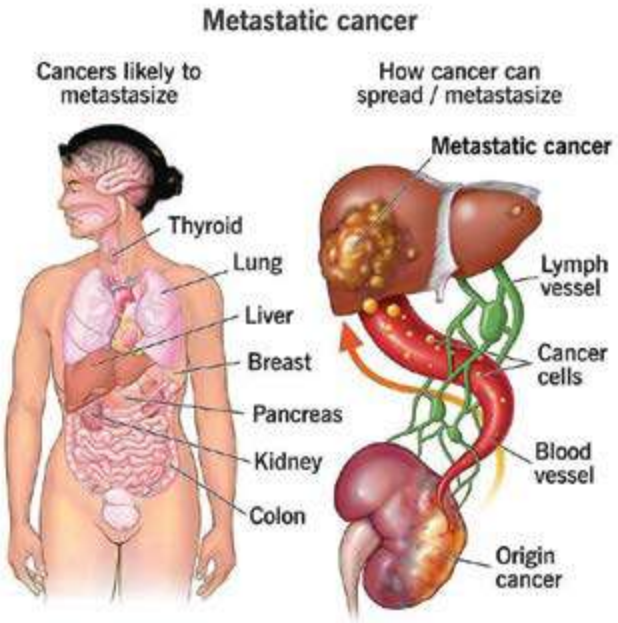
Limitations of conventional chemotherapeutic agents

The existing chemotherapeutic drugs are toxic to all cells including cancer and normal cells. So the administration of these toxic agents kill the rapidly proliferating cancer cells as well as the normal cells which may lead to some serious side effects and may sometimes cause the death of patients.



Metastasis poses a huge problem in cancer treatment

One of the main reasons for the difficulties associated with cancer treatment is the metastatic nature of cancer. The asymptomatic nature of certain cancers and the lack of diagnosis allow the cancer to spread to different parts of the body from its site of origin without any medical intervention. The first site where the cancer is starts is called the "primary cancer site" whereas the sites in which cancer has spread is known as the "secondary or metastatic site". There are three major methods of cancer metastasis : local spread, through blood circulation and via the lymphatic system. So when cancer metastasizes the treatment should not only be directed towards the primary cancer but also needs to eliminate the secondary ones. This poses a great problem. Moreover there are certain metastatic events in cancer which are too small to be detected. These are called micrometastases events.



By solving the identified reasons for the difficulties in cancer treatment we can reduce the incidence of different types of cancer.■

Can Animals Feel Empathy?

How unique is our (humans) ability to feel the pain, fear, and intentions of others? The ability to recognize and respond to others› emotions and intentions—empathy—may not be a uniquely human behavior, recent research suggests. Neural activity associated with empathy has been observed in mice, dogs, elephants, chickens and monkeys. Disrupting such activity disrupts empathic responses.

This research suggests that targeting oxytocin, a hormone underlying empathy, may allow for better treatment of antisocial behavior. "Nonhuman animals are amazing beings. Daily we're learning more and more about their fascinating cognitive abilities, emotional capacities and moral lives." – **Dr. Mark Bekoff**

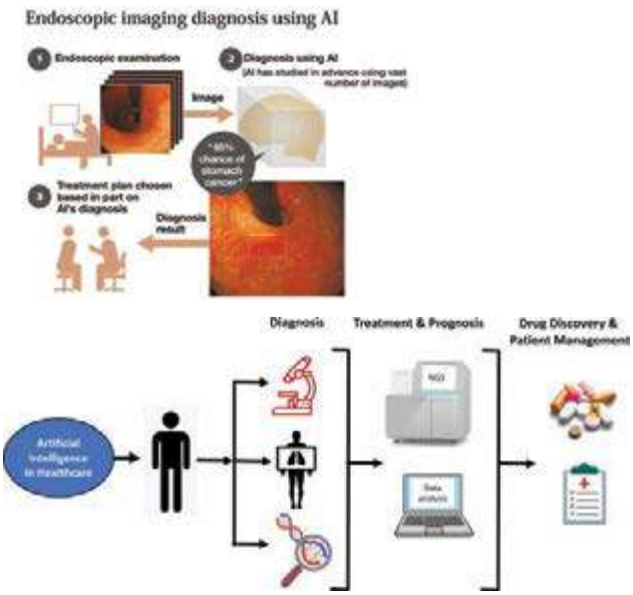
• Elephants Mourn a Lost Conservationist
• Dogs Comfort Humans in the Aftermath of Trauma
• Rats Look Out for Their Friends

Artificial Intelligence Paving The Way

"Future of Managementss"

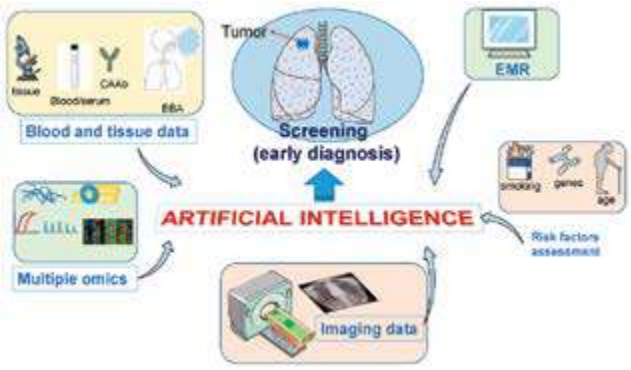
Dr. Susovana Sujith Nair
Oncologist
KCCC

The promise of highly personalized oncology care using artificial intelligence (AI) technologies has been forecasted since the emergence of the field. Cumulative advances across the science are bringing this promise to realization, including refinement of machine learning and deep learning algorithms. There are unique ethical and legal considerations associated with artificial intelligence models that limit their broad application and reproducibility, including their inherent bias when trained with data sets that disproportionately exclude underrepresented persons.



The broad field of computer science in which machines or algorithms are programmed to simulate human intelligence is encompassed by the term AI. Machine learning (ML) is a branch of AI in which computers perform defined tasks and apply statistical methods to detect hidden patterns in the data and to improve model performance.

Natural language processing (NLP) is an adjacent specialty within AI that attempts to interface human language with machine interpretation and it is used to transform unstructured data from clinical notes and diagnostic or procedural reports into discrete data elements.



In the field of oncologic radiographic imaging, AI is being used for detection and diagnosis. Computer-aided detection has been used historically for breast cancer imaging, but it did not demonstrate

The broad field of computer science in which machines or algorithms are programmed to simulate human intelligence is encompassed by the term AI. Machine learning (ML) is a branch of AI in which computers perform defined tasks and apply statistical methods to detect hidden patterns in the data and to improve model performance.

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In the field of oncologic radiographic imaging, AI is being used for detection and diagnosis. Computer-aided detection has been used historically for breast cancer imaging, but it did not demonstrate high clinical value. Hence, breast cancer imaging has been a prime target for AI-based cancer detection. For example, AI-based models are now routinely a part of breast imaging and are being used clinically in many practices. Ongoing research to support the application of AI to cancer genomics is anticipated to enable multicancer early detection and determination of tumor site of origin. This can transform cancer screening, particularly for less prevalent and rare cancers, and it may enhance surveillance strategies for cancer survivors.

Continued advances in imaging-based ML can also lead to the development of models that assess risk for various types of cancer, enhance the diagnostic accuracy of cancers, or predict associated morbidity and mortality outcomes. This can allow for individualized screening and prevention strategies, treatment approaches, and survivor surveillance, and it can furthermore support the virtual biopsy to classify the pathologic and genomic features associated with a cancer diagnosis.■

Mosquitos are evolving to beat insecticides:

Chemical pesticides have been used for many years to control insect populations and remain the most important method of managing diseases carried by pests, including mosquitoes. However, insects have fought back by evolving resistance to many pesticides. There are now thousands of instances of evolved resistance, which make some chemical classes completely ineffective.

The Aedes mosquito, largely responsible for the spread of viruses like dengue and Zika, has globally developed resistance to commonly used chemicals, including pyrethroids, which are the most used insecticides in the world, which includes the control of dengue outbreaks and quarantine breaches at air and sea ports.

In Asia and the Americas, pyrethroid resistance in Aedes mosquitoes is now widespread. In Australia, mosquitoes have not developed these defenses and pyrethroids are still very effective. The difference lies in stringent and careful protocols for chemical use.

Mosquitoes usually become resistant to pyrethroids through the mutation of a sodium channel gene that controls the movement of ions across cell membranes, even mutation in a single gene is enough.

The Conversation

Contributed By: Dr. Piyush Bafna

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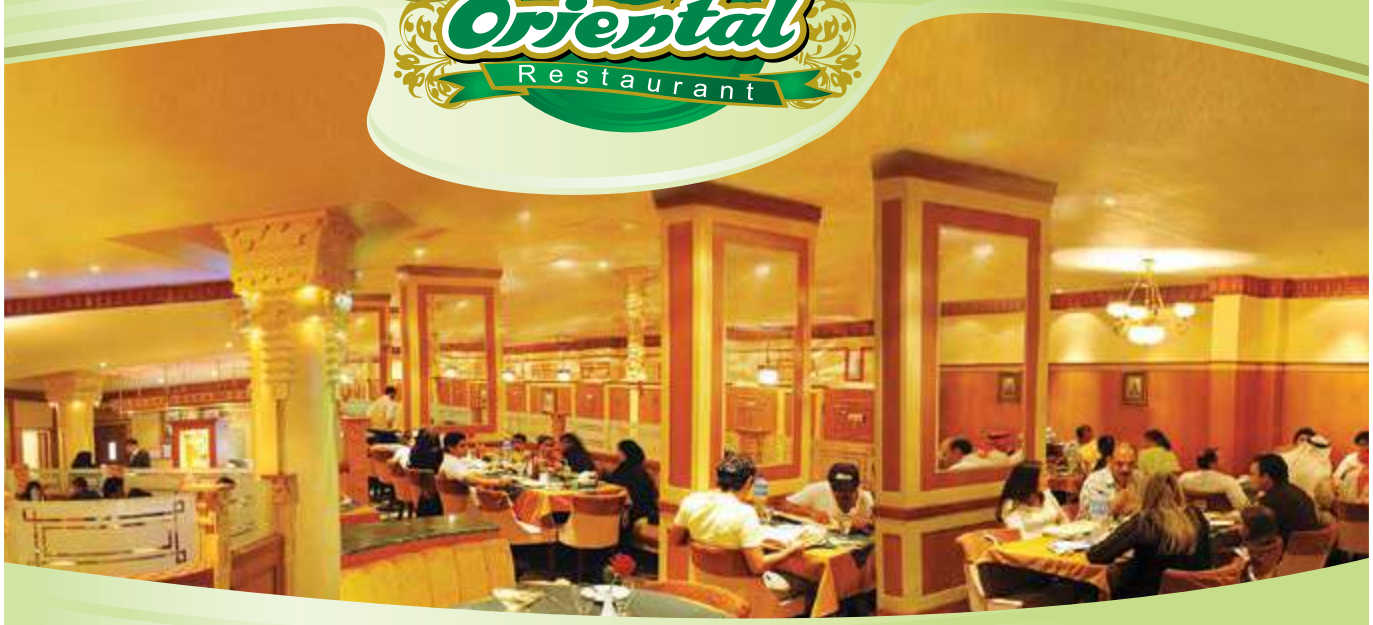

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Plastic Surgery
Past Present and Future

"The Renovators"

Dr. Amit Bhatnagar
Plastic Surgeon
Royale Hayat Hospital

The word Plastic in Plastic Surgery comes from the Greek word "Plassein" which means to mould or shape. Plastic surgery origin dates back to India roughly 800-600 BC, where Sushruta, "Father of Plastic Surgery", described reconstruction of the nose in "Sushruta Samhita". Modern plastic surgery techniques were developed during and after First World War, especially by Sir Harold Gillie, and is considered the "Father of Modern Plastic Surgery".

Plastic Surgery is a broad term encompassing many fields or specialties. The reconstruction ladder includes simple to complex reconstructive procedures for correction of the deformity. Aim of plastic surgery is to accomplish healing of a part, restore its function along with maintaining its cosmetic or physical appearance so that the operated part looks normal. Plastic surgery specialty per se includes but is not limited to the following:

BURNS: Includes treating patients with acute burns from flame, chemicals, hot liquids (scalds), electricity or radiation. Also includes preventing and treating post burn deformity or disfigurement, using skin grafts (a patch of skin surgically removed from part of body and attached to another part) or Flap (a piece of tissue with its blood supply, surgically transferred from one part of body to another) along with management of scars caused by burns.

BIRTH DEFORMITY (Congenital Anomalies):- Involves treating patients with birth defects like cleft lip/cleft palate, hand and limb deformities like fused fingers / thumb (Syndactyly), having extra fingers (polydactyly), genital deformities like abnormal urinary opening in boys (Hypospadias), chest deformities like pigeon shaped chest (pectus carinatum), birth marks over skin (Haemangioma / Vascular malformations), abnormal scalp shape deformity (Craniosynostosis), abnormal ear/Bat Ear (Otoplasty), absent ear formation at birth (Microtia) and many more.

FACIAL DEFORMITY: It includes soft tissue deformity like Earlobe repair (split ears), face swellings , bone deformity of face or fractures of face (jaw and nose), post injury wound management/reconstruction of facial wounds like lip injury, cheek injury, eyelid injury etc.

POST CANCER RECONSTRUCTION: encompasses reconstruction of body parts thereby recreating the healing, function and appearance of face, mouth or body part like breast, chest, abdomen and limbs after cancer removal surgery.

WOUND CARE, BODY RECONSTRUCTION, HAND SURGERY: Plastic surgical procedures involve management of simple and complex wounds following road traffic injury/ trauma. It includes reattaching the severed finger, ear, hand or foot back to the body (re-implantation) or restoring damaged blood supply of the limbs after injury (revascularization) to avoid permanent removal (amputation) of the part. Patients having diabetes with nonhealing ulcers over foot (diabetic foot), Infected wounds and skin infections eg wounds over chest after open heart surgery, bed sores/pressure sores (decubitus ulcers) in bed ridden patients following paralysis or old age, patients having toe nail infections (In growing toe nail)are also successively managed by plastic surgical procedures. Resistant bone infections (osteomyelitis) or wounds having exposed bone are managed by complex plastic surgery procedures in team work with bone surgeons.

The scope of plastic surgery includes patients requiring hand reconstruction following injury like muscle, nerve or tendon injury. Patients having hand and nail infection (paronychia/Tenosynovitis), compression of nerves (Brachial plexus injury/Carpal Tunnel Syndrome) and other deformities of the hand are also managed by reconstructive procedures.

AESTHETIC/COSMETIC SURGERY: Cosmetic surgery or Aesthetic plastic surgery involves both surgical and non-surgical procedures to beautify the body. It includes anti-aging procedures of hair, face, neck and body.

The common non-surgical facial rejuvenation procedures include botulinum toxin (Botox), Dermal Fillers (Hyaluronic Acid), Chemical peel, various Lasers eg Fraxel, HIFU etc, and Thread lift to improve skin quality and to reduce facial wrinkles. Surgical Facelift treatment involves incision around the ear to tighten the face and neck skin and underneath structures.

For improving quality, density of hair and for improving hair growth, platelets (part of Blood component) are used (Platelet Rich Plasma; PRP) or patient may opt for surgical hair transplant where hair from back of head are removed along with their roots and reattached over the bald area over head, and this hair grows naturally like other hair. Hair transplant can be used to reshape or regrow lost eyebrow, beard or mustache also.

Swelling or cyst over face or body part can be removed using surgery so that the scars produced remain inconspicuous. Scars from previous injury or surgery can be modified using various nonsurgical (lasers/creams/silicon, etc) and surgical modalities (scar revision surgery), so as to make scar less visible. Split ear resulting from heavy ornaments /earrings are common outpatient plastic surgery procedures performed.

Nose job (Rhinoplasty) involves reshaping the nose. Body contouring surgeries or procedures (Liposuction/Abdominoplasty/Mommy makeover) may be done in patients having disproportionate body fat distribution. Patients after delivery or after Bariatric surgery (Gastric Sleeve/Bypass operation) have excess loose skin and stretch marks around abdomen, arms, thighs which require body reshaping surgeries namely arm lift (Brachioplasty) or thigh lift (Thighplasty). Liposuction involves sucking away fat from abdomen or chin or any part using cannulas making very small incisions (<5 mm). Abdominoplasty involves removing extra skin from the lower abdomen with an incision that is hidden beneath undergarments.

Aesthetic breast surgery (Augmentation/Reduction/ Mastopexy) involves reshaping and / or resizing the breast, using patients own tissue or Silicone implants. Enlarged male breast (Gynecomastia) correction surgery is also a Plastic surgery procedure.

The new research along with new technologies have revolutionized plastic surgery. With the advent of artificial intelligence in the field of medicine, there is improvement and precision in surgical techniques along with better patient outcomes. The use of Three Dimensional Printing (3DP) devices for surgical planning, medical education and biological implants has become a boon nowadays. Face transplant, hand or limb transplant, gender reassignment surgeries are now a reality.

The indication of plastic surgery for reconstructive purposes like burn management, post cancer removal surgery, post trauma reconstruction, birth deformity reconstruction, wound care, body and hand reconstruction is more of a necessity rather than a choice.

For the aesthetic component of plastic surgery, the patient should not get a procedure done, just because the family or friends are urging or pushing the patient for it. Patients should be clear as to why they want to get it done like he/she may not be happy or is concerned or disturbed about some feature /shape of part of the body and wants to get it rectified or modified so that it will improve their self-confidence. Also, cosmetic plastic surgery can be offered to patients who have tried everything to improve their body shape like diet, yoga or exercise but failed to show any improvement, or it may be as simple as that patient just wants to look younger. Plastic surgery is like any other surgical procedure, aimed to improve the appearance. Plastic surgery cannot improve the cosmetic appearance overnight, as there is a downtime associated with it. There are surgical complications associated with it, just as in any other surgery. Besides surgical complications, most common being, patients not happy with the result of surgery or procedure. The doctor and patient should discuss at length about the procedure, post procedure care, dos and do not, expected recovery time, proposed achievable cosmetic result after surgery etc. Patients should have a realistic expectation about the results and the doctor should also tell them about what maximum that can be done.

The doctor has all the reasons to give his best professional service to the patients. He wants his patients to have the ultimate results and will be happier that his patients on accomplishing them. This article is an overview, to bring awareness to the general public regarding the scope and pitfalls of Plastic surgery. The readers are requested to take professional opinion from qualified personnel before undergoing any Plastic surgical treatment. ■

mRNA Vaccines: The Dawn of a New Era of Cancer Immunotherapy

mRNA therapy is a novel anticancer strategy based on in vitro transcription (IVT), which has potential for the treatment of malignant tumors. The outbreak of the COVID-19 pandemic in the early 21st century has promoted the application of mRNA technologies in SARS-CoV-2 vaccines, and there has been a great deal of interest in the research and development of mRNA cancer vaccines. There has been progress in a number of key technologies, including mRNA production strategies, delivery systems, antitumor immune strategies, etc. These technologies have accelerated the progress and clinical applications of mRNA therapy, overcoming problems encountered in the past, such as instability, inefficient delivery, and weak immunogenicity of mRNA vaccines. mRNA vaccines represent an important class of cancer vaccines that are capable of encoding and expressing TAA, TSA, and their associated cytokines. mRNA cancer vaccines can stimulate both humoral and cellular immunity, increasing the adaptability of these vaccines to different diseases and patients. mRNA cancer vaccines have several advantages, including rapid production, flexibility, relatively low cost, and the ability to generate a robust protective immune response. More importantly, from the viewpoint of safety, mRNA does not integrate into the host genome, in contrast to DNA vaccines. Large quantities of accurate and personalized mRNA cancer vaccines can be produced in a short period, making them a promising therapeutic modality.

Contributed By: Dr. Piyush Bafna

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From the Associate Editor's Desk

Women's Well -being and Comprehensive Child Care

"And one day she discovered that she was fierce and strong and full of fire and that not even she could hold herself back, because her passion burned brighter than her fears." Mark Anthony.

In the 21st century, women have come a long way, both in the workforce and in the society as a whole. A chosen few are now even firefighters, air-force pilots, and FIFA World Cup referees! Health indices for women show some upward trend, for example, maternal mortality has come down by 38% in the last two decades. Now women are expected to live longer than men, as 'the global life expectancy at birth' for women is 75 years while for men it is 70 years. The reason for this is not crystal clear, though the influence of estrogen hormones, the extra X-chromosome and less visceral fat as well as the fact that women smoke less might all contribute. This increase in lifespan has posed new challenges for women. Menopause harbingers rapid deterioration in health, beauty and stamina that need to be addressed thoroughly due to an increasing post-menopausal life span. So, here's a shout-out to all women on self-care- to prevent and even revert adversities of menopause. Osteoporosis is a real threat and can drastically reduce the quality of life. Prevention is way better than cure!

Juxtaposed to the increase in life expectancy, the fertility rate is slated to shape the world demography. As women get empowered, participate in the workforce and plan their families as per their resources, the fertility rate has halved in the last 50 years. The world population is now growing more slowly at the rate of 1% as compared to 2.3% in 1963. Some choose not to procreate, while others cannot. Infertility is fueled by a more sedentary lifestyle as well as unhealthy diet and stress, added to a background of disturbed hormones and physiology.

Lifestyle and technology are also affecting our future generation. The state-of-the-art neonatal treatments have made it possible for preterm babies delivered even in the sixth month of pregnancy to survive. Moreover, advances in medicine and surgery have given hope for survival and a near-normal life to children with several birth defects, including "holes" in the heart. As we unravel chromosomes and decipher our genetic material, vaccinations take on a whole new meaning. Not only do they protect us and our children from infections of deadly microbes, especially viruses like COVID-19, they have also acquired new roles in the prevention and treatment of chronic diseases and cancer.

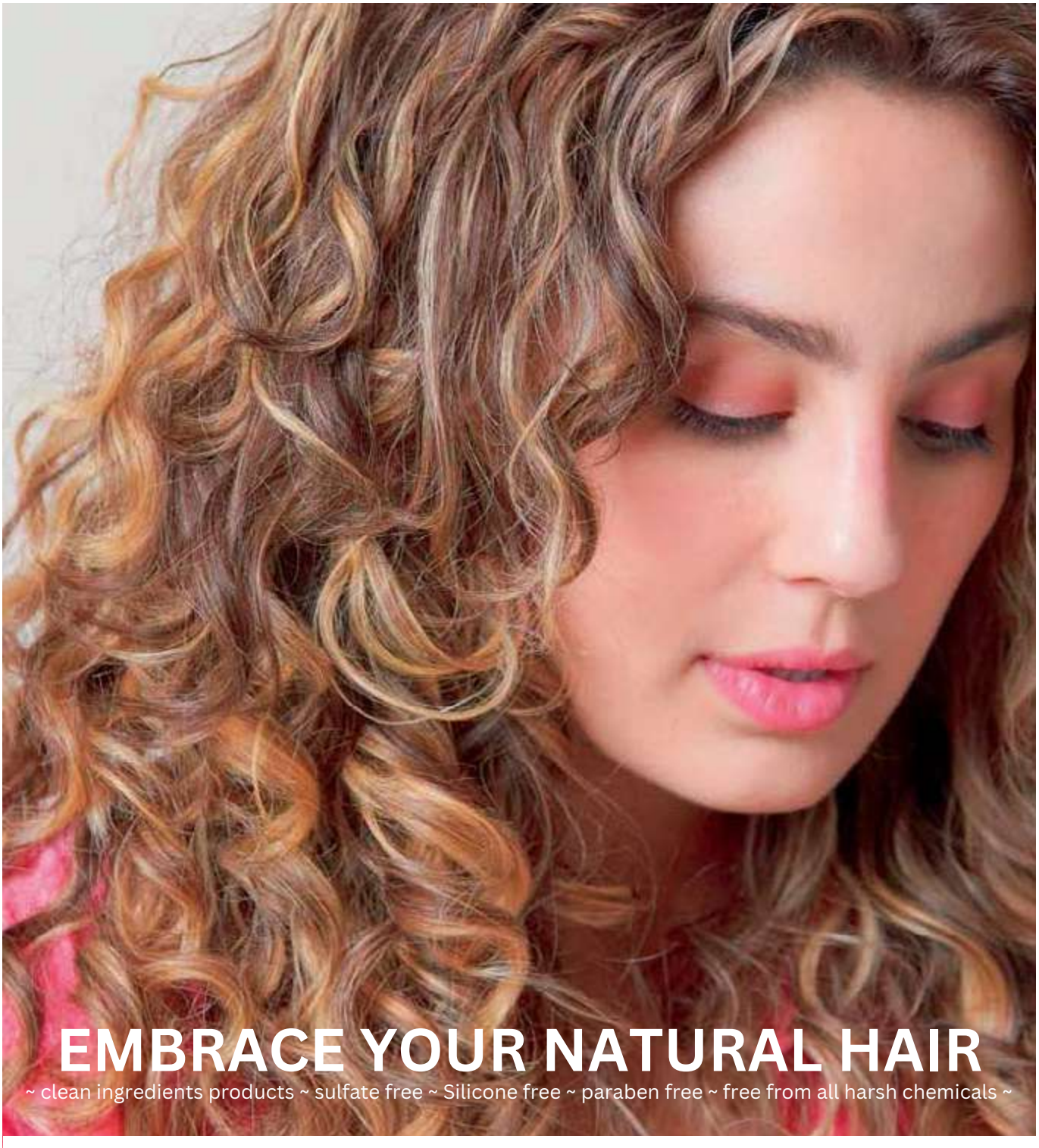
The tech-explosion has on the other hand, made adolescents (more so than grown-ups) increasingly vulnerable to "technology addiction" and social media abuse, sometimes leading to disastrous consequences. On an average, 'Gen Z' is online 10 hours a day in the United States and a significant 25% has suffered from "emotional distress", nearly double the previous generation. They are smarter and more aware, but also more prone to stress, isolation, distress, and depression. Our disapproval alienates them further. We need to befriend them, earn their trust, and keep them close if we wish to help them.
Immersed in gadgets for long hours, we have leaned heavily towards physical inactivity, and obesity in children is on the rise. Recent research elucidates that obesity can take root right in the womb and is encouraged by aberrant feeding patterns of mother in pregnancy, and of the baby in infancy. So, let us feed ourselves and our kids well, and encourage and participate in sports and outings!

In this section, the authors focus on these challenges of maternal and pediatric health and offer their views and solutions in an attempt to create awareness.

Dr. Ruchira Vasudeva

WOMEN & CHILD HEALTH CHALLENGES

SECTION FOUR



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Neonatology

"They Help in Getting The First Breath"

Dr. Tahseen Khan
Neonatologist
Jahra Hospital

Advances in Medical Care of newly born babies

Introduction

Newborn babies are not just small adults. Their problems are unique and pose a special challenge to the doctors taking care of them. The babies that are born before their bodies are ready to leave the womb are called premature. Important organs such as the heart, lungs, stomach, and skin may not be mature enough to function without special help.

What problems can arise in newborns?

The baby's birth is indeed a miracle and most deliveries go smoothly. Occasionally problems do occur while transitioning from the secure environment of the mother's womb to the external world where they have to breathe and function independently.

The complications may arise due to hitches while the baby is being born leading to birth injuries. Oxygen and essential nutrients from the placenta can abruptly be compromised before the baby has adapted to breathe independently. This leads to Birth asphyxia, which causes various degrees of damage to the developing brain. Which can lead to cerebral palsy (CP) (problems in movement), intellectual disabilities, epilepsy, hearing and vision impairments. Therapeutic hypothermia or cooling is the only treatment shown to reduce death or disability for infants with moderate to severe brain damage. Cooling of the head or body to below normal temperature, reduces the metabolic demand of the brain cells by decreasing the rate of oxygen consumption. The chemical changes needed to grow and stay healthy are slowed down temporally to allow the brain to recover.

Neonatal sepsis is a serious condition in which bacteria enter the bloodstream, multiply and produce toxins causing deadly effects to the health of neonates.

Early-onset sepsis is seen in the first 24 to 48 hours of birth. This infection happens from the mother before or during delivery.

Late-onset neonatal sepsis. Occurs after the first week of life, mostly due to prolonged stay in the hospital or due to prolonged dependency on intravenous fluids Screening the mother during pregnancy and treating with specific antibiotics has decreased the rate of bacterial infections. Discovery of newer antibiotics has reduced the infection rate.

But, sepsis still remains a major cause of concern as signs of sepsis are subtle in the newborn and early diagnosis and treatment remains a challenge With unscrupulous use of antibiotics more and more harmful bacteria are developing resistance to drugs leading to infections, which are difficult to treat.
There are many simple ways in which infections can be prevented in the newborn infant:

- Hand hygiene before touching an infant is the most important method of preventing infection in the nursery. And restricting the number of visitors to the nursery also helps.

- Breast milk contains antibodies, and protects the gut of the infant from infections and also encourages the growth of harmless bacteria in the gut which prevent the growth of harmful bacteria.

Advances in preterm care

Babies born before the completion of pregnancy (t40 weeks) were previously considered a lost cause. Improvement in technology as well as an increase in professional knowledge has given hope for survival of these babies born before term.

The survival of babies born at extremely low gestational ages has increased. But, there is a high rate of brain damage and developmental problems reported in survivors which is of great concern to both the public and professionals. Prematurity is a global health issue and is ranked in the top 10 of the WHO list of leading causes of burden of disease
Babies as young as twenty three weeks gestational age and as small as 500 grams are successfully treated now. The survival rate for babies born at twenty-three weeks gestational age is now at 33% historically. Much progress in neonatal care was made through the use of technology.

The development of infant incubators has helped in improving the chances of survival for preterm infants. These babies don't have enough body fat to hold their body temperature. Incubators or radiant warmers keep them warm in the nursery. These small beds with heaters over them help babies stay warm while being monitored. Since they are open, the caretakers have easy access to provide care, Currently double-walled servo-controlled incubator now protect these vulnerable infants.

Mechanical Ventilation

Babies in the Neonatal Intensive Care Unit (NICU) sometimes develop problems which leads to breathing failure, Mechanical ventilation is lifesaving in this situation to help the baby to breathe. The baby is connected to a breathing machine by a plastic tube (endotracheal tube) placed into the windpipe through the mouth or nose.

This ensures adequate exchange of oxygen and carbon dioxide.

Modern technology and understanding of how the premature lungs work has led to the development of sophisticated ventilators. This has enabled the neonatologist to provide the precise volume of air and oxygen to these immature babies without injuring the delicate lungs.

Surfactant therapy Surfactant is a liquid made in the lungs at about 26 weeks of pregnancy. It coats the tiny air sacs in the lungs and helps to keep them from collapsing. The air sacs must be open to allow oxygen to enter the blood from the lungs and carbon dioxide to be released from the blood into the lungs. Babies who do not have adequate surfactant develop a condition called Respiratory distress syndrome (RDS).

Currently, surfactants derived from animal lungs are instilled into the baby's wind pipe through a tube so that the collapsed air sacs can expand and allow the exchange of gasses. Synthetic surfactants containing peptides that mimic the action of surfactant proteins

are emerging. Hopefully they will outperform their natural counterparts in terms of reliability and cost-effectiveness.

Parenteral nutrition

This is nutrition in a liquid that is given directly into your baby's bloodstream through a vein. The solution has nutrients such as vitamins, minerals, carbohydrates, proteins and fats. It has proven to be a valuable, life-saving tool in preterm infants who are unable to tolerate sufficient feeds to meet their nutritional needs.

However, many limitations and dangers are increasingly recognized.

New developments include recommendations to increase protein supply, lipids, and mineral supplements while encouraging human milk feeding. But, evidence of the risks and benefits of these developments is lacking.

Experimental Trials in Neonatal Care Technology

At present technology combined with computer intelligence can support the caregiver of these fragile patients. Such babies have a narrow range of safe values, and injury can easily occur when the infant is outside these narrow margins.

Technical devices with built-in algorithms will help to maintain preterm infants within these ranges and minimize injury, are still in the experimental stage. Predictive monitoring of all the vital data, parameters and lab results about the baby in the NICU are collected and centrally managed. By analyzing these physiological data there is a better chance of identifying a baby at high risk of illness at an early stage. Efforts are now undertaken to stabilize the preterm infant close to the mother by delaying the clamping of umbilical cord. Special tables to revive and stabilize the baby are placed very close to the birth canal, making it possible for the neonatal caregiver to provide complete care while the cord remains intact. Hopefully this could make a gentler and more stable transition to external environment.

Oxygen targeting

Preterm infants in the intensive care unit often receive additional oxygen. Unfortunately, the perfect range for the safety is very narrow, thus exposing the baby to dangerous levels of oxygen To prevent this, specialized nurses usually titrate oxygen manually which can be challenging. Automated regulation of oxygen is a very promising technology and currently trials are undertaken to test the effect on long-term outcome.

The aim of an artificial placenta is to provide an environment where the fetus can continue to develop as if remaining in the mother's womb, without the stress of preterm birth. The principle of treating a preterm infant as a fetus rather than a neonate is not a new idea in neonatal care .
The challenge lies in maintaining the diverse vital functions of breathing, nutrition, along with the circulation of blood.

Much progress has been made in the more recent years and artificial placenta would definitely be a new milestone in neonatal medicine.■

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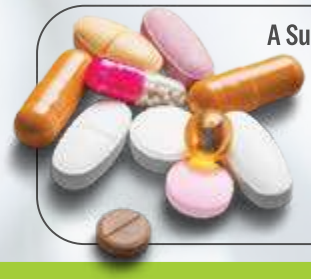

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Child Obesity Challenges

"Care Starts From Infancy"

Dr. P S N Menon
Chief Pediatrician & Ex-Professor
at AIIMS, New Delhi
Armed Forces Hospital

■ Obesity and Overweight from Infancy to Adolescents: The New Epidemic – A Parental Challenge for the Coming Decade

Obesity is a worldwide lifestyle disorder affecting both developed and developing nations and a global health challenge. Epigenetics (the study of how our behaviors and environment can cause changes that affect the way our genes work) has provided us with some new information on the role of genetics, energy regulatory hormones and hormone (endocrine) pathways in the genesis of obesity.

Where is the epidemic heading to?

The International Obesity Task Force (IOTF) report in 2013 noted that nearly a quarter of children and adolescents in developed countries were overweight or obese. The prevalence continues to rise in developing nations and severe forms of obesity are very common. The prevalence of severe obesity, defined as body mass index (BMI) >120% of the 95th percentile, has shown an increase from 3.6 to 4.3% in children aged 6–11 years, and from 2.6 to 9.1% in adolescents from 1988–94 to 2013–14 in the USA. Studies from 12 European nations showed that the prevalence of overweight and obesity varied between 19–49% and 4.6–26% respectively in 2007–08 in children aged 6–9 years. Data from China also shows an increase in prevalence of overweight and obesity in the last decade, with the maximum rise among boys belonging to the age group 7–9 years. The prevalence of overweight or obesity among Kuwaiti adolescents reached nearly 50%, with males (54.3%) having a significantly higher overweight or obesity percentage than females (44.6%).

The situation in India is more alarming. The data from the National Family Health Survey-5 (NFHS-5, 2019–20) showed an increase in prevalence of overweight and obesity among Indian adults, compared to NFHS-4 (2015-16). A systematic review of Indian data during 1980–2013 showed an overall obesity prevalence of <2% among toddlers, 2–8% in school-going children, and 1.5–14% in adolescents. The recent Comprehensive National Nutrition Survey (2019) found prevalence of overweight and obesity to be 2% in under-five (weight for height ≥ 2 SD) children. In children aged 5–9 years, the prevalence of overweight and obesity was 4% and 1% respectively; the corresponding figures in adolescents being 5% and 1% respectively.

Asians have a higher tendency to develop abdominal obesity with increased 'visceral fat' ('hidden fat' or fat stored deep inside the belly, wrapped around the organs, including the liver and intestines). In addition, they have relatively lower skeletal muscle than Caucasians (those with a European ancestry) of comparable BMI. The higher proportion of visceral fat, called 'central adiposity', increases the risk of metabolic and cardiovascular disorders. Central adiposity is an integral component of the 'metabolic syndrome (MS)', which refers to a cluster of findings that increases your risk of heart disease, stroke and type 2 diabetes.

How do we assess obesity?

There are quite a few methods to check for obesity. BMI is the most commonly used tool. The major limitation of BMI is that it does not differentiate fat mass from lean muscle mass and does not measure central adiposity. It may therefore be a poor marker for MS. There are tables and charts readily available on the net to be fully utilized by the parents of growing children.

When will we suspect overweight and obesity in children and adolescents?

The definitions vary. It is easier in adults with a standard cut-off of BMI ≥ 25 kg/m2 and ≥ 30 kg/m2 for overweight and obesity, respectively. The Indian Academy of Pediatrics (IAP) 2015 growth reference data has provided BMI centiles for defining overweight and obesity for Indian children adjusted for adult BMI cut-offs of 23 and 27 kg/m2 respectively. These are available online for easy calculations.

What causes nutritional obesity?

Easy access to inexpensive 'fast food' (high fat, sugar and salt food, also called HFSS), increased 'screen time' (computers and phones) and limited physical exercise are the key identifiable factors in most developed nations. Families from lower socioeconomic group are equally vulnerable. In India, obesity is more prevalent among urban affluent families. In recent times, its prevalence is increasing in the rural areas and lesser affluent groups.

It may begin in fetal life itself!

The first 1000 days of life including 270 days of in-utero period are critical for nutritional exposures. Maternal nutrition and nutrition in early life can cause earliest epigenetic changes in the fetus. The maternal gut microbiome is linked to metabolic programming of the fetus. Maternal high fat diets result in depletion of protective microflora such as Bifidobacteria and Lactobacillus, thus increasing the risk of obesity in the offspring.

'Cafeteria' diets during pregnancy, which are energy-dense with a high fat and protein content, lead to maternal hyperglycemia (high blood glucose levels) and produce a state of hyperglycemia for the growing baby. As a result, the fetus is in a relative hyperinsulinemic state (high circulating insulin levels), which stimulates excess fetal growth leading to higher birth weight. On the other hand, maternal undernutrition also increases the risk of obesity in the offspring. Genetic programming occurs in babies exposed to maternal undernutrition to conserve fats and proteins, which increase their risk for obesity in later life. Thus, both maternal overnutrition and undernutrition increase the risk for obesity in the offspring. Micronutrient deficiency in pregnancy can also adversely affect fetal gene expressions.

Feeding practices during Infancy

The constituents, quality and pattern of infant and early childhood feeding affect not only the immediate weight gain of the child but also help establish the dietary pattern and preferences for the future with a consequent long-term impact. Exclusive breastfeeding during early infancy provides optimum nutrition for ensuring growth while having

a preventive influence on obesity. Commercial infant feeding formulas are high in protein content, which stimulates lipogenesis and is associated with higher postprandial (after food) insulin and insulin-like growth factor (IGF) levels, thus increasing risk of obesity. The gut microbiome of formula-fed babies differs from that of breastfed babies. Formula feeding is also associated with impaired development of satiety control.

Early introduction of complementary feeding before four months of age increases the risk of childhood obesity up to six folds. Sugar containing juices and drinks, low-fiber diets and processed foods are poor choices for complementary feeding.

Dietary practices beyond infancy

The modern-day Indian diets are frequently high in saturated fats, sugar, and refined carbohydrates and are poor in polyunsaturated fatty acids and fiber. Increasing urbanization predisposes to increased intake of easily available Western and Indian 'HFSS foods', which are usually fried, high in calories and cheaper than wholesome meals. The street food is usually fried in reheated oil that contains high proportion of trans-fats. Most prepacked snacks are also fried in a medium rich in trans-fats and are calorie-dense. Peer pressure, media and advertisements promote consumption of energy-dense beverages and HFSS foods as a mark of affluence and 'modern' life. This lifestyle, unfortunately, is also adopted and encouraged by parents and thus childhood obesity is commonly associated with obesity in other family members as well.

Lifestyle-related obesity

The recent rapid urbanization which has resulted in the migration of rural population to cities is associated with unplanned housing, physical inactivity and poor access to nutritious food. Academic pressures, lack of open spaces, security issues and increasingly screen use, are hindrances to an active lifestyle. Excessive screen time also predisposes to chronic fatigue, sleeplessness and altered neurohormonal regulation of the biological clock. It promotes snacking and risk of 'grazing', which further compounds obesity risk. Recently we observed a peaking of obesity in the young following the restrictions in lifestyle following the onset of COVID-19 pandemic. Lack of adequate sleep and poor sleep hygiene were shown to increase the risk of obesity up to 1.5 times.

What is the role of genetics?

It plays a very important role, which teaches us a lesson on how to set an example to the children.

Obesity and metabolic syndrome

Obesity is the mother or a family member of the metabolic syndrome. The definition of metabolic syndrome in children varies at different ages.

Age 6–10 years: Metabolic syndrome should not be diagnosed. However, children should be screened for biochemical alterations if abdominal obesity (defined as increased waist circumference) and a family history of cardiovascular event, type 2 diabetes, hypertension, and/or dyslipidemia are present.

Age 10–16 years: Abdominal obesity (defined as increased waist circumference) with any of the two following parameters being present:

Triglycerides ≥ 150 mg/dL

HDL-cholesterol < 40 mg/dL

Fasting blood glucose ≥ 100 mg/dL

Blood pressure (BP) – systolic BP ≥ 130; diastolic BP ≥ 85 mmHg

Principles of management

The main thrust of management in obesity is prevention based on dietary and lifestyle modifications. There is a limited role of pharmacotherapy (drug treatment) in children. Young children aged 2–11 years do not require severe caloric restriction. Weight maintenance

should be emphasized for all children who are overweight. However, in obese preadolescent children, a gradual weight loss of 0.5 kg per month should be targeted. In adolescents with BMI > 95th centile, a weight loss not exceeding 1.0 kg/week can be aimed for.

The major thrust in the management of a child with obesity include dietary modifications and lifestyle changes. There is no 'one plan for all children' – diet planning should be individualized for each child's age and the family's willingness to maintain a balanced nutrient proportion. Pharmacotherapy and surgery, both should be avoided and are rarely indicated.

Key messages

- Childhood and adolescent obesity is a challenging global epidemic.
- Nutrition and health in the first 1000 days of life provides a crucial window for prevention of obesity.
- The systemic effects of obesity during childhood have long-term impact on cardiovascular morbidity and metabolic syndrome.
- Growth monitoring during childhood is essential to detect early deviations in weight and BMI, as childhood obesity shows tracking into adulthood.
- The cornerstones of prevention and management of childhood obesity are dietary modifications and healthy lifestyle measures.
- Pharmacotherapy and bariatric surgery have very few indications in childhood; there is limited data on safety and long-term efficacy.
- It is the combined responsibility of the family, school and community of the childhood fraternity to develop collaborative efforts to prevent obesity.■

Key action statements guide physicians on how to evaluate children and teens for obesity

The AAP (American Association of Pediatricians) guideline recommends:

- Comprehensive obesity treatment may include nutrition support, physical activity treatment, behavioral therapy, pharmacotherapy, and metabolic and bariatric surgery.
- Intensive health behavior and lifestyle treatment (IHBLT), while challenging to deliver and not universally available, is the most effective known behavioral treatment for child obesity. The most effective treatments include 26 or more hours of face-to-face, family-based, multicomponent treatment over a 3- to 12-month period.
- Evidence-based treatment delivered by trained health care professionals with active parent or caregiver involvement has no evidence of harm and can result in less disordered eating.
- Physicians should offer adolescents ages 12 years and older with obesity weight loss pharmacotherapy, according to medication indications, risks, and benefits, as an adjunct to health behavior and lifestyle treatment.
- Teens age 13 and older with severe obesity (BMI ≥120% of the 95th percentile for age and sex) should be evaluated for metabolic and bariatric surgery.

Contributed By: Dr. Menon

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Understanding Common Heart Birth Defects

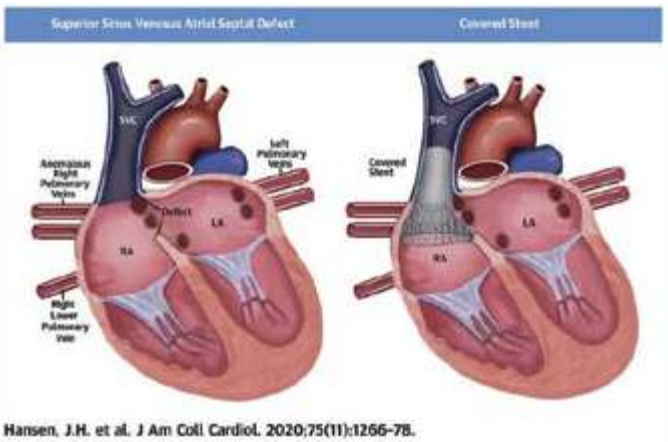
"We Can Safely Manage Them"

Dr. A.M. Shukur
Cardiologist
Kuwait Heart Center

■ 'Holes in the Heart' are birth defects of the heart which in medical terminology referred to as Congenital Heart Defects are present at birth and can affect the structure of the baby's heart while it is developing during pregnancy. Common types of such 'Holes'/ Heart Defects are Atrial Septal Defect, Ventricular Septal Defect and Patent Foramen Ovale. The cardiologist is at times challenged with the decision on its mode of management. When and how?

What are the most common types of 'Holes' in the heart? Common types of Congenital Heart defects/ Holes in the heart are Atrial septal defect (ASD), Ventricular Septal Defect (VSD) and Patent Foramen Ovale (PFO).

What is Atrial Septal Defect? Atrial Septal defect is one of the most common types of congenital (Birth defects) heart holes/defects occurring in about 25% of children. This is one category of birth defect/hole in the heart in which there is a hole in the wall (atrial septum) that divides the upper chambers (atria) of the heart. (When there is failure to close the communication between the right and left atria.)
There are Four types of Atrial septal Defects. The defect is named according to its location in the septum, the wall or curtain dividing the Atria. (Fig 1 and 2).



Hansen, J.H. et al. J Am Coll Cardiol. 2020;75(11):1266-78.

Fig 1. This picture shows the different spots where the Atrial Septal Defects occur. RA=Right Atrium and LA = Left Atrium. The management decisions are finalized based on the size and the site of the defect. It is a collective decision between an Interventional cardiologist and the cardiac surgeon. Such decisions at times are not easy to take, which is a challenge to them as "Your life is in our hands". Whatever decision taken is always with the best intentions to help the patient and the family.

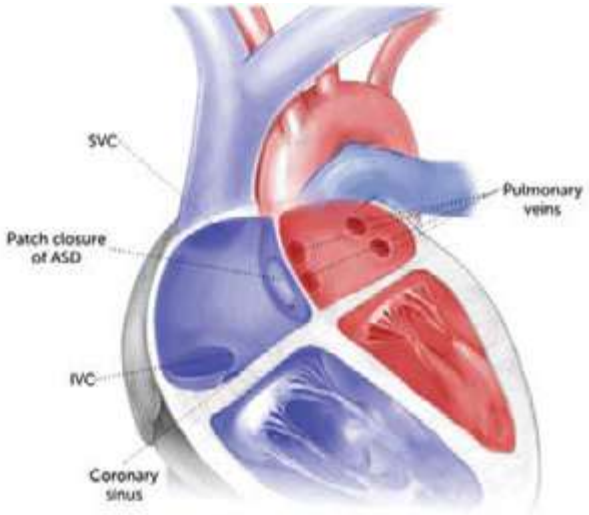


FIG 2. An example of how a Atrial Septal defect correction done without surgery by using an Umbrella like mechanism. (See patch closure of ASD in the above picture.

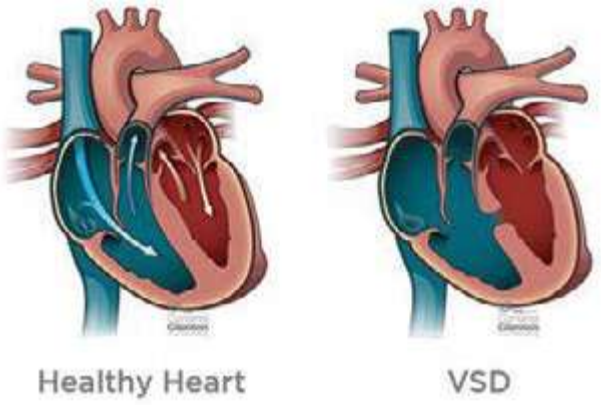


Fig 3. Observe the wall between the two large chambers called the ventricles is intact in the Healthy Heart picture and how a defect is seen in the Ventricular Septal Defect (VSD) picture.

What is Ventricular septal defect?

Ventricular septal defect (VSD)is a birth defect of the heart in which there is a hole in the wall that(septum) separates the heart's lower pumping chambers of the heart (ventricles). Ventricular septal defect/hole can be in different site on the septum and can vary in size. It can occur alone or with heart abnormalities present at birth. There are four types of ventricular defects based on the location of the defect and best understood by a trained experienced cardiologist.

Small (less than or equal to 3mm), Medium (3-6mm) and Large (greater than 6 mm) Small Ventricular Septal Defects/Holes close spontaneously as the child grows up. If the Hole is small, regular follow-up is required. Surgery is the preferred choice for repairing most Ventricular Septal Defects. Catheter method of Device closure is another type of procedure to close Ventricular Septal Holes.(Fig 3) Ventricular septal defect/hole can rarely occur later in life following an acute heart attack and such hole may be life threatening condition with high mortality rate, if left untreated.

What is Patent Foramen of Ovale? (PFO)

It's a hole between the left and right atria (Upper Chambers) of the heart. This hole exists in every one during the development of the baby's heart before birth. Most often closes shortly, after being born. In certain conditions it fails to close after the baby is born; then it's called PFO. Approximately in 1 out of 4 individuals it never closes naturally. The exact cause of PFO is unknown. But it can be found in association with other heart abnormalities (Atrial septal aneurysms) (Fig 4).

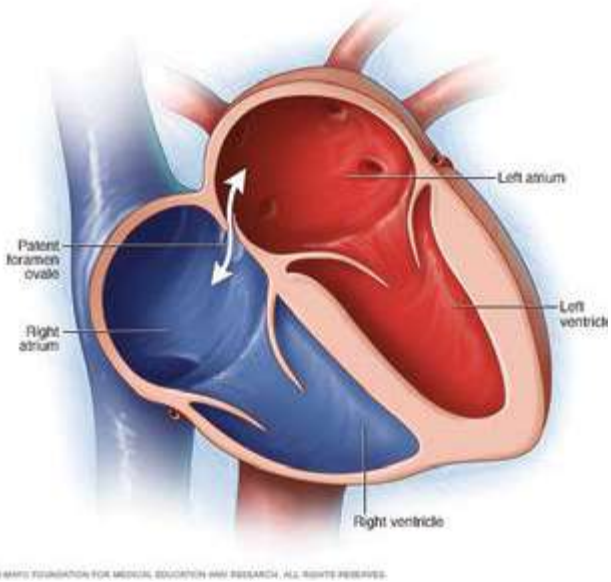


Fig 4..Patent Foramen Ovale ,(PFO). It is like a flap during development and it should close at birth but at times it does not. Mostly it has no issues but a closure decision is required at times.

What are the Causes /Risk factors of Birth Defects/ Holes in the heart?

Smoking, Drinking excessive alcohol, Consuming certain drugs during pregnancy (antiseizure drug-valproate & the drug used in acne-isotretinoin) Maternal viral infections such as Rubella, measles in the 1st trimester of pregnancy, Uncontrolled diabetes mellitus in the mother may affect the formation and growth of baby's heart, Risk of developing such Holes in the heart(cardiac defects) increases if someone in the family has birth defects.

Are there any genetic defects? Gene studies reported a gene defect on chromosome 1 for congenital heart defects. There is an association between VSD/ASD/and chromosomal abnormalities (aneuploidies trisomy 21, trisomy 10, trisomy 13 and Klinefelter syndrome).

Symptoms (Manifestations)

What are the symptoms? Usually, the symptoms depend upon the type & severity of particular hole/defect and or in combination with other heart abnormalities. Some might have few or no signs & symptoms. For example, infants with patent foramen of ovale and no other heart defects do not have any symptoms (Clinical Manifestations).

When to worry & to seek health care provider/ doctor: Shortness of breath, reduced exercise capacity, fatigue & abnormal heart sounds; but in case of babies-tend to have blue tinted nails or lips, fast or hard breathing tiredness when feeding & sleepiness. Some complications may develop during adulthood such as chest infection, developmental delay, heart infections, (Endocarditis) heart failure and pulmonary hypertension. Few adults with PFOs (Patent Foramen Ovale) suffer from migraine headache and rarely stroke.

DIAGNOSIS:

Fetal Echocardiogram: Special type of ultrasound that creates the ultrasound picture of the fetal heart & detects the heart defects/holes before the birth. Echocardiogram: Regular echocardiogram is useful to diagnose defects in the Heart after the child is born. Ultrasound detects images of the heart defect (holes in the heart). It also supports observing the heart beating & to identify abnormalities of heart valves and muscle. Trans-esophageal echocardiogram is a specialized type of echocardiogram in which an echo probe is passed into the esophagus, creating the ultrasound waves to detect & confirm heart holes or defects.

Electrocardiogram (ECG): may be of help at times.
Pulse oximetry: The test measures how much oxygen is in the blood. A sensor is placed at the end of a finger to record the amount of oxygen in the blood. It is useful to detect the mixing of blood due to the defects.

MRI: One of the imaging techniques provides precise imaging of Holes in the heart (heart defects) and other abnormalities if any.
Cardiac Catheterization: - Provides detailed view of heart holes or defects in the heart. It provides the detailed anatomy (structural view) of the defects in the heart.

What are the Treatments for heart defects /Holes in the Heart

Medications: Heart defects can rarely be treated by prostaglandins. Antibiotics are used for Endocarditis prophylaxis .

The use of Device closure

Through a catheter procedure or by open heart surgery Heart defects can be repaired. The interventional pediatric cardiologist using special catheters or surgical techniques repairs the defects. The catheter method has been used successfully since the past several years.

ASD repair without a surgery: A catheter is inserted into a vein in the groin (upper thigh) of the patient & threads the tube to the heart's septum. The device (umbrella-like device) is attached to the catheter and when the catheter reaches the septum, the device is pushed out of the catheter and it is deployed so that it plugs the hole between the atria. Then the catheter is withdrawn. Within a few months the normal tissue grows in and on the device.

Surgical repair: An open heart is performed if the defect is large and serious and not repairable by device closure. Defects in the heart are closed with surgical stitches or a patch. Ventricular septal defects are similarly closed by a surgical procedure.■

PEDESTRIANS CHOOSE HEALTHY OBSTACLES OVER BORING PAVEMENTS

Up to 78% of walkers would take a more challenging route featuring obstacles such as balancing beams, steppingstones and high steps, research has found. The findings suggest that providing 'Active Landscape' routes in urban areas could help tackle an "inactivity pandemic" and improve health outcomes.

Millions of people in the UK are failing to meet recommended targets for physical activity. Exercising "on the go" is key to changing this but while walking along a pavement is better than nothing it causes no significant increase in heart rate so only qualifies as mild exercise. Walking also fails to significantly improve balance or bone density, unless it includes jumping, balancing, and stepping down.
But would adults opt for such 'fun' routes if given the choice? A University of Cambridge-led study published today in the journal Landscape Research suggests that with the right design, most would.

Previous research on 'healthy route choices' has focused on people's likelihood of walking instead of using transport. But this study examined how likely people are to pick a more challenging route over a conventional one and which design characteristics influenced their choices.

"Our findings show that pedestrians can be nudged into a wider range of physical activities through minor changes to the urban landscape. We want to help policy makers and designers to make modifications that will improve physical health and wellbeing."

Participants were shown images of challenging and conventional tarmac routes and asked which route they would choose. The researchers tested out a range of encouraging / discouraging parameters in different scenarios, including crossing water, shortcuts, unusual sculptures and the presence / absence of a handrail and other people. Participants were asked to score how challenging they thought the route would be from 1 (as easy as walking on level tarmac) to 7 (I would not be able to do it).

Eighty per cent of the study's participants opted for a challenging route in at least one of the scenarios, depending on perceived level of difficulty and design characteristics. Where a challenging option was shorter than a conventional route, this increased the likelihood of being chosen by 10%. The presence of handrails achieved a 12% rise.

Importance for health
The WHO and NHS recommend at least 150 minutes of 'moderate' or 75 minutes of 'vigorous' activity spread over a week, including a variety of activities aimed at enhancing bones, muscles, and agility to stay healthy. In addition, adults over 65 are advised to perform strength, flexibility, and balance exercises.

Boldina said: "The human body is a very complex machine that needs a lot of things to keep working effectively. Cycling and swimming are great for your heart and for your leg muscles but do very little for your bone density."

"To improve cardiovascular health, bone density and balance all at once, we need to add a wider range of exercises into our routine daily walks."

Psychology of choice
Co-author Dr Paul Hanel said: "Children don't need much encouragement to try out a balance beam but we wanted to see how adults would respond, and then identify design modifications which made them more likely to choose a challenging route."
"We found that while embarrassment, anxiety, caution and peer pressure can put some adults off, the vast majority of people can be persuaded to take a more challenging route by paying careful attention to design, safety, difficulty level, location and signage."
The participants expressed a range of reasons for picking challenging routes. Unsurprisingly, the study found that challenging routes which also acted as short cuts appealed. Up to 55% of participants chose such routes. The researchers also found that the design of pavements, lighting and flowerbeds, as well as signage helped to nudge participants to choose more challenging routes. Many participants (40%) said the sight of other people taking a challenging route encouraged them to do the same.

The researchers found that people of all levels of activity are equally likely to pick a challenging route. But for the most difficult routes, participants who regularly engaged in strength and balancing exercises were more likely to choose them.

Older participants were as supportive of the concept as younger ones but were less likely to opt for the more challenging routes for themselves. Nevertheless, across all age groups, only a small percentage of participants said they would avoid adventurous options completely.

The study applies the idea of "Choice Architecture" (making good choices easier and less beneficial choices harder) plus "Fun theory," a strategy whereby physical activity is made more exciting; as well as some of the key principles of persuasion: social proof, liking, authority, and consistency.

Compiled by: Dr Piyush Bafna

Vaccination and Vaccine's Future

"An Order of The Day"

Dr. Rajendra C Mishra
Pediatrician
Royal Hayat Hospital

Advances in vaccine technology are crucial to limit and prevent infectious diseases around the world and deaths associated with them which accounts for 40% of all reported deaths. Changing how existing vaccines are used, developing new vaccine delivery technologies and generating new vaccines are some of the ways the researchers are working to overcome this ongoing challenge and save lives. Many technologies under development will improve the effectiveness of vaccine delivery, and make it simpler.

The first vaccine, the smallpox vaccine consisted of a live, attenuated virus. "Attenuation" means weakening a virus to the point where it can still provoke an immune response, but doesn't cause illness in a human host.

Many of the vaccines used today, including those for measles and some influenza vaccines, use live, attenuated viruses. Others used killed forms of viruses, pieces of bacteria, or inactivated forms of toxins that the bacteria create. Killed viruses, pieces of bacteria and inactivated toxins can't cause illness, but can still provoke an immune response that protects against future infection.

However, new techniques are also being employed to create different types of vaccines. Some of these new types include:

- Live recombinant vaccines
- DNA vaccines
- mRNA vaccines

Live recombinant vaccines use attenuated viruses (or bacterial strains) as vectors: a virus or bacterium from one disease essentially acts as a delivery device for an immunogenic protein from another infectious agent to enhance the immune response or cause mild disease.

Starting with a complete virus, researchers identify a section of the virus's DNA that is not necessary for replication. One or more genes that code for immunogens of other pathogens are then inserted into this region. Each gene essentially contains instructions that tell the body how to make a certain protein. In this case, researchers select genes that code for a protein specific to the target pathogen: an immunogen that will generate an immune response to that pathogen. For example, a Baculoviral which only infects insects can be used as a vector, and the gene for a particular immunogenic surface protein of an influenza virus may be inserted. Human adenoviruses have been considered potential

vectors for use in recombinant vaccines, particularly against diseases such as AIDS. The vaccinia virus, which is the basis for the smallpox vaccine, was the first used in live recombinant vaccine approaches. Experimental recombinant vaccinia strains have been designed to protect against influenza, rabies, and hepatitis B, among other diseases.

DNA vaccines consist of DNA coding for a particular antigen, which is directly injected into the muscle, which then produce the antigen from the infectious agent. Since this antigen is foreign, it generates an immune response. This type of vaccine is relatively easy to produce, since DNA is stable and easy to manufacture, but is still experimental, as no DNA-based vaccines have been shown to elicit the substantial immune response required to prevent infection. Research for DNA vaccines to generate immunity against parasitic diseases, such as malaria is underway.

mRNA vaccines aim to deliver a snippet of messenger RNA to a cell, so that the cell's protein-producing machinery can create a protein. That protein created from the mRNA code resembles the protein of a pathogen (virus, bacteria, fungus, or parasite) that triggers an immune response. The protein is then "presented" to immune cells to kick off the immune response consisting of killer cells and antibody-producing cells. All of this allows vaccines to include no part of the pathogen for which the vaccine is created. As of April 2020, the only licensed mRNA vaccines in the world are against SARS CoV-2, the virus causing the COVID-19 pandemic.

To make a vaccine that only needs to be given once, it must either be very powerful or packaged so that its contents are released intermittently once it has been administered. Technologies and alternative adjuvants that can remove the need for multiple shots are under development.

Currently, many vaccines need to be injected—an experience that people can find unpleasant, and may be a serious psychological barrier for some. Needle-free administration is already possible for some vaccines, such as live vaccines given orally (e.g., rotavirus). Researchers are working on edible plant-based vaccine materials, needle-free skin patches and microneedle injection technologies to get the vaccine through the skin without discomfort. Technologies for delivering multiple antigens in one injection are improving. Many different inactivated vaccines can already be given in one injection without impairing the immune response to any of them, and some live virus vaccines can also be given in one injection. That means fewer needles for patients and more efficient vaccine delivery overall. Future immunization delivery methods, however, may differ from what we use today. Inhaled vaccines, for example, are already used in some cases: influenza vaccines for seasonal flu have been made in a nasal spray. Other possibilities include a patch containing a matrix of extremely tiny needles that deliver a vaccine without the use of a syringe. It is particularly useful in remote areas, as its application would not require a trained medical person.

Another issue the researchers are trying to address is the so-called cold chain problem. Many vaccines require cool storage temperatures to remain viable. Unfortunately, temperature-controlled storage is often unavailable in parts of the world where vaccination is vital for disease control. One of the reasons smallpox eradication was successful was that the smallpox vaccine could be stored at relatively high temperatures and remain viable for reasonable periods.

One possible approach to this problem was studied in early 2010 by researchers at the Jenner Institute of the University of Oxford. Starting with a small filter-like membrane, the researchers coated it with an ultrathin layer of sugar glass, with viral particles

trapped inside it. In this form, the viruses could be stored at temperatures of up to 113°F for six months, without losing their ability to provoke an immune response.

The researchers also demonstrated that the vaccine material could be placed in a holder designed to attach to a syringe, allowing a vaccinator to prepare the vaccine material and administer the vaccine almost simultaneously. Although this research was preliminary, it offers a promising new avenue for vaccine storage and delivery. With a stabilization method like this, widespread vaccination campaigns may be possible in areas previously difficult or impossible to reach.

Most successful vaccines protect against acute (short-lived) infections largely through the production of antibodies. Vaccines for chronic (long-lasting) infections, especially for HIV, tuberculosis and malaria, remain a challenge. One of the primary reasons for this is that the viruses, bacteria and parasites causing these infections hide from the immune system inside the person's cells. To overcome this, a different kind of immune response involving T cells is required instead of, or in addition to, an antibody response. New vaccines are needed for chronic and emerging infections

There are some infections associated with serious long-term complications that we don't yet have a vaccine for. For instance, infection with the bacterium Helicobacter pylori means patients are more likely to develop stomach cancer, and group A streptococcus infection is responsible for rheumatic fever, which is still a significant cause of death and disability in developing countries.

Based on experience with emerging infections like Ebola and Zika, progress has been made in developing vaccines that use mRNA to stimulate some of our own cells to temporarily produce antigens. The research and progress made in this field contributed to the speed of development for COVID-19 vaccines.

Use of vaccines for treatment as well as prevention of diseases is another exciting development. Such therapeutic vaccines are being targeted at persistent infections, such as shingles and those due to human papilloma virus. They are also being targeted at non-infectious conditions, including autoimmune disorders, tumors, allergies, and drug addiction.
In the case of tumors, the vaccine can either be directed against the tumor itself or be designed to amplify the anti-tumor immune response. For autoimmune or allergic disorders, vaccines are being designed to switch off unwanted immune responses (so-called 'negative vaccination'), rather than switching on the useful immune response needed for infections and cancer. Promising trials are in progress for vaccines to treat nicotine and cocaine addictions.

The increased development speed of vaccines for COVID-19 are a result of improved and new vaccine technologies being available, substantial investment, international collaboration between scientists and increasing the speed of regulatory review. The scale of the COVID-19 pandemic has demonstrated the essential role of vaccination in today's world. Several vaccines were produced and implemented in vaccination programs globally within the first year after the onset of the pandemic, compared with the previous average vaccine development time of 10 years.

Gene vaccines rely on the introduction of specific antigen-coding DNA or mRNA sequences into the human body. These genes are then expressed as an antigen, subsequently triggering an immune response in the body to induce immunity. While the mRNA vaccine technology may still need to overcome cold chain logistics and the long-term

effects remain to be fully evaluated. An advantage of this new mRNA vaccine technology platform is that it allows newer, variant-specific vaccines to be developed more quickly. Since it also has a short manufacturing cycle, the mRNA platform is suited to combat highly infectious and rapidly mutating viruses

Several vaccine developers are studying this technology for deployment against rabies, influenza, Zika, HIV and cancer, as well as for veterinary purposes Given that only the genetic code for a protein of interest is needed, synthetically produced mRNA vaccines can be made rapidly, in days. Other vaccine approaches involve growing and/or producing proteins in cells, a process that can take months. Messenger RNA vaccines are generally regarded as safe, since they do not integrate into our cells' DNA and naturally degrade in the body after injection and can be safely administered repeatedly. A number of laboratories are testing more thermostable formulations of mRNA vaccines, which currently must be kept at freezing or ultra-cold temperatures. Others are investigating second-generation vaccines that will only require a single shot, and "universal" coronavirus vaccines that could protect against future emerging coronaviruses. Messenger RNA vaccines that target a broad range of different diseases, all in one shot, are also in development; this approach has the potential to greatly simplify current vaccination schedules. The ability of this platform technology to be transformative is no longer a hope, but more likely to be a reality in the very near future. Global partnerships like the Coalition for Epidemic Preparedness and Innovation (CEPI), tasked with facilitating the development of vaccines to stop future epidemics, have called for vaccines to be able to be tested in the clinic within months after a new pathogen is identified.

The future of immunization depends on the success of medical research for vaccines that are simpler to administer, survive transport even without refrigeration, and provide a more substantial and long-lasting immune response. And in parallel, the continuing success of vaccines against so many infectious diseases have inspired scientists to use similar methods to combat diseases that remain lethal to many people, such as malaria, HIV/AIDS, and other diseases for which there are not yet effective vaccines.

P.S. In the pipeline are vaccines for Malaria. Soon in the UK an "Oxford vaccine" is coming up for use. In Africa, in use now is a vaccine by the RTSS/ASO1, trade name Mosquirix, is a WHO endorsed vaccine in December 2021, making it the first Malaria vaccine and the first parasite vaccine to receive this recommendation.■

Ambulatory Imaging.
Picture a digital imaging detector built into a stretcher in an ambulance. In the few critical moments before reaching the hospital emergency personnel take X-rays of the patient. The images, beamed wirelessly to the hospital, enable the emergency room staff to begin treatment immediately upon arrival. Using organic electronics, scientists are expanding flexibility in the capture of X-rays. Such technology may be embedded in a hospital bed, a wheelchair, or even a hospital gown, enabling X-rays to be taken with minimal inconvenience to the patient. In addition, such devices free up hospital resources by eliminating the need to transport patients.

Compiled by: Dr. Piyush Bafna

Generation "Z" Challenges

"Parental Guidance Required"

Dr. Nafees Fatima Syed
Dermatologist
Sabah al Salem Clinic

We live in a rapidly evolving, advancing world in terms of lifestyle and technology. The fast-paced life and a constant barrage of extreme, environmental stimuli has created a new set of never seen before challenges for young children, adolescents and especially the parents.

Youngsters already facing intense mental and physical changes associated with puberty, incredible academic loads and not to mention overwhelmingly peer pressure are constantly trying to balance parent expectations, along with the emotional need to fit in with what's considered cool. All of this coupled with the isolation of the pandemic and reduced physical activity has led to an alarming rise in psychological disorders, depression and anxiety amongst children and young adults. Understanding the new names to the past generations. Our concern is for the Generation "Z" and beyond.

Generations defined by name, birth year, and ages in 2022

Generations	Born	Current Ages
Gen Z	**1997 – 2012**	**10 – 25**
Millennials	1981 – 1996	26 – 41
Gen X	1965 – 1980	42 – 57
Boomers II (a/k/a Generation Jones)*	1955 – 1964	58 – 67

We are also the first generation of parents having children born with ``Smart'' phones in their hands. Mealtimes are literally incomplete without an episode of "coco melon" The infant or toddler acts out with intense rage and frustration if device is taken away. The explosion of the internet and social media has created a dopaminergic overload for children of all ages leading to false sense of instant gratification and lack of development of self-control, tolerance and coping mechanisms.

The self-esteem of the young adult has also taken a beating with false "filter" reality flooding all

media platforms. The constant need for "likes" and external validation has led to rapidly deteriorating self-awareness and inability to differentiate between what is really genuine from fake.

Physicians are also noticing an alarming rise in incidents of "Precociousness" where the average age of acquiring puberty is rapidly declining. This can be attributed to hyper stimulating environmental exposure, along with chemically processed and fast foods. "Cyber bullying" along with interacting with faceless strangers on all online platforms such as, "Roblox", has even imposed serious threats to mental and physical safety of children.

Suffice to say, it is now more than ever the greatest responsibility of the parents, teachers and "influencers" of all kinds to protect our children, and enable them to grow into healthy adults, and prevent the formation of future societies full of mindless and heartless zombies! Another dangerous," fad" that is," trending" these days is the use of smoking devices such as" vapes" and "sheesha" along with other addictive substances (party pills) by young people who have no idea about the immediate and long-term health implications of these drugs and drink (including seemingly harmless energy drinks such as, "Red bull" that have been known to cause arrythmias and sudden death in adolescents). It's been normalized as part of socializing and no party is apparently "happening" enough without them. A recent checking at my children's school led to finding of maximum number of vaping devices (easily available everywhere) from grade 6 students (literally preteens) which was a huge shock for parents and teachers alike. In this atmosphere, it's more important for teachers and parents to be more engaged and intuitive with the behavior of their growing children especially of volatile and impressionable age group. It's also the job of schools and forums such as ours to conduct regular awareness programs and health camps to raise the knowledge levels of children and parents to the dangerous effects of substance abuse of any kind. It is also the moral responsibility of elders, parent and teachers to not reinforce these behaviors by practicing it themselves (especially in front of them) as we all know children learn by watching us more than any teachings.

When we were children, we looked forward to our evening escapades with our siblings and neighbors where we would play games outdoors and were reluctant to return home, as opposed to now, when children are hooked to violent video games, creating impassive, aggressive kids, with an attitude of apathy in all matters.

A few general measures which I have found to be useful are outlined below

- The first step depends on the basic family unit that includes the parents, grandparents and elder siblings at home to create a warm and emotionally intimate environment, of unconditional love and support, where in, the child feels free to communicate a sense of fear, anxiety, and threat to their physical safety, or when any of their boundaries are violated.

- The deteriorating state of affairs (where in pedophiles are now being referred to respectfully as "Minors attracted persons"!!!) has made it mandatory to enable children as young as toddlers to identify predators and raise an alarm. They also need to be taught very importantly from an early age(preschool) about what constitutes private body parts, "Good touch "and "bad touch".

- It is also important to note, that ultimately children ape their parents so we must mirror behavior we expect to see in them - for example, if we as parents are glued to our screens and gadgets in front of them, they will most likely follow suit and ignore us similarly.

- Most simply, limiting screen time for the whole family and spending quality time together discussing all issues and constant appraisals are key. Any change in general behavior, sleeping or food habit should be carefully monitored.

- Instilling in child spiritual strength with prayer, community service and love for God will always help them grow as mentally and emotionally strong stable individuals of benefit to future societies.

- Most importantly, engaging of child in healthy hobbies of personal interest such as art, craft, musical instruments, dance, sports or any kinds of regular physical activity especially in times of electronic gadgets has become most crucial for their mental and physical health.

Apart from this, as physicians we cannot stress enough upon the importance of a healthy diet full of protein, fresh fruits and vegetables providing all essential nutrients and minimizing intake of processed and fast foods. All this can make the most crucial difference to long term mental and physical health of children.■

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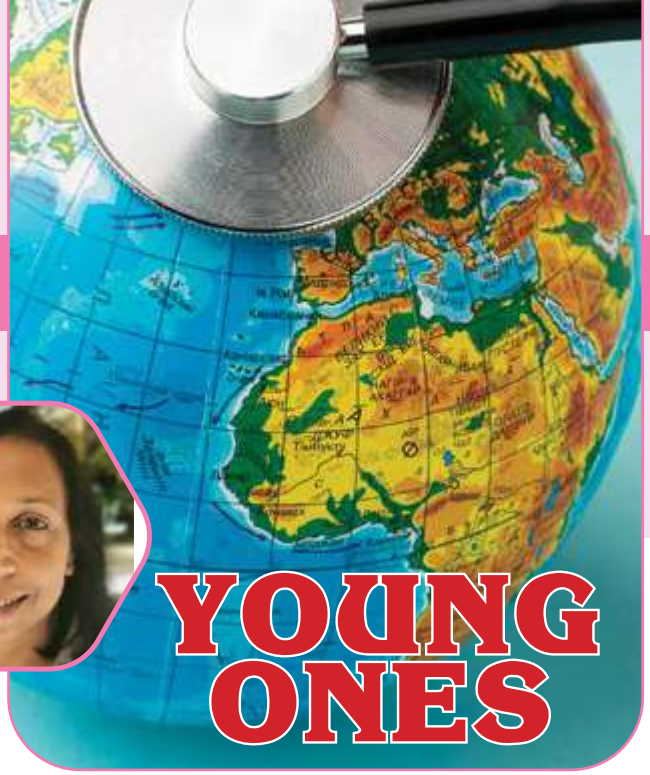
Global Challenges in Adolescents

"Your Child Your Friend"



Dr. Madhu Gupta
Gynaecologist
Farwaniya Hospital

Adolescence is the phase when children go through several changes and challenges as they journey from childhood to adulthood. It is a vulnerable time and the only way to deal with needs and problems at this age is to know and be ready to face them. Parents play an important role in understanding Parents-Adolescent crucial relationships and dealing with them in a positive way. FIG 1

1.PHYSICAL CHANGES: Physical changes happen due to changes in the teenager's hormonal levels. Globally there is a trend of gaining early menarche (start of periods), breast development in girls where they become conscious about their figure. Similarly change of voice, facial hairs, Adam's apple in the boys, Acne, pubic and axillary hairs, obesity are few other challenges that may stress the Adolescent.

Solution The best way to help your teenager get through this phase is to make them aware of these changes. Explain that it is normal for the body to change as every teenager goes through. Help them to acknowledge and adapt these changes in a smooth way. Encourage them to stay healthy and fit through nutritious diet and exercise.

2. EMOTIONAL AND BEHAVIORAL CHALLENGES: Hormones affect teenagers not only physically but also emotionally. They tend to feel overly emotional just about anything making them happy, excited, mad or angry. Puberty can be an emotional Roller-coaster. Feeling and thoughts about sex may trigger a sense of guilt. Due to increasing peer effect and vast disarticulated material in the social media, this challenge is accelerated

Solution Assist them to take care of themselves. Let them talk. Listen to them without judging and giving them advice when they are not ready. Assure that it is normal. Talk to them sensitively. Indulging in creative and physical activity can help them channelize their emotions.

Overwhelming emotions can lead to impulsive behavior which can be harmful. As a part of their new independence, adolescents may also want to try new adventures and risks and sometimes difficult lifestyles. Gaining your child's trust is most important to help them with behavioral issues. We need to talk to them and listen carefully. Do not judge or criticize as it may worsen the situation. Help of professional counselors can be sought. FIG 2

3. SUBSTANCE USE AND ABUSE: Substance abuse in teenagers is one of the biggest problems that today's world has to deal with. Peer pressure and easy availability has a big impact in the present world. What may start as "thrill" can become a habit.

SOLUTION: Keep an eye on your child's behavior. Look for erratic behavior and changes in their appetite, sleep pattern and moods. Encourage them to talk and be honest. Tell them the concerns and discuss the problems. If necessary get a medical consultation and appropriate treatment. Avoid going far away and losing trust and confidence of the child.

4.EDUCATIONAL CHALLENGE: Nowadays teenagers may find pressure to perform excellently academically and obtain desired college admissions. Juggling school work, extracurricular activities and choices at home can be very tiring for them.

SOLUTION: Support your child's aspirations for college education as what they need is the encouragement to do well. We may cut down on a few activities so that they can concentrate better. Good nutrition and exercises can help them to get through a hectic high school period.

5. HEALTH PROBLEMS: Adolescents are vulnerable emotionally and physically. Without proper nutrition (growing culture of erratic fasting and binge eating of fast food), they are susceptible to illnesses. Adolescent girls can develop disorders like anorexia (refusal to eat) or bulimia (overeating). It may set up psychological issues like anxiety & depression.

SOLUTION: We need to guide them about health issues and help to adapt to a healthy lifestyle and balanced diet. Be there for them emotionally and physically as this will help them to deal with any possible disorders. If necessary seek professional advice. FIG 3

6.SOCIAL PROBLEMS AND RELATIONSHIPS: Attractions to opposite sex begins during puberty. They may not be comfortable talking to you about relationships unless you win their trust and confidence. In the present highly competitive society, your child may compete with her/his peers in anything and everything.

SOLUTION: Be friendly to your teenager. Let them talk and try to align their thought process in a smooth and non-judgmental way. Sharing your social life experiences can put them in ease.

7. ADDICTION TO CYBERSPACE: The advent of social media has changed the way we interact with each other. It has affected the teenage lifestyles the most. They are addicted to the internet tend to have fewer friends and a less active social life. It also may have detrimental effect on their academic and social performance.

SOLUTION: Do not say NO to the internet which will make them more adamant. Instead talk about your concerns and help them work on other things not requiring computers including family activities. Have some cyber rules and boundaries for everybody at home.

CONCLUSION: Parents play an important role in Adolescents behavior development in a challenging world. Our Adolescents are at an age that we have already been through. Be empathetic and try to understand what your child is going through. It would make the path easier.■

The Plants and flowers of the Kuwait's desert.

Kuwait occupies largest area in the world considered semi-arid desert. It's a land of sand and gravel and whose conditions make no difference with that of other deserts. It experiences high temperature, water shortage and high salinity. In spite of all these, Kuwait is enriched with biodiversity of 374 plants of various species. These plants and flowers has designed their own way of survival and growth despite the weather. Some plants retreat underground until it rains. It's later they resurrect their seeds and germination or growth continues.

These plants are important to humans and animals living in the desert for they provide food, medicine, protection etc. These plants include, Cyperus Conglomeratus, Panicum Turgidum, Centro podia Forsalii among many other. Many of these plants have been tested for their medicinal qualities They were and are still used indigenously in the absence of Allopathic medicine. This and many other desert plants bear lovely flowers on them. The Arfaj plant (Rhanterium epapposum) is one of them and its bright yellow flower is the "National Flower of Kuwait". Below are examples of Kuwait's desert plants.

Compiled by: Dr Hasan Khan

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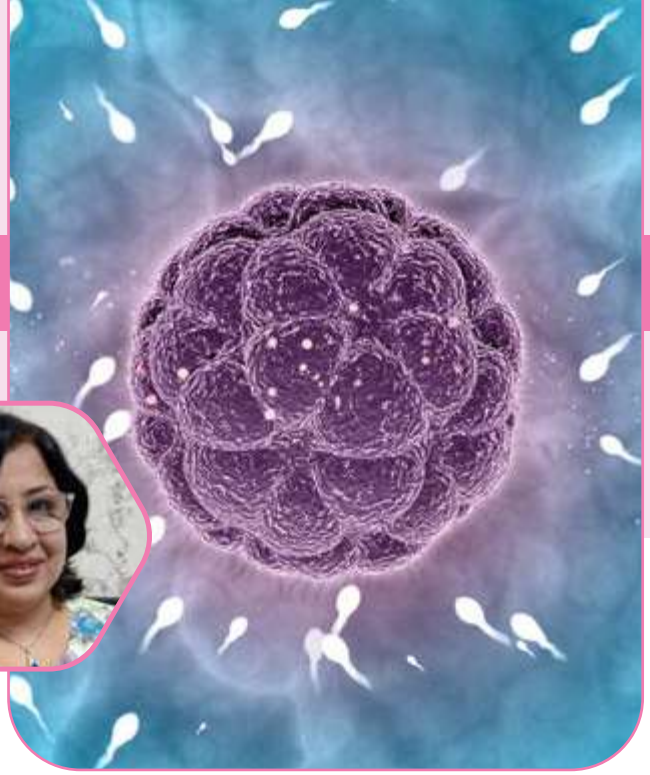
Infertility

"A Solvable Two Way Issue"



Dr. Tasneem Jasvi
Gynaecologist
Farwaniya Hospital

One of the greatest challenges the gynecologists are facing in day to day practice is exponential rise in infertility cases. Infertility means a couple is not able to achieve pregnancy after 1 year of trying.

There are 2 types of infertility:

1. PRIMARY. Women who have never conceived.
2. SECONDARY. Women who have conceived at least once, but are not able to conceive again.

Infertility is classified into 3 types depending on the cause:

1. Female infertility. There is a problem with women. It accounts for 40 percent.
2. Male infertility. There is a problem with man. It accounts for 20 percent of cases.
3. Both man and woman factors are responsible in remaining 40 percent of cases

Why are the cases rising?

Change in day to day lifestyle is the main reason. It has changed our thought process, our eating habits and mental and physical activities.

Causes of infertility

1. Age: It decreases with age. Women in their 20s are 2 times more fertile than those older than 35yrs. In men also, the quality of sperm declines after the age of 40. Nowadays men and women are ambitious and career oriented which has led to late marriage and postponing pregnancy.

2. Obesity: Sedentary lifestyle and eating high calorie "easy to go'' junk food has contributed to problems of overweight and obesity. Excessive fat cells in women produces increased amount of hormone estrogen, which causes disturbance in function of ovaries, that results in irregular menstrual cycle because of not releasing egg from the ovary on time. Obesity has led to other diseases like diabetes mellitus, hypertension, which again causes hormonal imbalance. It is very well established that reduction in 5 percent of body weight improves fertility rate.

3. Stress: It has become an integral part of our life. It affects our emotional, mental and physical wellbeing. Chronic stress makes alteration in hormones in the body leading to its consequences of disturbed reproductive health, causing difficulty in conceiving.

4. Smoking and Alcohol addiction affects both men

and women. They affect the quality of the eggs and sperm, which makes them less fertile.

Causes related only to women:

1. **PCOS:** It means Polycystic Ovarian Syndrome. characterized by enlarged ovaries with many small cysts on the outer edge. Infertility is a common feature of this disease. One in ten women are suffering from it. Its cause is believed to be genetic and lifestyle. It is a hormonal disorder causing high levels of male hormones called androgens. They prevent the release of eggs from ovaries. This leads to 3 main features of PCOS, i.e. excessive hair growth on face, irregular periods and infertility. One of the most practical ways to manage this disease is to follow a healthy lifestyle and weight management. It not only keeps your hormones balanced also makes your treatment easy and more effective. It also reduces long term complications of PCOS like Diabetes, high cholesterol, heart disease and cancer of the uterus.

2. **Uterine:** factors such as fibroids, which are benign tumors.

3. **Blocked fallopian tubes,** These tubes connect ovaries to uterus. Hence, they transfer fertilized egg to uterine cavity. Tube block can result from infections, which are because of having unprotected sex and unsafe abortions.

Causes in Men

1. Due to decrease in number or motility or quality of sperm. This may due to obesity, chronic illness like diabetes hypertension, inappropriate use of drugs, occupational exposure to toxins and high temperatures.
2. Varicocele is swelling of tubes that transfer sperm from testis.

TREATMENT:

Lots of advances have happened in recent years.
9 out 10 couples will eventually have a baby.
The treatment modalities are:

- Correcting lifestyle.
- Ovulation induction drugs which stimulate production of eggs.
- Intrauterine insemination
- ART means Assisted Reproductive Techniques. Under which most common is IVF.

  In IVF the egg is fertilized outside the body and the embryo. It is then transferred to the uterine cavity.

Eggs and sperms can be from the couple themselves or collected from a donor. This technique, is also useful in overcoming advancing age factors for those undergoing cancer treatment, where the use of chemotherapy and radiation destroys eggs.

Before starting these therapies immature eggs from ovaries are collected and kept frozen They are used later when a woman is fit or wishes to conceive.

Finally, we have learned how our current lifestyle has increased the burden of this disease. In order to overcome this problem, we will have to go back to our basics and adapt to them.

Eat lightly, breathe deeply and stay active and cheerful. ■

GAZYVA®
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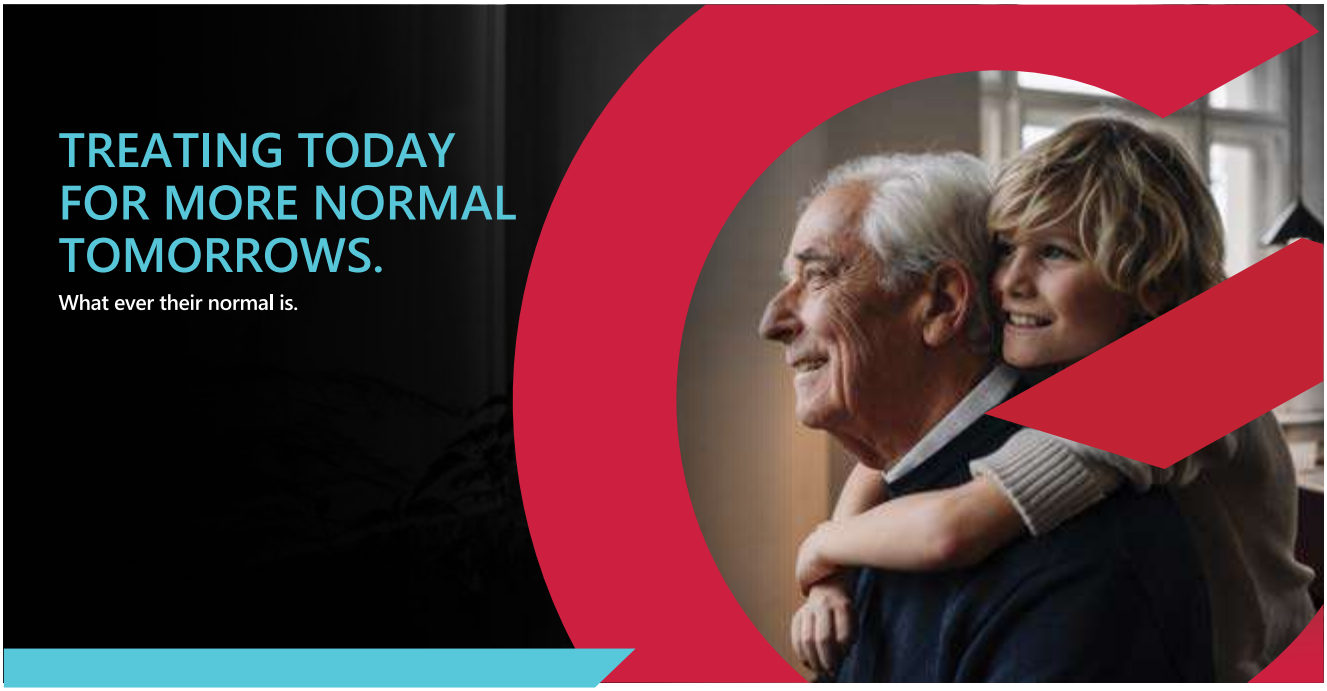

FL, follicular lymphoma
References: 1. Gazyva GCC Prescribing information.

PRESCRIBING INFORMATION Gazyva (obinutuzumab) Concentrate for solution for infusion. Each 40 ml vial contains 1000 mg obinutuzumab. For full prescribing information please refer to locally approved Product Information for Gazyva. Indications: Chronic lymphocytic leukemia (CLL): in combination with chlorambucil for the treatment of patients with previously untreated CLL (CLL) and additional comorbidities. Follicular lymphoma (FL): in combination with chemotherapy followed by subsequent maintenance therapy (for a maximum of 2 years) for the treatment of patients with previously untreated follicular lymphoma (FL) who require systemic therapy. Gazyva in combination with bendamustine, followed by Gazyva maintenance therapy (for a maximum of 2 years), is indicated for the treatment of patients with FL who have not responded to therapy or have progressed during or after treatment with rituximab or a rituximab-containing regimen. Dosage and Administration: Treatment with Gazyva should only be conducted under the supervision of a medical specialist experienced in the management of cancer patients. The infusion should only be administered in a place where full resuscitation facilities are immediately available and under the close supervision of an experienced physician. Gazyva is administered as an intravenous infusion through a dedicated line and must not be given as an intravenous push or bolus infusion. Isotonic 0.9% sodium chloride solution should be used to prepare the infusion solution. CLL: The recommended dosage of Gazyva is 1000 mg administered 3 times in the first cycle and once in each of cycles 2-6 (28-day cycles). At the start of treatment (first infusion) the total dose should be distributed to two infusion bags (bag 1 with 100 mg and bag 2 with 900 mg). FL: Previously untreated follicular lymphoma; Induction therapy: The recommended dosage of obinutuzumab in combination with chemotherapy is 1000 mg (administered 3 times in the first cycle, days 1, 8 and 15): and once on day 1 in each of cycles 2-6 (28-day cycles) in combination with bendamustine or once on day 1 in each of cycles 2-6 (21-day cycles) in combination with CHOP, followed by 2 additional cycles of Gazyva alone or once on day 1 in each of cycles 2-8 (21-day cycles) in combination with CVP. Maintenance therapy: Previously untreated patients with complete or partial response to induction therapy (Gazyva plus chemotherapy) should continue on maintenance therapy with Gazyva (1000 mg obinutuzumab once every 2 months) until disease progression or for up to 2 years. Relapsed/refractory follicular lymphoma: In patients with FL who have relapsed after or who have failed to respond to treatment with rituximab or a rituximab-containing regimen, Gazyva should be administered in six 28-day cycles in combination with bendamustine. Relapsed/refractory patients who achieve complete or partial response or stable disease should continue on maintenance therapy of 1000 mg Gazyva once every 2 months until disease progression or for up to 2 years. The recommended dosage of obinutuzumab is 1000 mg administered 3 times in the first cycle, days 1, 8 and 15, and once in each of cycles 2-6 (28-day cycles), followed by administration every 2 months (infusion of 1000 mg obinutuzumab on each occasion) until disease progression or for up to two years. The recommended dosage of bendamustine in combination with obinutuzumab is 90 mg/m2, administered intravenously on days 1 and 2 in each of cycles 1-6 (28-day cycles). In follicular lymphoma patients who do not experience a grade ≥3 IRR in cycle 1, Gazyva may be administered as a short infusion (approximately 90 minutes) from cycle 2 onwards. Short infusion in patients with follicular lymphoma Cycles 2-6 or 2-8 (day 1): If no grade ≥3 IRRs have occurred during cycle 1, the infusion (1000 mg obinutuzumab) may be started at a rate of 100 mg/h for 30 minutes, then increased to 900 mg/h for approximately 60 minutes. If a grade 1-2 IRR with ongoing symptoms or a grade 3 IRR has occurred during the previous short infusion, obinutuzumab should be administered at the standard infusion rate. Maintenance therapy (every 2 months until disease progression or for up to 2 years): If no grade ≥3 IRRs have occurred during cycle 1, the infusion (1000 mg obinutuzumab) may be started at a rate of 100 mg/h for 30 minutes, then increased to 900 mg/h for approximately 60 minutes. If a grade 1-2 IRR with ongoing symptoms or a grade 3 IRR has occurred during the previous short infusion, obinutuzumab should be administered at the standard infusion rate. Contra-indications: Known (IgE-mediated) hypersensitivity to the active substance or to any of the excipients. Precautions: Infusion reactions: The most frequently observed adverse drug reactions (ADRs) were infusion reactions which occurred predominantly during infusion of the first 1000 mg. In the majority of patients, regardless of indication, infusion reactions were mild to moderate and could be managed by slowing or temporarily halting the first infusion, but severe and life-threatening infusion reactions requiring symptomatic treatment have also been reported. To prevent infusion reactions, premedication with an analgesic/antipyretic (e.g. paracetamol) and an antihistamine (e.g. diphenhydramine) should be given 30 to 60 minutes before every Gazyva infusion. Premedication with a corticosteroid is recommended before the first infusion in FL patients. Such premedication is mandatory in CLL patients. Intravenous glucocorticoids (100 mg prednisone/prednisolone or 20 mg dexamethasone or 80 mg methylprednisolone; hydrocortisone is not recommended) should be given at least one hour before the start of the Gazyva infusion to all patients in the first cycle (CLL days 1 and 2, FL day 1) and, in subsequent cycles, to those who have experienced a grade 3 infusion reaction during the previous infusion or with a lymphocyte count >25 × 109/l prior to the next treatment. Hypotension may occur as a feature of infusion reactions during Gazyva intravenous infusions. Therefore, interruption of antihypertensive treatments should be considered for 12 hours before, during and for the first hour after each Gazyva infusion. Hypersensitivity reactions including anaphylaxis Hypersensitivity reactions of the immediate type (e.g. anaphylaxis) or delayed type (e.g. serum sickness) have been reported in patients treated with Gazyva. Hypersensitivity reactions may be clinically difficult to distinguish from infusion reactions. Tumor lysis syndrome (TLS): Patients considered at risk of TLS (e.g. patients with a high tumour burden and/ or a high circulating lymphocyte count and/or renal impairment) should receive prophylaxis. Prophylaxis should consist of adequate hydration and administration of uricostatics (e.g. allopurinol) or a suitable alternative such as urate oxidase (e.g. rasburicase) before the start of Gazyva infusion. For treatment of TLS, correct electrolyte abnormalities, monitor renal function and fluid balance, and initiate supportive measures, including dialysis, as indicated. Neutropenia: Patients who experience neutropenia should be closely monitored with laboratory tests until resolution. Thrombocytopenia: Patients should be closely monitored for thrombocytopenia, especially during the first cycle; regular laboratory tests should be performed until the event resolves, and dose delays should be considered in case of severe or life-threatening thrombocytopenia. Worsening of pre-existing cardiac conditions: patients with a history of cardiac disease should be monitored closely. Infections: Gazyva should not be administered in the presence of an active infection. Infections: Gazyva should not be administered in the presence of an active infection. Caution should be exercised when considering the use of Gazyva in patients with a history of recurring or chronic infections. Patients with severe viral infections should not be treated with Gazyva. Hepatitis B reactivation: HBV screening should be performed in all patients before initiation of treatment with Gazyva. Progressive multifocal leukoencephalopathy (PML): Therapy with Gazyva should be withheld during the investigation of potential PML and permanently discontinued in case of confirmed PML. Immunization: Vaccination with live virus vaccines is not recommended during treatment and until B cell recovery.

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Menopause Challenges

"Life Can Be Normal"

Dr. Anantha Priya Vaidya
Gynaecologist
Adan Polyclinic

Global life expectancy of women in the twenty-first century is around 70 years; By this standard, women nowadays will spend a third of their life in menopause. To make this major chunk of life-span meaningful, women as a group need to be enabled to live physically, socially, and sexually active lives.

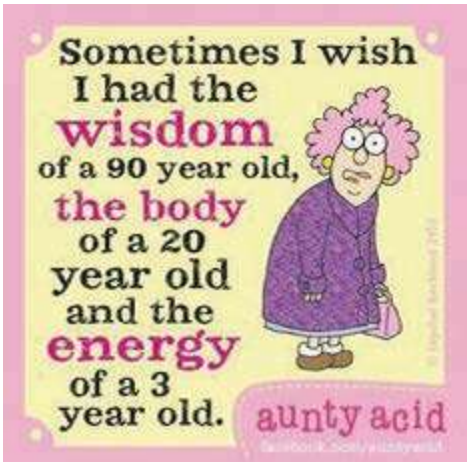
"Climbing these stairs at your age must be difficult for you." "Aunty, that dress must be for your granddaughter, surely you can't wear it." "What do old people need privacy for?" How many of us "women of a certain age" have heard such hurtful comments and bristled at them? The general mindset, especially in India is that a woman's life after menopause is essentially over. They are expected to devote their lives to their kids and grandkids and lead a quiet, color less, sex-less life. This needs to change! And the change happens with us.

Let us understand the when, why, how, and what of menopause first and then we can look for answers.

When does menopause happen? For most women it is around 50 years of age, but for some it can come as early as 40 years and some others, as late as 58 and it depends mainly on genetics. Early or premature menopause is the term used when menstruation stops before 40 years of age. Sometimes environmental factors like viral infections and pollution, surgical removal of uterus and ovaries, cancer and its treatment with chemo or radiotherapy may play a role.

Why does it happen? The ovaries are organs in a woman's body that produce eggs, which when fertilized leads to a pregnancy. Usually, one egg is released every month along with the hormones, estrogen, and progesterone. The hormones prepare the uterus to receive the pregnancy and if there is none, the uterus sheds its lining leading to a "period", an event all of us are familiar with. Now, the ovary has only a limited supply of eggs, about 400 in a lifetime, and this supply is exhausted around 50 years of age. When this happens, the ovaries stop working and the woman stops having pregnancies.

How does this all happen? The hormones produced by the ovaries not only regulate the monthly period but also have other roles to play in various parts of the body. The loss of these hormones leads to the common "menopausal symptoms". A lot of these changes start years before the periods actual stop because the ovaries usually don't stop abruptly, they lose their function gradually over time, producing fewer and fewer eggs, lesser and lesser hormones, before finally ceasing activity.



What can one expect at menopause? Even before the periods stop, for 4 to 5 years women experience symptoms of perimenopause. Common ones are irregular periods, hot flashes, sleep disturbances, aches and pains, bloating, and weight gain. Others include, increased urination, burning in the private parts, mood changes, difficulty in concentrating and sometimes more serious problems like anxiety, depression, and memory problems.

The loss of ovarian hormones also results in dry, loose skin, hair loss, decreased muscle tone, leading to tiredness and fatigue. More serious problems include osteoporosis, where the bones lose their calcium and become brittle and susceptible to fracture. Loss of libido and pain during sexual intercourse is also a direct effect of the lack of ovarian hormones.
Besides these, the other age-related problems like diabetes, high blood pressure, heart disease, arthritis, all start making an appearance.
Sounds awful, doesn't it? Makes you wonder if those hurtful comments are actually true. Is life really over after menopause?

The answer is an emphatic NO!

The twenty to thirty postmenopausal years can be happy and fulfilling. It just needs a few medications, and little tweaks in your lifestyle to make that possible.

Menopausal symptoms can be treated with hormone replacement therapy or HRT as it is popularly known. These pills replace the hormones which the ovaries have stopped producing, thereby improving hot flushes, mood disorders, skin changes, vaginal dryness, painful sex, and other common symptoms. They are also known to prevent cognitive deterioration, memory problems and heart disease. HRT is also a very powerful tool in improving bone health and preventing fractures.

However, there are certain risks with HRT, and these should be discussed with your doctor before starting this medication. Besides, these medicines are not available in Kuwait and other GCC countries. Alternatives to HRT include certain herbal medications which are available over the counter. Vaginal lubricants are also available freely and are helpful with improving sexual activity. But life after fifty doesn't have to be all about medicines. There are other important strategies you can adopt to make life more fulfilling.

There is a saying – if you don't use it, you lose it. That is very much true for the organs in the human body. If you don't move, all your muscles including your heart, will become thin and weak, your bones will become brittle and your joints stiff. So, the best way to ensure a pain free life is to keep moving.

The American Heart Association recommends "at least 150 minutes per week of moderate-intensity aerobic activity or 75 minutes per week of vigorous aerobic activity, or a combination of both, preferably spread throughout the week". Activities like walking, swimming, and gardening are very effective means to keep fit. It is important to avoid high impact activities to avoid falls and injuries. This goal is not difficult to achieve and is a small price to pay for keeping fit and avoiding medicines. Physical activity has multiple rewards.

It prevents diabetes, high blood pressure, and heart disease. Menopause can increase the risk of fall and fractures; Light weight bearing exercises increase muscle mass and prevents osteoporosis thereby reducing these risks.

Physical exercise has also been shown to improve cognitive function and postpone age-related memory loss. Studies have shown physical activity is associated with improved mood and libido. So, it looks like there is one powerful mantra to ward off old age-MOVE!

The second most important tool at your disposal is of course your diet. A sensible diet is the best way to keep healthy. When we hear the word diet, images of starvation and food deprivation come to mind. That is not what this is about. A healthy diet means having a balance of different food groups, avoiding processed food like chips and fast foods that are high on fat and salt content, and making sure to get enough proteins and vitamins. Getting adequate protein in the diet is important because it is the most important nutrient to prevent muscle loss. Sources of protein like lean meat, poultry, fish, milk, lentils, nuts are also good sources of other nutrients like vitamins and calcium. It is also important to drink enough water and imbibe alcohol in moderation. Your doctor can also advise some dietary supplements if needed.

There is a general opinion that elderly women are not interested in sex. That is certainly not true. Studies have shown that companionship and a healthy physical relationship are important factors for maintaining physical and psychological health. Several aids are available to make sexual intercourse less painful and women should have easy access to them.

While keeping good physical and mental health is important, a healthy social life is also just as important. Having a good circle of friends who are preferably not immediate family is extremely beneficial. Hobbies, pastimes, and volunteering are known to promote psychological well-being as well as form an important support system in times of need. So don't just play the role assigned to you as a wife, mother, or grandmother; have your own identity and social circle.

Another area of concern nowadays is the financial health of the elderly. Health care especially is a major expense. It is not a sensible idea to rely on your children for financial support. If you have been a member of the workforce, try and continue working as long as your health and other circumstances permit. Plan your finances well for retirement.

To sum up, keep moving, eat healthy, and take pills when needed. Plan your finances, have lots of friends, take up hobbies, help others. Most importantly- climb those stairs, buy that colorful outfit, enjoy the company of your significant other. Old age is not a challenge. **You are as young as you want yourself to be.**■

What is my diagnosis?

1 I'm old and confused. Memory's gone and mood diffused. It's difficult to carry a task through. I was born in Timbuktu, yes it's true!

2 My skin is red and itchy, bubbles ooze and crust! Oh scratch I must.

3 I feel a flutter in my chest, discomfort, short of breath and dizzy. I'm now in a tizzy!

4 It is red and teary, my head aches, and my vision is blurry. There is pain in my eye; Doctor says its pressure is high.

5. I sneeze and cough, body aches, fever and chills. Don't come near me or catch it you will

6. I feel tired and thirsty, pee often, mouth is dry. I didn't eat that chocolate, yet my sugar is high

7. I have pain and swelling and stiffness in my knee. It's getting difficult to climb up, I wonder what it can be?

8. I was bitten by mosquitoes, developed symptoms 10 days later. Now I have fever, chills and sweats, oh when will I get better?

9. I have pain in right lower abdomen, low grade fever and vomiting. It needs surgery they say; wonder what have I been eating

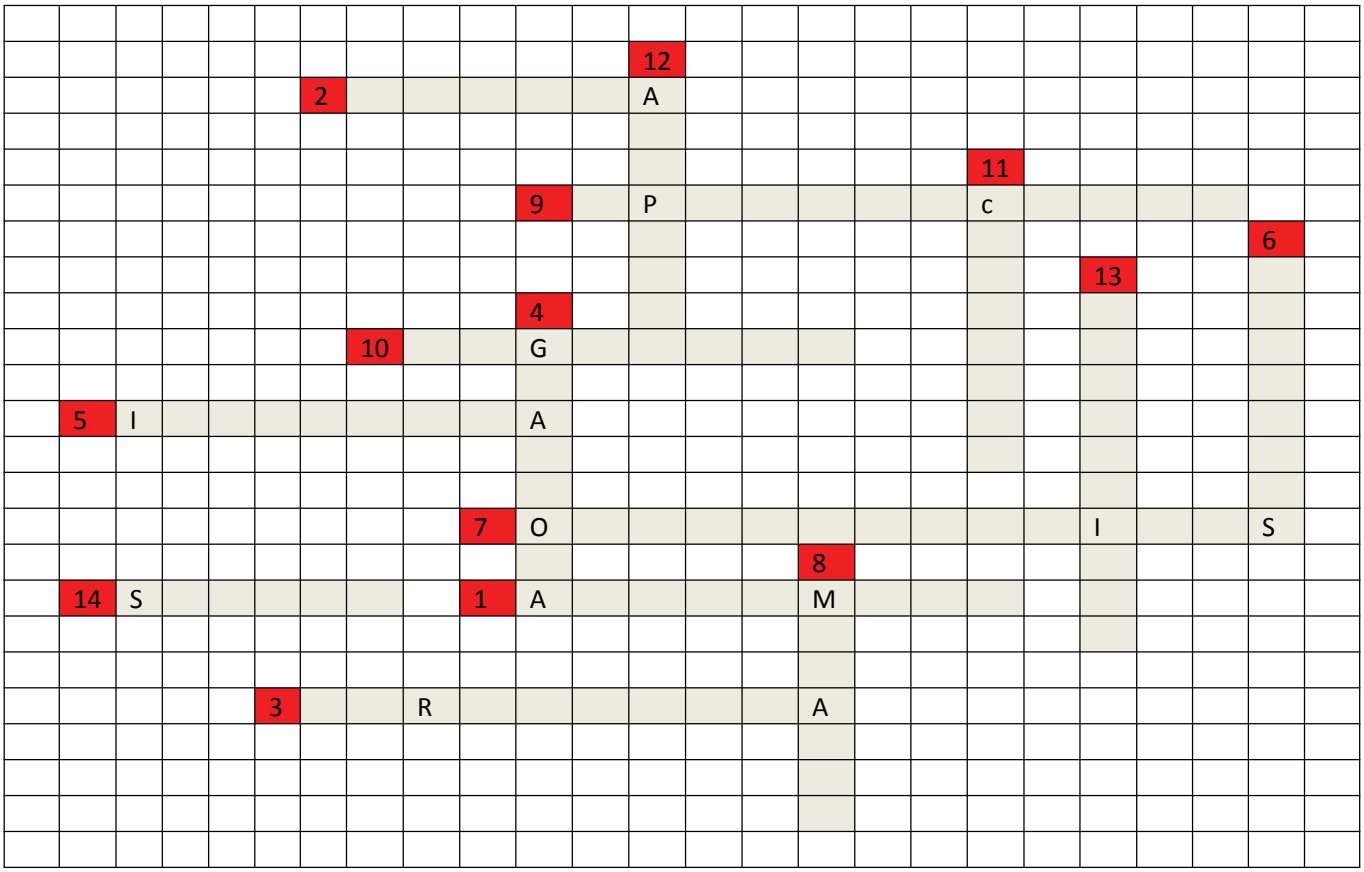
10. I have a throbbing headache on half of my head. I hate sound and light, my neck is heavy as lead

11. My vision is clouded and blurred, there are halos around light, I see double when I read, uncomfortable driving at night.

12. My hair is falling; there are bald patches on my head. It can come from stress, somewhere I had read.

13 My voice turned hoarse, and then weak-now it's gone. Throat tickles and is sore-wonder what more can go wrong!

14 My muscles are aching and my gums are bleeding. Skin is rough & has red dots; that wound is not healing



Learn Medicine by solving this CROSSWORD

Solution at the end of one of the articles.....Find it !

Compiled by: Dr. Ruchira Vasudeva

Osteoporosis

"The Preventable Nightmare"

Dr. Arijit Chattopadhyay
Endocrinologist
Al Sabah Hospital

Osteoporosis literally meaning 'brittle bone' is largely a silent disease. Osteoporosis damages bones to become abnormally thin, weakened, and easily broken. Osteoporosis is often diagnosed after a fracture has already occurred.

Diagnosis of osteoporosis is made by a special type of X-ray to measure bone mineral density (BMD) called DEXA scan. BMD scan generate T score for back bone (Lumbar) and Hip, which define Osteoporosis/ severe bone weakening (T score < -2.5) and Osteopenia/ moderate bone weakening (T score -1.0 to -2.5).

Certain Individuals are at high risk of Osteoporosis

- Women after menopause and Men over age 70 years.
- History of spontaneous or low trauma fracture as an adult
- Family history of early age fracture (parents or first-degree relatives).
- Those on systemic corticosteroid treatment more than 3 months
- Suffering from malabsorption disease e. g. celiac disease, inflammatory bowel disease
- Certain Endocrine disorders: hyperactive parathyroid, low sex hormones.

Why does osteoporosis occur?

Our bone undergoes regular repair and remodeling. Bone strength and mass continues to increase till the attainment of 'peak bone mass' achieved around 28-30 Years. There are two sets of activities sequentially happening; bone resorption and bone formation. Whenever there is excess resorption and deficient bone deposition, thinning of bones occurs (Figure 1). In certain situations; bone loss is over-activated due to lack of female hormone (estrogen) after menopause, corticosteroid use, overactive parathyroid gland etc.

What are the consequences of osteoporosis?

Although the effect of osteoporosis can be generalized, certain bony parts are more susceptible; back bone/ vertebra, hip bone/femur, and forearm/ radius (Figure 2). Progressive weakening of bone leads to fracture with decreased quality of life, increased morbidity and mortality.

How to prevent Osteoporosis?

- Regular intake of adequate dairy products
- Keep your vitamin D within healthy normal range
- Regular aerobic exercise
- Stop Cigarette smoking
- Reduction of excessive intake of alcohol, caffeine
- Stop cola drinks

Exercise and physical therapy focus on improving a patient's strength, flexibility, posture, and balance to prevent falls and maximize physical function. Exercise should be done for at least 30 minutes five times per week. Aerobic low-impact exercises, such as walking and bicycling, are generally recommended. During these activities, patients should maintain an upright spinal alignment. Balance training incorporates the strengthening of various parts of the body e.g., trunk, legs, proprioception, and vestibular input which help in fall prevention.

Dietary Measures: Adequate calcium and vitamin D intake are important in persons of any age, particularly in childhood as bones are maturing, and are essential in the prevention and treatment of osteoporosis. Vitamin D is increasingly being recognized as a key element in overall bone health, calcium absorption, reduction in risk of falls and muscle performance. For women older than 50 years, the recommended dose of calcium is 1200 mg/day, for men 51-70 years of age 1000 mg/day and those over 70 years 1200 mg/day. For both women and men, the recommended daily dietary allowance of vitamin D is 600 IU from age 51-70 years and 800 IU for after age 70 years. Many patients require higher levels continuously or for a short period to be considered vitamin D replete, which is defined as a serum 25-hydroxyvitamin D level of at least 75 nmol/L. A large meta-analysis concluded that vitamin D given together with calcium reduced hip fractures and total fractures, and possibly vertebral fractures.

How to treat Osteoporosis?

Various medications are recommended to treat osteoporosis.

- Bisphosphonates: Available both oral and injectable form. Act as anti-resorptive agent
- Denosumab (RANK-L inhibitor): Available as an injection every 6 months.
- Teriparatide: Daily injection for 18-24 months, Helps bone formation. Reserved for severe osteoporosis

These treatments (Figure 3) are indicated for established osteoporosis patients only. Patients are advised to remain under specialist supervision to assess clinical response and monitor any side effects.

Vertebroplasty and Kyphoplasty

The goals of surgical treatment of osteoporotic vertebral fractures include rapid mobilization and return to normal function and activities. Operative interventions include anterior and posterior decompression and stabilization with placement of internal fixation devices as screws, plates, cages, or rods. Bone grafting is routinely performed to achieve bony union. Vertebroplasty and balloon kyphoplasty are indicated in patients with incapacitating and persistent severe focal back pain related to vertebral collapse.

Doctor, I need to get a dental procedure. Should I discontinue osteoporosis medication?

Many patients need to undergo dental procedure e.g. dental extraction or dental implants and need to be informed about possible hazards. Those patients already on anti-osteoporosis treatment should discuss with their dental doctor about the procedure and may need to have a drug holiday (3 months) prior to the procedure. Osteonecrosis of the jaw is a rare side effect of bisphosphonates and denosumab treatment. Patients should be informed about these side effects and advised to check with

dental doctors for pre-existing disease in order to prevent fractures in men and women with low bone density or osteoporosis.

Following recommendations are made:

- Clinicians should offer pharmacologic treatment to women with known osteoporosis to reduce the risk for hip and vertebral fractures.
- Hormone replacement treatment (HRT); Estrogen/ estrogen plus progestogen or raloxifene are not recommended in postmenopausal osteoporosis.

- For patients with advanced osteopenia who are at high fracture risk, decisions to treat should consider patient preference, fracture-risk profile based on FRAX score, benefits, harms, and cost of medications
- Pharmacologic treatment should last for at least 5 years to have sustained benefit

- Monitoring of bone mineral density (BMD) is generally every 2-3 years.
- Teriparatide as a bone anabolic treatment is used for a period of 18-24 months for patients with severe osteoporosis (BMD T score < -3.5) or with fragility fracture.■

Human Anatomy - Word Search

J K K E W A W M V J L L V V E E V C V X L Q V A V H K B D H
X V D P L B T N X P I U U K Y Y E V U K C U N B B C E R R O
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Pancreas	Humerus	Stomach	Ear
Uterus	Spleen	Kidney	
Ovary	Tooth	Tibia	
Liver	Brain	Heart	
Femur	Lung	Nose	
Knee	Bone	Eye	

Compiled by: Dr. Sajna Mohammed

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From the Associate Editor's Desk

Innovation and renewal are required to keep a laboratory on the frontiers of science

-Burton Richter

As has been stated by Sir Jagadish Chandra Bose & Marie Curie – "The true laboratory is the mind, where behind illusions we uncover the laws of truth. I am among those who think that science has great beauty. A scientist in his laboratory is not only a technician: he is also a child placed before natural phenomena which impress him like a fairy tale. We should not allow it to be believed that all scientific progress can be reduced to mechanisms, machines, gearings, even though such machinery has its own beauty."
The body is a marvelous machine...a chemical laboratory, a power-house. Every movement, voluntary or involuntary, is full of secrets and marvels.

In this section keeping with the above perspective in mind Dr. Mrinmay K. Mallik has beautifully defined cytopathology (study of free cells and fragments of tissue) and outlined the tests that come under its umbrella. So has Dr. Mohan Ram stated the larger role of Biomarkers / molecular testing in the management of both hematological and solid malignancies in the era of precision medicine. Myself, Dr. Piyush Bafna have tried to explain the complex and multi-faceted work of the modern radiologist which is not only as an "Imagologist" but has pivotal role in overall management in the patient's health care even at primary or the ground level. He is the doctor, protector, communicator, innovator, scientist and teacher. Dr. Rajesh Venunath has highlighted that the future of minimally invasive surgery will be to a large extent offered by interventional radiological procedures which are of high-quality with low-complications & cost-effective therapies.

Paramount to the global health challenges are the blatant abuse of antibiotics and the current sound producing devices. The resultant antimicrobial resistance and hearing loss respectively has been aptly explained in simple language by Dr. Divyaa Elangovan, a Microbiologist & Dr. Soumya R Shetty, the ENT surgeon. Fallacies related to the blue light from the electronic devices being damaging to the eyes and the need for healthy viewing habits has been emphasized by Dr Rajesh Vasudeva. Dr Manu Kurian has highlighted the various tests used to understand the difficult subject of "The lung functions" in an as simplified manner as possible.

In this section articles mainly focus on diagnostic challenges along with misuse / abuse of antibiotics, sound producing devices & electronic screens and the solutions offered by the authors.
A biologist & a nature writer commented: "We live in a scientific age, yet we assume that knowledge of science is the prerogative of only a small number of human beings, isolated and priests like in their laboratories. This is not true. The materials of science are the materials of life itself. Science is part of the reality of living; it is the way, the how and the why for everything in our experience".

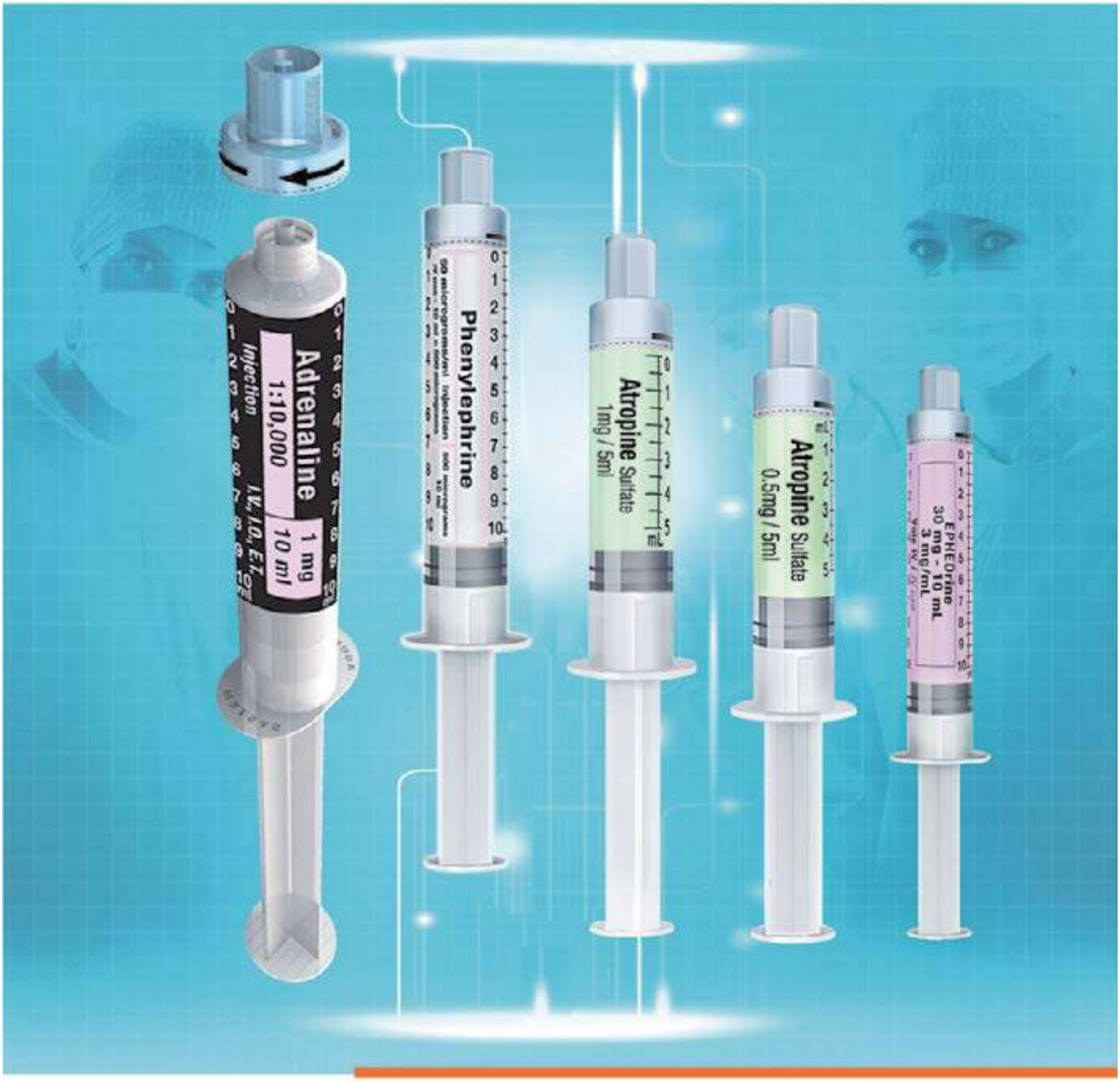
DIAGNOSIS IS NOT THE END BUT THE BEGINNING OF PRACTICE.

Dr. Piyush Bafna

INVESTIGATIVE MEDICINE AND OTHER MEDICAL CHALLENGES

SECTION FIVE

AGUETTANT PRE-FILLED SYRINGES



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Role of Radiology and The Radiologist In Global Health Challenges

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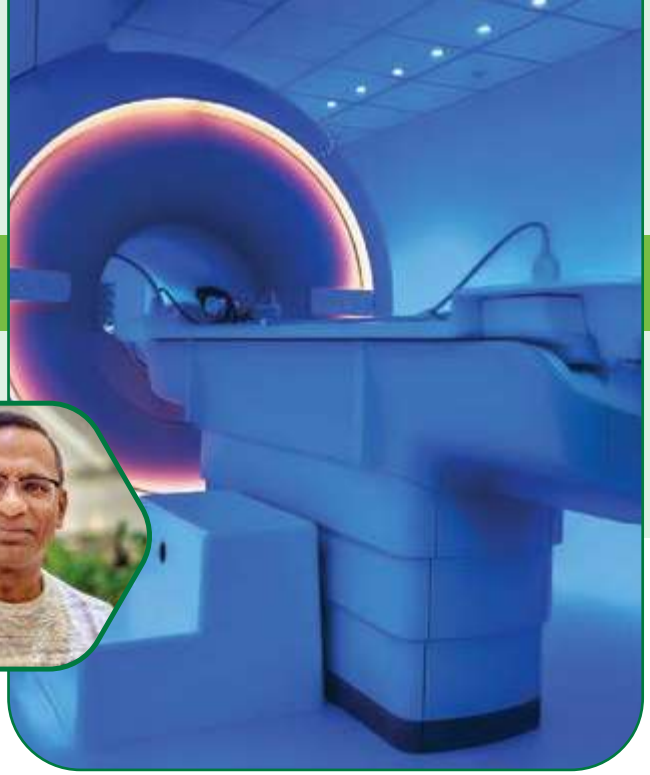

Dr. Piyush Bafna
Radiologist
Specialized Clinics Centre

Radiologists were not there at the beginning of radiology. Neither were radiation oncologists or nuclear medicine physicians. With the advent of X-rays for diagnosis and therapy, and pioneering advances in the fields of ionizing radiation, it took a few decades for radiology and radiotherapy (and later, nuclear medicine) to establish themselves as independent specialties, separate from other disciplines. Initially, radiology was a single field, with any competent radiologist expected to be familiar with all its applications. As knowledge and capabilities grew, subspecialties began to emerge within radiology; the entire field became too broad for any one individual to master, and the benefits of high-level knowledge and service delivery by doctors working exclusively in their particular subspecialty became clear.

Radiology as a specialty has been enormously successful since its beginnings, moving over time from an adjunct to clinical decision-making to a crucial component of multidisciplinary patient care. However, this reliance on radiology services carries within it dangers, prominent among them being the danger of it being viewed as deliverers of a commodity, and the risk of radiologists becoming overwhelmed by increasing workload, unable to interact sufficiently with patients and referrers due to pressure of work.

Global health radiology

The term global health is derived **from the concept of tropical medicine, public and international health.** Although these terms may appear similar and have overlapping definitions, they differ in areas of emphasis. **Global health** is defined as an area for study, research, and practice that places a priority on improving health and achieving equity in health for all people worldwide. It emphasizes transnational health issues, determinants, and solutions; involves many disciplines within and beyond the health sciences and promotes interdisciplinary collaboration; and is a synthesis of population-based prevention with individual-level clinical care. This definition of global health has been adapted in the specialized area of radiology known as **global health radiology** to clarify the various roles and strategies that the radiology community is using to assist resource limited and impoverished communities in the developing world. Based on this definition, several components of global health became the characteristics that defines global health radiology

Challenges of global health radiology

The primary global challenges confronting radiology are :

1) Inequality in access to radiology services - This disparity in access is termed the **"radiology divide"** and is largely due to limited financial and human resources as well as lack of appropriate device procurement and planning. In addition, disparity in access can impact health outcomes and lead to higher rates of undiagnosed and untreated diseases like pneumonia, tuberculosis, cancer, trauma, and congenital abnormalities.

2) **Injudicious use of existing resources** – examinations ordered repeatedly where freely available.

3) Large gap in image service quality

4) Deficiencies in service planning, sustainability and the paucity of appropriate data to inform future strategic planning, policy, standards, and guidelines.

5) Multidisciplinary collaboration across radiologic and non-radiologic medical specialties as well as outside the health sciences (such as economics, technology, engineering, business, and social science disciplines).

The lack of relative progress in many **LMICs (Low and Middle Income Countries)** has worsened the inequality. A baseline country survey carried out by WHO (world health organization) about the type and number of highly specialized radiological equipment around the countries of the world sheds light on this. Based on the information received revealed disparity in access to radiology services. The survey showed on average, around 54 percent of countries have at least one magnetic resonance imaging (MRI), 70 percent have at least one computed tomography (CT) scanner, 89 percent have mammography and 10 percent have PET scanner unit per 1 million populations (Table 1). But sometimes the differences are great. For example, only 14 percent of the low-income countries have at least one CT equipment per million populations as opposed to 100 percent of HICs (high income countries). Similarly, in terms of radiology workforce, great disparity exists. For example, there are more radiologists working in four selected teaching hospitals in Boston, Massachusetts, than there are in West Africa according to a report. Additionally, in many resource deprived countries where imaging equipment are available, at least 40 percent of these equipment have been estimated to be not fully functional, often because they are donated at the end of their lives and getting replacement parts isn't possible.

Table 1

Percentage distribution of specialized radiology equipment according to World Bank classification of countries

	MRI	CT	Mammography	PET
Low Income countries	0	14	76	0
Lower Middle - Income countries	30	60	79	4
Upper Middle- Income countries	70	88	97	3
High Income countries	92	100	100	29
Average	54	70	89	10
Total Respondent Countries	132	135	123	116

The **sustainability of radiology** is also a challenge due to the high cost of equipment and skill requirement of radiology services. Sustainability in this context is the ability to develop and maintain knowledge, equipment, skills, and other resources as part of an enduring radiology infrastructure that addresses the health care needs of a community by integrating with existing health care infrastructure. Key areas requiring sustainable strategies are: Finance, clinical imaging, information technology (IT), education and training of healthcare personnel.

Lack of electricity, roads, or an information system to store images are non-medical related challenges confronted with radiology in global health.

Workforce				Imaging Equipment
Full professional team	-	Tertiary care	-	Full set of equipment
Dedicated workforce	-	Secondary care	-	X-ray, CT, ultrasound
Primary care workforce	-	Primary care	-	Portable ultrasound

- The role of the radiologist in the modern, rapidly changing world of healthcare is multifaceted and essential. Radiologists are clinical doctors, trained in a specialty just like any other specialist, with specific expertise that does not imply limitations on their clinical knowledge and primary clinical role in diagnosis and treatment of patients as part of multidisciplinary management teams.

- Radiologists play a key part in the diagnosis, treatment, and protection of patients. Contribute to preventing the development of clinical disease; many screening programmes (e.g., breast cancer, colon cancer, lung cancer) rely heavily on imaging-based determination of the presence or absence of pre-clinical disease, and radiologists are central contributors to these programmes.

- Through research and application of novel technologies, radiologists contribute heavily to medical innovation.

- Viewpoints on radiology that consider it as a commodity are incorrect, and ignore much of the activity, relevance and value-creation of modern radiologists.

Role in global health

Radiology in global health initiatives is very critical in **reducing disparities in access to radiology.** Components of radiology in global health initiative programs should consider a viable and sustainable economic strategy, designing and testing of good clinical imaging models, integration of radiology to public health programs, enhancing interpersonal education and collaboration of health professionals, and the utilization of information technology strategies.

The work of the modern radiologist is **complex and multi-faceted,** viewed as image interpreters by many non-radiologists away from direct patient care and interaction. There may be some truth to this characterization, as it is a major aspect of the work profile. However, now the role is central in patient care, with important aspects in complete patient management (multidisciplinary teams), inclusive of treatment (interventional radiologists). Only by refusing to be pigeon-holed as single-task automatons will the key role in patient care be maintained and developed.

The position of the radiologists in the modern healthcare environment should be considered with respect to their duties and contributions as **doctors, protectors, communicators, innovators, scientists and teachers.** They are not just tertiary care providers based on only reference from other medical faculty clinicians, but their role in providing an economical solution to the overall management in the patient health care even at primary and ground level should not be undermined as only **"Imagologists"**.■

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Interventional Radiology' The Minimally Invasive Way Forward

"A True Advance In Invasive Medical Care"

Dr. Rajesh Venunath Nair
Interventional Radiologist
Jaber Al Ahmad Al Jaber Al Sabah Hospital

INTRODUCTION

Interventional Radiologists or popularly referred to as "IR", are doctors who are called image-guided surgeons. In this modern 21st century era of robotic surgeries and artificial intelligence it is not surprising that technology has advanced in such great bounds that it is now possible to perform surgeries with the help of medical imaging tools to diagnose and treat diseases. Interventional Radiologist is defined as a "clinical doctor who performs minimally invasive image-guided procedures to treat complex medical conditions".

Over the past decade, interventional radiology (IR) has made significant progress in technological applications, quality of care, training, expansion, and even recognition. Interventional Radiology (IR) uses imaging, such as ultrasound, CT, MRI, and Fluoroscopy to perform "minimally-invasive" procedures through a small 2-3 mm puncture, whereby most of the procedures are bloodless, scar-less and painless. Many procedures that previously required open surgery can now be performed by an Interventional Radiologist in almost half the time with much less the cost, usually as day care under local anaesthesia.

Who makes up the IR team?

The IR team consists of:

- An Interventional Radiologist (IR) is a radiologist who has specialised training to perform minimally-invasive image-guided procedures.
- Radiology technologist and nurse trained for assisting in interventional procedures.

How are IR procedures done?

IR procedures are done in a special sterile operating room like setting called a Catheterization Lab or Angiography suite using a Fluoroscopy machine to see inside your body. The room is equipped with all sorts of machines and gadgets for performing a wide array of procedures and managing all sorts of complications. Most of the vascular procedures are done using a puncture wound in your groin or neck to gain access to your blood vessels either an artery or a vein and placing a special vascular sheath to maintain access.

Modified Seldinger technique is used for passing instruments over a wire under guidance which makes most of the procedures less traumatic and more precise. The vascular sheath helps in

performing various tasks like plasty or stenting or embolization by aiding deployment of devices like stents, plugs, filters and valves along specially designed & engineered guidewires and catheters.

Interventional Procedures.

Can be broadly classified into endovascular and non-vascular (percutaneous) body interventions: peripheral and neuro-interventions. Vascular procedures are done within the major arteries and veins of the body. Non vascular interventions are those that are performed within solid organs or ducts percutaneously under ultrasound or CT guidance. Continuing advances in technology mean the range of conditions that can be treated by interventional radiology is continuing to expand.

Scope of IR

Interventional radiologists do a variety of procedures, including:

- **Angiography.** This is an X-ray of the arteries and veins to find blockage or narrowing of the vessels, as well as other problems.
- **Angioplasty.** The doctor puts a small balloon-tipped catheter into a blood vessel. Then he or she inflates the balloon to open up an area of blockage inside the vessel.
- **Embolization.** The doctor puts a substance through a catheter into a blood vessel to stop blood flow through that vessel. This can be done to control bleeding.
- **Gastrostomy tubes.** The doctor puts a feeding tube into the stomach if you can't take food by mouth.
- **Intravascular ultrasound.** The doctor uses ultrasound to see inside a blood vessel to find problems.
- **Stent placement.** The doctor places a tiny mesh coil (stent) inside a blood vessel at the site of a blockage. He or she expands the stent to open up the blockage.
- **Foreign body removal.** The doctor puts a catheter (snares, forceps, etc) into a blood vessel to remove a foreign body in the vessel.
- **Needle biopsy.** The doctor puts a small needle into almost any part of the body, guided by imaging techniques, to take a tissue biopsy. This type of biopsy can give a diagnosis without surgery. An example of this procedure is the needle biopsy of breast lesions.
- **IVC filters.** The doctor puts a small filter into the inferior vena cava (IVC) which is a large vein in your abdomen. The filter catches blood clots that may go into your lungs.
- **Injection of clot-dissolving medicines.** The doctor injects clot-dissolving medicines such as tissue plasminogen activator. This medicine dissolves blood clots and increases blood flow to your arms, legs, or organs in your body.
- **Catheter insertions.** The doctor puts a catheter into a large vein to give chemotherapy medicines, nutrition, or hemodialysis. He or she may also put in a catheter before a bone-marrow transplant.
- **Cancer treatment.** The doctor gives the cancer medicine directly to the tumour site.

What are types of IR procedures?

Blood vessel disease

Arteries

Narrowing of arteries leading to restricted blood flow (peripheral vascular disease): Interventional radiologists treat this by using balloons to stretch

the vessel (balloon angioplasty, PTA) and sometimes metal springs called stents to hold them open. Sometimes arteries or bypass grafts block suddenly with a rapid loss of blood supply to the limb. Unless the blood supply is restored this can lead to amputation. Interventional radiologists can help by infusion of clot busting drugs directly into the artery via small catheters thus saving many limbs.
Expanded arteries (aneurysms) at risk of rupture and bleeding: IRs treat these by relining the vessel with a tube called a stent graft.

Bleeding (haemorrhage). This is the most common vascular emergency treated by IR. Haemorrhage can come from almost anywhere e.g. from the gut, secondary to major injury or following birth. Bleeding can often permanently be stopped by blocking the vessel (embolization), relining the vessel with a stent graft or by blowing up a balloon in the vessel to stop the bleeding until emergency surgery can be performed. Interventional radiology is also used to prevent bleeding during some sorts of surgery e.g. during caesarean section in patients with a high risk of bleeding from an abnormal placenta (postpartum haemorrhage).

Veins

Blood clots in the lung (pulmonary embolism, PE): interventional radiologists perform 2 different forms of treatment, placement of devices (inferior vena cava filters) to capture blood clots before they reach the lung preventing further PE. When there is a massive PE causing collapse, an interventional radiologist may use small catheter tubes to break up the blood clot and restore blood flow.

Dilated veins (varicose veins): these most commonly occur in the legs but can occur in the pelvis or scrotum. These can be treated by blocking the vein by heat treatment (laser or microwave) or by the use of irritant drugs and embolization techniques. Recently a technique called Venaseal glue injection is gaining popularity.

Blocked veins: this can occur in the context of blood clot in the veins (venous thrombosis, DVT) which is sometimes treated by the injection of blood clot dissolving medicines (thrombolysis) through a small catheter passed into the vein. Some patients develop blood clots as a result of a narrowing in a vein, when the clot has been broken down using balloons and stents. Sometimes tumours in the chest will compress a vein leading to facial swelling, headache and other symptoms which can usually be relieved with a stent.

Non vascular interventions

This is sometimes referred to as interventional oncology but the treatments are also effective in benign conditions. IR therapies are used for the following:

- to treat the tumour / cancer (tumour ablation, embolization)
- to relieve the effects of the cancer on other systems e.g. blockage of the gullet (oesophagus), bowel, kidney (nephrostomy) or liver (biliary drainage)
- To drain collections of fluid or pus in the chest or abdomen
- To place feeding tubes (gastrostomy, jejunostomy)
- To treat collapsed spinal bones (vertebroplasty)

Tumour therapies: these treatments are intended to shrink or destroy tumours at their primary site or which have spread to other areas (metastases). This is an area of increasing interest and leading to improved survival with reduced morbidity.
Liver, kidney and other tumours (e.g. bone, lung): these can be treated by destructive therapies

(ablation) usually involving heat (radiofrequency, laser, microwave, ultrasound) or cold damage (cryotherapy). The treatment is performed and monitored using imaging (ultrasound, computed tomography or magnetic resonance imaging).

Uterine fibroids: heavy menstrual bleeding and pain can be caused by benign tumours called fibroids. These can be treated by blocking blood vessels (uterine fibroid embolization, UFE) which leads to shrinkage. Embolization is sometimes combined with drug therapy (chemo-embolization) or radiotherapy (radio-embolization) which targets the effect to the tumour and limits some of the side effects of cancer therapy.

Stone Disease

Kidney stones are not uncommon and cause pain, infection and blockage of the kidney. Obstruction of the kidney in the presence of infection will rapidly cause irreversible kidney damage. Interventional techniques include placing a tube in the kidney (nephrostomy) to allow the urine to drain and removing the stones using a variety of instruments placed through the skin into the kidney. Large kidney stones are best dealt with by creating a tunnel into the kidney through a small skin incision and then passing an endoscope directly into the kidney, breaking the stone with special instruments and pulling the fragments out (percutaneous nephrolithotomy).

Gallstones are one of the most common upper abdominal disorders. Most are dealt with by laparoscopic surgery. When stones or tumour stop bile draining from the liver this causes jaundice, this is usually treated via a telescope passed down the throat (endoscopy) but sometimes requires an interventional radiologist to perform drainage by placing catheter tubes through the liver to either remove the stones or place stents to allow drainage.

Neuro- interventions

Interventional Neuroradiology is a subspecialty of clinical radiology dealing with the diagnosis and treatment of vascular diseases of the brain, head & neck, and spine. By treating these conditions through an endovascular approach with cutting edge imaging and guidance techniques using the body's natural conduits (arteries and veins) to reach the site of disease, the need for open surgery can often be avoided, and a speedy return to normal life can be facilitated, to treat conditions such as strokes or aneurysms.

Interventional neuroradiology is used to treat:

- Head, neck and spinal tumours through embolization (injecting medical grade 'glue', special tiny coils or sand-like particles into the blood vessels of a tumour)
- Intracranial brain aneurysms
- Vertebroplasty (injecting bone cement into vertebrae to stabilise them)
- Radiofrequency Ablation

IR Clinics

IR has now become an integral part of the multidisciplinary health care system that many hospitals now have dedicated IR OPD clinics where doctors can evaluate, counsel and prepare patients for procedures. Usually the patients who require interventional management are referred from other clinics when their primary doctor feels that the patient may get optimal benefit from IR treatment. Quite a number of patients have now gained sound knowledge regarding the potential benefits of IR and now choose to consult the Interventional Radiologist directly to establish patient-physician relationship and better understanding of the

complexities of the treatment and potential risks and benefits. Dedicated IR clinics with outpatient care are now established in many hospitals who provide regular consultancy services as well as perform minor outpatient procedures. There is now a growing sense among interventional radiologists that the procedures performed today demand more active involvement in direct patient care, the interventional radiology clinic is slowly becoming a fixture in most successful practices.

Side effects of Interventional Procedures.

There are few untoward side effects of image guided procedures. Many of them do not cause any long term harm. Some of which include.

- Many of the procedures are done under fluoroscopy which can produce long term harm due to radiation exposure.

- Interventional procedures may harm the growing viable foetus. Hence young female patients should inform the doctor regarding possible pregnancy and confirm before exposing to radiation.

- The endovascular procedures are done by injecting iodinated contrast media into the vessels to make visualisation easier. These contrast agents are found to damage the kidneys in the long term especially in elderly patients who are diabetic and takes multiple medications. To reduce the risk of damage to the kidneys we are now using newer nonionic low osmolar water soluble contrast agents.

- Many of the endovascular procedures carry risk of forming blood clots within the vessels. Hence the doctor will administer anticoagulants like heparin during the procedure to make your blood thin.

Challenges in IR

There are several challenges to the delivery of IR services. These include the training of interventional radiologists, workforce provision, clinical practice commitments, access to inpatient beds, day-case facilities, competition, and certification of IR practice.

Provision of IR procedures is a growing need for rural patients. Recruitment and retention of interventional radiologists is a growing problem for rural hospital and radiology practices, the full magnitude of which is yet unclear. The problems are multifaceted and need further examination.

Future of IR

Recent developments in AI (Artificial Intelligence) represent additional revolutionary opportunities of growth in the current and future practice of image-guided interventions. Utilising AI, outcomes of interventions can be more accurately and quickly predicted, improving patient outcomes. Machine learning algorithms will be able to augment the interventional radiologist in guiding treatment decisions and selecting patient populations that would benefit most from interventions in areas, such as interventional oncology, where multimodal therapies abound. Another area with future potential in imaging-guided interventions is robotics, which has already been integrated into many fields of medicine.

Endovascular approaches continue to be identified as a way to treat conditions formerly managed with invasive surgeries and medication therapies. The future is bright as the value proposition of interventional radiology offering minimally invasive, high-quality, low-complication, cost-effective therapies align extremely well with the future of medicine and healthcare.■

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Dr. Mohan Ram
Hemato-Oncologist
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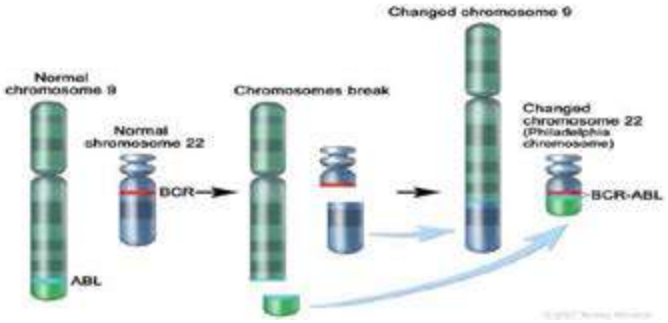
■ Biomarkers in hematological malignancies (Blood Cancers)

Introduction: Biomarkers (biological markers) are surrogate molecules that indicate normal or abnormal process taking place in your body and may be a sign of an underlying condition or disease. There are different types of molecules such as DNA (genes), proteins or hormones. These can be produced by cancer cells or by other cells in body in response to cancer. Biomarkers are not limited to cancer only but also found in many other diseases like heart diseases, multiple sclerosis etc. It is fast growing area in the field of hematological malignancies and its treatment which help in diagnosis, prognosis and therapeutic work up. There are certain hematological condition where bio-makers are very helpful for the diagnosis, and management including targeted therapy.

Myeloproliferative disorders (MPDs): MPDs are blood cancers caused by changes in the stem cells inside the bone marrow where blood cells is being formed. There are different kinds of MPDs like.

1.Chronic myeloid leukemia-The discovery of Philadelphia chromosome, t(9,22) in CML was a major breakthrough in the management of CML. Philadelphia Chromosome is a piece of chromosome 9 and a piece of chromosome 22 break off and trade places. The BCR ABL gene is formed on chromosome 22 where the piece of chromosome 9attaches. The changed chromosome 22 is called Philadelphia chromosome. There are two kinds of Philadelphia chromosome according to breakpoint on chromosomes. In CML (P210) and in Acute Lymphatic leukemia (P190). This is a diagnostic tool for CML, which can be done by fluorescence in situ hybridization (FISH), cytogenetics or reverse transcriptase polymerase chain reaction (RT-PCR). The latter is used for monitoring of minimal residual disease (MRD). There are variety of tyrosine kinase inhibitors (TKIs) available for the treatment CML or Ph+ diseases. Atypical CML is Ph negative but deep sequencing may show CSF3R mutation which could be present in chronic neutrophilic leukemia as well.



2.Polycythemia Vera (PV) / Essential Thrombocytosis (ET) / Primary Myelofibrosis (PMF): - Polycythemia Vera is a type of blood cancer where bone marrow produces too many red cells. These excess cells thicken your blood which may results into blood clots.

Essential Thrombocytosis is a rare blood disease in which the bone marrow produces too many platelets which also can leads to increase risk of blood clot or thrombus, can leads to serious health problems.

Primary Myelofibrosis is disorder in which normal bone marrow tissue is gradually replaced with fibrous scar like material which can leads to marrow failure. In such condition there are certain biological markers which include Janus Kinase 2 V617V (JAK2617V), Calreticulin gene and Myeloproliferative leukemia (MPL) gene.

JAK2 V617F mutation was discovered in 2005 and was shown to be present in 95% of PV cases and approximately 50% to 65% of ET and PMF. There is another mutation exon 12 of JAK 2 which can be detected in 5% cases of PV, if JAK2V617F absent. Likewise in ET and PMF cases lacking the JAK2 mutation, an assessment of MPL is indicated, given that 5% or more of patients with PMF even fewer patients of ET (1%) will show an aberration in this gene.

Another mutation called CAL-R is found in 20-25% of ET / PMF patients and carries a better prognosis.

Mastocytosis: Mastocytosis is a rare condition caused by an excess number of mast cells gathering into body's tissues. There 2 main types cutaneous and systemic. Cutaneous may not be life threating but systemic can be. The most common mutation in systemic mastocytosis is D816V around 70%-80% and includes major criteria for the diagnosis of entity. The patient with D816V variant is resistant to Imatinib.

Myeloid and Lymphoid Neoplasm with Eosinophilia and abnormalities of PDGFRA, PDGFRB, FGFR: A unique group of myeloid and lymphoid neoplasms (blood cancers) are defined by aberrant TKI activity due to translocation involving PDGFRA, PDGFRB, FGFR. These all associated with eosinophilia. A work up for abnormalities in these genes should be considered in cases of eosinophilia with end organ damage or in which secondary reactive eosinophilia has been excluded. These abnormalities can be detected either by conventional cytogenetics or FISH. These abnormalities are sensitive to Imatinib 100 times more than BCR – ABL1 rearrangement.

Myelodysplastic Syndrome (MDS): MDS is disease of elderly but can occurs in younger people also. It is a rare type of blood cancer where you don't have enough healthy blood cells. There are many different types of MDS. Some types can stay mild for years and others are more serious.

About 50% of the cases, cytogenetics abnormality (mostly del (5q/7q) or monosomies) will be found. TP53 mutations are associated with therapy related MDS and have poor prognosis. Various cytogenetic abnormalities can be considered presumptive evidence of MDS even in absence of dysplasia i.e. -5/ del 5q, -7 / del 7q, +8, -Y, del (20q) etc. Apart from these many other mutations which can be detected by next generation sequencing (NGS) technologies like KIT, JAK 2, NRAS, CBI, MPL, RUNXI, ETV6, IDH1/ IDH2, TET2, DNMT3A, EZH2, ASXLI, SETBP1, SF3B1 SRSF2, TP53, NPMI and PHF6.

In case of MDS or MDS/MPD neoplasm in which the diagnosis is unclear or dysplasia has yet to emerge, detecting a mutation in one of these key genes may be helpful in establishing the diagnosis of a clonal myeloid neoplasm.

Acute myeloid leukemia (AML): AML is the most common acute leukemia (blood cancer) in adults. It is a lethal disease and the 5 year relative survival rate

is about 30%. AML outcomes are heterogenous and overall survival rates range from approximately 5 to 70 %. Thus, there is need of prognostic markers to predict outcomes and guide therapeutic decisions. Most reliable prognostic factor for predicting therapeutic response is cytogenetics (Karyotyping). On the basis of cytogenetic, AML is stratified as:

1.High risk like MLL gene re-arrangement, inv (3), t (6,9), -7, del (7q), -5, del (5q), TP53 deletion and complex cytogenetics.

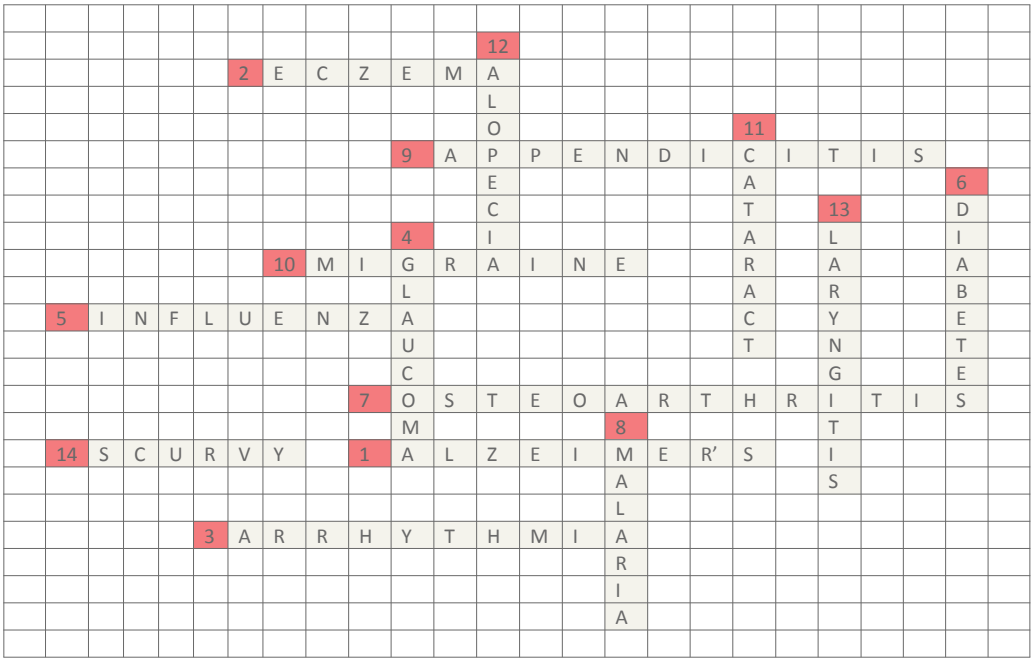
2.Favorable cytogenetics which includes t (15,17), t (8,21), inv (16) and normal cytogenetics with NPM1 mutation, normal cytogenetics biallelic CEBPA and

3. Intermediate risk category. Apart from these, there are certain other mutation which can predict outcome like FLT3/ITD, NPM1, CEBPA and other markers as described in MDS.

Lymphoid Neoplasm: Acute Lymphocytic Leukemia (ALL) is categorized either B-ALL or T-ALL.

Around 25% adult ALL patients are Philadelphia chromosome positive but in children it accounts 2-4%, which carries adverse outcome. A t (1,19), B-ALL being associated with poor outcome as well. The outcome across all variants of acute lymphocytic leukemia has changed over last few years by use of multi agent chemotherapy and novel target therapies. There are certain Ph like B-Acute Lymphocytic Leukemias (B ALL) which include IKZF1, CR2F2 representing poor outcome. TCR gene re-arrangement is associated with T-ALL and also has poor prognosis.

Conclusion: Biomarkers/ molecular testing has become essential component of diagnostic and therapeutic strategies in management of hematological malignancies. These **assays provide insight into the disease and utilize targeted and novel agents in an organized way.** As sequencing technologies become more available, standardized and affordable, they may attain larger role in the diagnostics and therapeutic paradigm in the management of both hematological and solid malignancies in the era of precision medicine.■



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The Cytopathology Diagnostic Tests

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Cytopathologist
Mubarak Al Kabeer Hospital Kuwait

Cytopathology is a branch of pathology used to diagnose diseases by examining cells obtained from various tissues and fluids in the body. A cell is the structural and functional unit of life. A tissue is a group of cells that work together to perform a particular function. Cytopathology is different from histopathology, a related but distinct branch of pathology. Histopathology studies whole tissues, in contrast to cytopathology, which studies free cells and fragments of tissue. A cytopathologist is a specially trained medical doctor who diagnoses disease conditions by identifying cell abnormalities using a microscope. The terms 'cytology' and 'cytologists' are frequently used as alternative terms for 'cytopathology' and 'cytopathologists', respectively. Let us look at some of the standard tests in cytopathology.

Fine needle aspiration cytology (FNAC): This is a diagnostic procedure used to determine the nature of lumps or masses by obtaining samples of cells from within these lumps using a thin needle and then examining these cells `using a microscope (and sometimes other specialized laboratory tests). Some of the common targets of FNAC are lumps in the thyroid gland (that produce the thyroid hormone), soft tissue, salivary glands (glands in the neck that produce saliva), lymph nodes (small bean-like structures that are parts of the body's immune system), the respiratory system, the digestive system, pancreas, and liver. Samples can be obtained directly from the lumps when they can be felt on examination. However, quite often, these lumps are situated deep inside the body. In these situations, various imaging procedures like ultrasonography and computed tomography (CT) scans are used to visualize these lumps so that the needle can be placed accurately within them. The needles can also be passed within the hollow passages of the respiratory or digestive system through tubes called endoscopes fitted with video devices and ultrasonography facilities. FNAC is a simple, reliable and inexpensive procedure that can quickly tell us the nature of a lump. These lumps may be due to infections or tumors.

A tumor is an abnormal growth of body tissue that may be malignant (cancerous) or benign (non-cancerous). The procedure is also used to evaluate the condition of the testes in infertile men. The FNAC procedure is usually performed without anesthesia, except in the FNAC of the testes, where local anesthesia is used. The patients are not required to fast before the test unless the procedure involves

endoscopy (see above). Patients who are on blood thinning medications must stop these medications for a few days before the test as per the advice of the treating doctor.

Pap test: This test is performed in women to detect early changes of cervical cancer through examination of cells obtained from the cervix, i.e., the lower end of the uterus situated at the top of the vagina. Cervical cancers that are detected early have a far higher chance of cure compared to those that are detected late. Women in their reproductive age group should undergo a Pap test as a screening test at regular intervals. A screening test is performed to look for a disease in otherwise healthy individuals. The age at which a woman should get her first pap test and the intervals at which she should repeat it depends upon several factors, including local socio-religious practices and other medical issues. Women should discuss these issues with their gynecologists before a Pap test. These tests are often complimented with other tests that look for changes in genes in the cells, which indicate human papillomaviruses (HPV) infections that cause cervical cancers.

Respiratory tract cytology: The respiratory tract comprises the lungs and the airways which lead up to them. Sputum and bronchoalveolar lavage (BAL) are two common specimens analyzed using cytopathology to detect infections and tumors. Sputum or phlegm is the secretion coughed up from the lower part respiratory tract. One of the most typical indications for requesting a sputum cytology test is in patients who cough out blood. BAL is a procedure where a saline solution is used to wash the airways and collect a fluid sample during bronchoscopy. This procedure allows us to see the inside of the airways using a device known as a bronchoscope.

Urine cytology: The urinary tract comprises the kidneys, the ureters (the tubes which carry the urine from the kidneys to the bladder), the urinary bladder (which stores the urine) and the urethra, through which the urine is passed out. Urine passed out by the patients, as well as specimens of urine obtained through catheters, can be evaluated. These tests are most often performed to detect cancers in the urinary tract. Patients with blood in their urine should undergo a urine cytology test to look for cancer cells. In such situations, patients must submit three urine samples on consecutive mornings.

Body fluid cytology: The pleura is a thin sac that covers the lung and lines the interior wall of the chest cavity; the peritoneum is a similar structure that lines the cavity of the abdomen; while the pericardium covers the heart and the roots of the big blood vessels that go in and out of the heart. During disease states, fluid can accumulate in these cavities. These body fluids are pleural fluid, peritoneal fluid and pericardial fluid, respectively. In addition, cerebrospinal fluid (CSF) is a body fluid found in tissues surrounding the brain and spinal cord. These fluids are extracted with a needle and sent for cytopathology tests, most often to determine if these spaces are involved by cancer.

Global health challenges and cytopathology: The evolving health challenges of the present century need to be met with an integrated approach combining the different specialties of medical sciences. Cytopathology is a very crucial component in that approach. The world has already seen the effectiveness of the Pap test in drastically reducing cervical cancers in countries that have incorporated cervical cancer screening within their health programs. The ability of the fine needles to reach highly remote locations in the body to pick up cells from the tiniest cancers has improved patient management significantly. Besides, a cytopathologist's ability to pick up even a

small number of cancer cells in a sample of urine or body fluid is a powerful weapon in our fight against cancer. Besides cancers, infectious diseases like tuberculosis remain a formidable challenge globally. Cytopathologists have very crucial roles in the diagnoses of these diseases. Cytopathology tests are simple, inexpensive and quick. Yet, their ability to incorporate sophisticated methods like those that detect genetic aberrations, make them highly potent tools in dealing with the ever-growing health demands of the modern world.

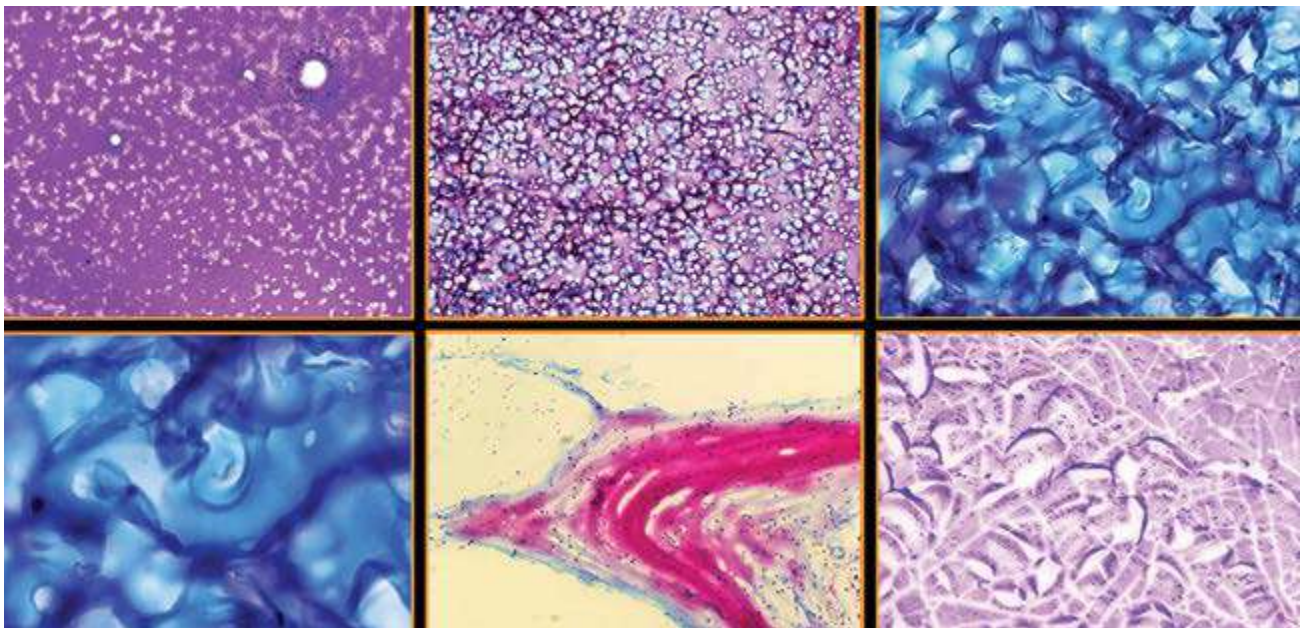

Figure legend: Cytopathology is beautiful. This is a collage showing how a substance known as colloid present inside our thyroid gland may look under the microscope when colored with stains (dyes). The thyroid hormone is produced inside the thyroid gland and stored in an oily form known as colloid. The colloid was obtained by fine needle aspiration cytology (FNAC) of the thyroid gland. It is good to see lots of colloid as shown here because it indicates that we are looking at a non-cancerous lesion. A majority of swellings involving the thyroid gland are non-cancerous.■

Words of Wisdom From the Chief Editior:

"Our critics make us strong!
Our fears make us bold!
Our haters make us wise!
Our foes make us active!
Our obstacles make us passionate!
Our losses make us wealthy!
Our disappointments make us appointed!
Our unseen treasures give us a known peace!
Whatever is designed against us will work for us!
"Some People will 'appreciate' you.....
Some will 'criticize' you.....
In both cases you are the beneficiary.....
One will "motivate" you..
while the Other will "improve" you."

Quote by: Israelmore Ayivor

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Misuse of Antibiotics: Crisis of today, Failure of Tomorrow

"Protect Your Future Generation"

Dr. Divyaa Elangovan
Clinical Microbiologist
Adan hospital

Infectious diseases are increasing globally at an unprecedented rate and remain the leading cause of death across the world, but the burden is disproportionately higher in developing countries. Most of the infectious diseases are caused by bacteria and viruses, although parasitic and fungal infections also account for considerable infection in vulnerable populations. The spread of SARS-CoV-2, the virus that causes COVID-19 pandemic, has demonstrated the speed at which infectious disease can spread across countries and around the world. Global coverage of vaccination against many infections and discovery of potent antimicrobial agents in the last 50 years gives strong hope for conquering many infectious diseases in future. Despite these advances, human lives are at greater risk because of the lurking threat of antimicrobial resistance (AMR). Antimicrobials include antibiotics, antiviral, antifungal and antiparasitics are the wonder drugs to treat these deadly infectious in humans. **Antimicrobial resistance (AMR)** occurs when bacteria, viruses, fungi, and parasites change over time and no longer respond to medicines making infections harder to treat and increasing the risk of disease spread, severe illness and death. Recent World Health Organization (WHO) report shows that over 50 percent of life-threatening bacterial infections are becoming resistant and causes treatment failure.

History of Antibiotic

Since the discovery of penicillin in 1928 by Scottish scientist Alexander Fleming who not only initiated the golden age of antibiotic discovery, but he could also already see a future unfold in which life-saving antibiotics would be rendered useless. In just over a century, different classes of antibiotics have come into the market and have drastically changed modern medicine, saving many human lives along with the hidden threat of antibiotic resistance. Figure:1

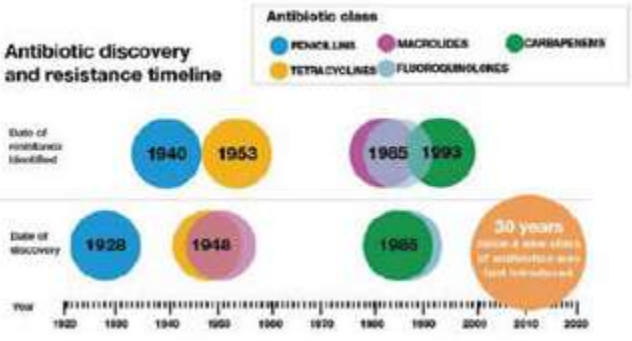

Figure 1: Timeline of-modern antibiotic discovery and subsequent resistance according to antibiotic (Source: Public Health England, 2015)

Importance of antibiotic

Antibiotics are used not only for treating bacterial infections like respiratory tract infections (e.g., pneumonia, ear, and sinus infection), urinary tract infections (UTIs), gastrointestinal infections and blood stream infections but it is also vital for all surgeries and other lifesaving treatment. Without antibiotics it would not be possible to perform organ transplants, cancer chemotherapy, other surgical procedures, such as hip replacements as they are more prone to get bacterial infection anytime during or after the procedure. Figure:2

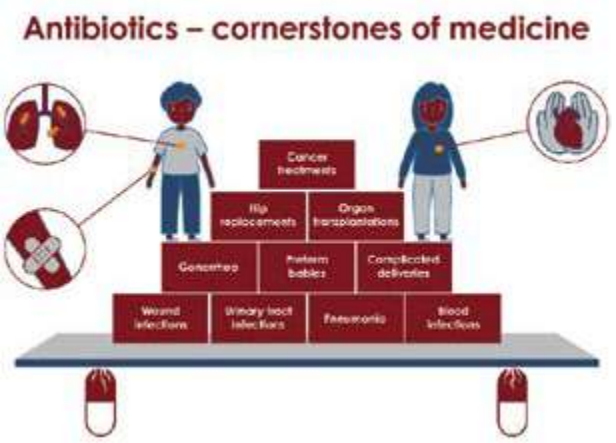

Figure: 2-Importance of antibiotic (Source- REACT GROUP.org)

How do antibiotics work

Antibiotics attack the bacterial cell and this either kills the bacterium(bactericidal) or slows down bacterial cell growth (bacteriostatic). There are several classes of antibiotics with different targets and destroying specific parts in bacteria, namely bacterial cell walls, machinery that make nucleic acid and proteins which are necessary for the survival of bacteria.

What is Antibiotic resistance?

Antibiotic Resistance is when bacteria mutate, they no longer respond to antibiotic, and this creates difficulty in treating infections

The main mechanism by which the bacteria withstand the effects of an antibiotics are
I. Blocking the antibiotic from reaching its target at a high enough concentration inside the bacterial cell
II. Modify or bypass the target where the antibiotic acts on bacteria.

Causes of Antibiotic resistance

The fact that bacteria develop resistance to a drug is normal and expected. But the way that drugs are used affects how quickly and to what degree resistance occurs. Bacteria that survive an antibiotic treatment can multiply and pass on resistant properties
Figure:3

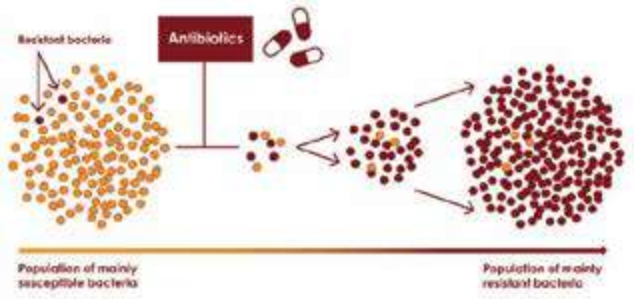

Figure 3: Natural selection of antibiotic resistance (Source- REACT GROUP.org)

When exposed to antibiotics, susceptible bacteria are killed; resistant bacteria continue to grow and multiply. Also, some bacteria can pass on their drug-resistant properties to other bacteria by horizontal gene transfer. The overuse and misuse of antibiotics are key factors leading to antibiotic resistance.

I. Antibiotic Overuse

Antibiotics are one of life saving drugs for treating bacterial infections in humans, however antibiotics are often ineffective for viral infections like common cold, sore throat, Flu-like illness and in some chest infections. According to the Centers for Disease Control and Prevention, about one-third of antibiotic use in people are not needed nor appropriate. It was also estimated that around 10- 20 courses of

antibiotics are prescribed to children before the age of 18 years. Secondly, lack of rapid and accurate diagnostic tools could be one of the factors for inappropriate use of antibiotics. If a health care provider is unsure about an infection, he or she may prescribe antibiotics just to be on the safer side, until the test result is ready. Lastly, non-prescribed or over the counter sales of antibiotics renders the community or individuals to self-medicate without taking advice from a physician and is predominantly seen in many low- and middle-income countries.
During the COVID -19 pandemic, antimicrobial resistance was slowly increasing. There were improper uses of antibiotics both in community and in hospitals. It has been documented that about 72% of COVID-19-admitted patients were treated with antimicrobials, however only 8% of these patients had bacterial or fungal co-infection. Different antibiotics particularly Azithromycin (antibacterial), chloroquine (antimalarial) and Ivermectin have been used and explored to treat COVID -19 which causes collateral damage to humans.

II. Antibiotic Misuse in farming

The consumption of antibiotics greatly varies in different countries, which are attributed to socioeconomic factors, financial incentives, and education. It was estimated that antibiotic consumption in livestock was 93,000 tons in 2017 globally and projected to increase by 11.5% by 2030.

Antibiotics are routinely used in farm animals to promote the growth in a very short span and prevent disease outbreak. In agriculture, antibiotics are sprayed on or injected into fruit and vegetable crops either for long term storage or to prevent bacterial attack.

Scientists have provided evidence that antibiotic use in the animal and agricultural sector is a major factor in involuntary consumption of antibiotics by humans. Colistin was considered as a reserve antibiotic for critically ill patients infected with multidrug- resistant bacteria and considered to be used as a last resort when all other therapies fail. At the same time, colistin was marketed to farmers for treatment and prevention of disease in farm animals and for their growth. The usage of colistin caused a selective pressure in the bacteria and led to spread of multidrug resistant gene (mcr-1) responsible for development of superbugs. This makes it transferable between different species of bacteria. Eventually over a time, multidrug resistant gene (mcr-1) has been apparently detected in humans as well causing severe illness which could not be treated by any other antibiotics in the current situation. In 2015, WHO declared a Global Action Plan on 'One Health' approach— emphasizing the need for cause and solution encompassing the interactions between humans, animals, and the environment to combat AMR.

How does Antibiotic resistance spreads

Resistant Bacteria can spread from person to person either through direct or indirect contact by touching the inanimate objects. Humans can also acquire multidrug resistant organisms by consuming food and water contaminated by resistant bacteria.

Health care facilities are hot spots for resistant bacteria since many sick people are in close vicinity of each other and antibiotic usage is high, resulting in spread of resistant organisms. Poor hygiene, poor sanitation, and poor infection control are three interconnected key factors contributing to the spread of resistant bacteria in health care facilities and communities.

Impact of Antibiotic resistance

As per WHO report in 2019, 1.27 million deaths worldwide were related to antibiotic resistance, which is more than deaths caused by fatal diseases like HIV/AIDS or Malaria. AMR Infection leads to

serious illnesses and prolonged hospital admissions, increases in healthcare costs, and may result in unsuccessful treatment.

Also, unsolicited use of antibiotics causes adverse effects like allergic reactions and organ damage. Evidence suggests that 1 in 5 hospitalized patients who receive an antibiotic has an adverse drug event. Inappropriate use of antibiotics kills the normal human microbiota in the gut causing diarrhea and abdominal discomfort.

How to tackle antimicrobial resistance

AMR needs to be tackled through multidisciplinary strategies by thorough understanding both by the public, health care workers and experts in the field. This requires a 'global One Health approach' across different sectors. The coordination, communication, and collaboration between the national, health care facility and community levels are needed. Healthy lifestyle, good personal hygiene, and sanitation measures will help to reduce unnecessary use of antibiotics in the community. Strengthening our vaccination program to reduce the burden of infectious diseases, which indirectly reduces AMR. Health education and campaigns would create awareness among the public and farmers to encourage prudent use of antibiotics. Every year, World Antimicrobial Awareness Week (WAAW) was celebrated between November 18 to 24, as a global campaign to improve awareness and understanding of AMR. Evidence-based guidelines on infection control and regular surveillance of antibiotic resistance can facilitate the development and implementation of infection control programs at health care facilities.

What we can do

Antibiotic stewardship is a term coined for the proper use of antibiotics to protect the effectiveness and lifespan of current antibiotics thereby to prevent the spread of antibiotic -resistant infections. The public also plays a major role in antibiotic stewardship by avoiding pressuring your health care provider to give you an antibiotic prescription, using antibiotics only as prescribed by your consulting physician. When antibiotics were prescribed by a health care provider, complete the full course of treatment as per advice of the physician. It is more important for children, older age groups and vulnerable populations to get vaccinated according to recommendations and National policy to prevent the spread of infectious disease.

Challenges in Tackling AMR

Childhood immunization has already shown positive impact on AMR in the last 30 years, but greater investment and development is needed for development of vaccines for some of the critical and bacterial resistant infections. Newer antibiotics are desperately needed to prevent the global AMR crisis, but there are too few innovative antibiotics in the clinical pipeline. However, if different classes of novel antibiotics come into market after all clinical trials, still threat of AMR remains the same for upcoming antibiotics. Recent WHO report shows that antibiotic resistance is predicted to kill ten million people every year by 2050. This would be a "wake- up call" for all and make timely efforts to use antibiotics responsibly.

"In the long run, we shape our lives, and we shape ourselves. The process never ends until we die. And the choices we make are ultimately our own responsibility." ■

— Eleanor Roosevelt

By acknowledging our role in tackling the Antibiotic resistance, it is the responsibility of each one of us to stop misusing antibiotics and save human lives from the growing threat of bacterial resistance. Professor Dame Sally Davies, UK's special envoy on global Health has stated recently that **antibiotic resistance could kill us even before the climate crisis does,** and this is the right time to take appropriate action to save antibiotics for the future.

Mobiles & Computers: Eye Health Challenges Of The Small Screens

"Listen To The Experts"

Dr. Rajesh Vasudeva
Ophthalmologist
Metro Medical Care

Computers and Mobiles have become an inseparable part of our lives and they are here to stay. So, it would be useful to know about the 'Myths and Facts' regarding any health challenges that they may present.

Let us begin by dispelling some incorrect beliefs: -

1. It is not correct that blue light from Computer or Mobile screens can damage eyes; and therefore, wearing spectacles with blue light filters is not protective for the eyes.

2. It is not correct that staring at Computer or Mobile screens can be the cause of children needing to wear prescription spectacles.

There is little or no evidence to support the above two incorrect beliefs.

There has never been any evidence that the blue light from computer screens can damage the eyes. Because of this the American Academy of Ophthalmology (AAO) **does not recommend blue light blocking glasses or any special eyewear for computer use.**

Children (and adults) need to wear prescription spectacles if they develop refractive errors in their eyes. The cause for refractive errors is developmental. There is some evidence that Myopia in children is related at least partially to lack of outdoor activity, (but not to any specific screen time on Computers or mobiles while being indoors). **So, it is not correct to believe that any child had to start wearing spectacles because of spending too much time staring at Computers or Mobiles.**

There are of course unhealthy effects of prolonged screen time. These can be:

1. Increased dryness of eyes because of the decreased blinking that occurs when staring continuously at the computer screen
2. Headache, redness and itchiness of eyes, or neck strain from long hours looking at the fixed distance and position of the bright computer screen
3. Episodes of momentary blurring of vision from focusing on the fixed distance of a computer screen for prolonged periods
4. Sleep disturbances due to disturbances in the body's natural 'wake and sleep' cycle (circadian rhythm), caused by prolonged screen time in evenings or at night

The following measures can help against such adverse effects of prolonged screen time:

1. Use Lubricating eye drops, to refresh the eyes whenever they feel dry
2. Contact lenses can also contribute to causing dryness of eyes. So, use spectacles instead of contact lenses when working for long hours on the computer
3. Use the '20-20-20' rule. Look at any object 20 feet away, for 20 seconds at least, every 20 minutes, whenever working on a computer for prolonged periods.
4. The computer screen should be placed 20-24 inches away (an arm-length away), from the eyes and be positioned a little below eye level.
5. The background light should neither be too dim, nor too bright.
6. Avoid using the screens 1-2 hours before bedtime, or even in late evenings. Use 'dark or night' modes on devices in evenings

So, THE BIG QUESTION IS: Do we need to restrict screen time of children? The fact is that the American Academy of Ophthalmology does not have any specific recommendations for the 'safe' length of screen time for children. There is very little evidence that looking at Computer or Mobile screens for a long time can damage the eyes permanently. But there is research that links increased screen time in children to other health issues, such as increased incidence of 'Attention related disorders' in children or even increased obesity in children due to their spending less time on healthier outdoor activities.

So, the World Health Organization's 2019 guidelines suggest 'no screen time at all for children before age 1, and very limited screen time for children for several years after that'. The American Academy of Pediatrics (AAP) recommends 'no digital media use until 24 months of age (except video chatting), and only up to 2 hours of screen time between the age of 2-5 years. Moreover, AAP also recommends focusing on educational media when children do start using screens.

The **take home message:** The small screen is here to stay. So, adopt healthy practices as outlined above. Most importantly: **Limit screen times in late evenings and NO SCREEN TIME WHEN IN BED WITH THE LIGHTS SWITCHED OFF. And Blue filters in spectacles? Not needed.**

(Picture courtesy John Hopkins Medicine) ■

Radiomics

As applied to radiology, is a field of medical study that aims to extract a large number of quantitative features from medical images using data characterization algorithms. The data is assessed for improved decision support. It has the potential to uncover disease characteristics that are difficult to identify by human vision alone. Radiomics can be applied to most imaging modalities including radiographs, ultrasound, CT, MRI and PET studies. It can be used to increase the precision in the diagnosis, assessment of prognosis, and prediction of therapy response, particularly in combination with clinical, biochemical, and genetic data. The technique has been used in oncological studies, but potentially can be applied to any disease. A typical example of radiomics is using texture analysis to correlate molecular and histological features of diffuse high-grade gliomas. The determination of most discriminatory radiomics feature extraction methods varies with the modality of imaging and the pathology studied.

Compiled by: Dr. Piyush Bafna

Noise-Induced Hearing Loss:

"A Silent, But loud Health Burden

Dr. Soumya Ramanna Shetty
ENT Surgeon
Badr Al Samaa Medical Centre

The world, as we know it, is a cumulative experience of all our senses. Among them, the sense of hearing connects us to our environment through sounds. Because our ears can perceive and interpret a wide range of sounds, speech and music without much conscious effort, we might take this special sense of communication for granted.

But, hearing loss, if unaddressed, can impact multiple aspects of an individual's life. Impaired hearing in early life affects the speech and language development, consequently affecting learning abilities, social interactions and professional growth. As population ages, the prevalence of hearing loss increases, contributing to the risk of cognitive decline in old age. The emotional effects of hearing loss can include anxiety, social isolation, loneliness and frank depression.

According to the Global burden of diseases study 2019, hearing loss is emerging as one of the leading causes of years lived with disability (YLD). According to WHO, about 5% of the world' population, over 400 million people have hearing loss and it is projected that by 2050, over 700 million are at risk of developing significant hearing loss, posing a health burden across the globe.

Varied causative factors leading to hearing loss are encountered at different periods of life span of a person, beginning as early as in the perinatal period. Among them, one of the emerging and concerning cause is the hearing loss associated with exposure to excessive noise or NIHL (noise induced hearing loss).

WHO estimates that over 1.1 billion young people, aged 12-35 years, are at risk due to exposure to noise in recreational settings. With increasing use of personal listening devices and unsafe hearing practices at high volume over long period, the risk of hearing loss is increasing. Fortunately, NIHL is completely preventable. Hence prevention of NIHL is paramount by creating awareness and taking effective safety measures.

How loud is too loud?

The majority of sounds that we are exposed to on a daily basis are within safe listening range. The sound intensity is measured by the unit decibel (dB). In general, sounds at or below 70dB are unlikely to damage hearing. NIHL can be caused due to prolonged or repeated exposure to sounds above 85dB or a single sudden exposure to loud sounds like firecracker explosion / gunshot. The

severity of hearing loss depends on the loudness of sound, the distance of the person from the source of sound and the duration of noise exposure. **(Table 1)** Also, certain people may be more at risk to develop NIHL than others in similar settings, due to genetic predisposition, age, chronic health conditions like diabetes and hypertension, exposure to cigarette smoke and certain ototoxic medications.

How to identify NIHL?

The onset of NIHL may be immediate if the noise is too loud and close, often associated with buzzing / ringing sound in ear (tinnitus). It may subside over the next 16-48 hours in some cases, but there may be residual damage to hearing. In cases of prolonged/ repeated noise exposure, the hearing loss may not be obvious immediately. The individual may notice lack of clarity of speech, tinnitus and distorted music or may gradually develop difficulty in understanding conversation, especially in the presence of background noise. If a person is experiencing these symptoms, it is highly recommended to consult an ENT to undergo hearing tests and discuss treatment options.

How to prevent NIHL?

NIHL is in most cases irreversible, but it is also the only type of hearing loss that is **completely preventable** by following safe listening practices.

1. **Limit the exposure to noise:** The first step begins with being aware of the harmful noise levels and doing our best to keep the volume down. Using noise-cancelling earphones or headphones might be better in noisy surroundings, since these earphones can reduce the need to raise the volume.
2. **Monitoring noise exposure:** Now the smartphone technology provides various apps through which individuals can measure the noise exposure levels and assess the risk.
3. **Reducing the time of exposure:** Usage of headphones/earphones must be ideally limited to less than an hour a day or taking periodic breaks of about 15-20 minutes for the ears to recover may be useful.
4. If the noise exposure is unavoidable, **keeping as much distance from the source of sound** is crucial, as well as using appropriate hearing protection devices is essential in avoiding potential damage.
5. **Regular hearing check-ups:** In individuals, who have been exposed to high level of noise or have experienced any of the symptoms, early screening for hearing loss must be done and measures should be taken to limit the damage.

How to use hearing protection devices?

Hearing protection devices are wearable devices that reduce the amount of sound reaching the ears. But their effectiveness depends on the correct and consistent usage. If a person is anticipating being in a noisy environment for long duration, like music concerts, sport events, fireworks shows, shooting ranges, industrial workplaces, it is advisable to wear an appropriate protective device. There are multiple options available like expandable foam ear plugs (fig. 1), pre-molded plugs made of silicone or rubber and ear muffs (fig. 2). If a high level of noise exposure exceeding 120dB is expected, wearing double hearing protection devices with ear plugs and ear muffs together is advised.

Currently, there is no cure for noise-induced hearing loss; damaged hair cells cannot regenerate. As the research advances, new preventive medications and gene and stem-cell therapies might emerge. Until then, let us join hands in creating awareness among our family and friends about the safe hearing practices. Safe guarding the hearing of our younger generation is prudent and a way of gifting them with a lifetime of healthy hearing. Mozart said, **"The music is not in the notes, but in the silence between",** our hope is for everyone to continue enjoying the music and the richness of life.■

Table 1 Noise exposure from different sources.

Normal Conversation	60 dB	Heavy city traffic	80-85dB
Vacuum cleaner	75 dB	Car horn/ Hairdryer	100 dB
Chainsaw, MP3 player at maximum volume	105 dB	Rock concert, sporting events	110-115 dB
Jet engine	130 dB	Firecracker/firearms	150 dB

Fig. 1

Fig. 2

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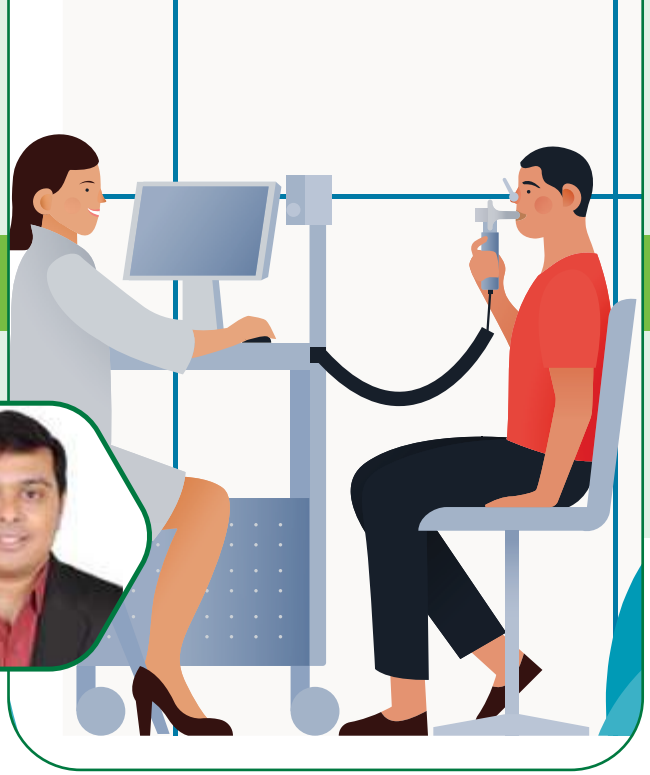
When Air Becomes Breath

"Then life Starts"



Dr. Manu Kurian Baby
Pulmonologist
Jaber Al Ahmad Hospital

The lungs are a pair of pinkish-gray organs in the chest cavity, one on either side of the heart. On breathing in, air enters the lungs, and oxygen diffuses into the blood. Then, carbon dioxide moves from the blood into the lungs when we breathe out.

One of the easiest ways to check lung function is by Spirometry. **Spirometry** is usually ordered for someone with symptoms of wheezing, shortness of breath, or cough to aid in ascertaining the underlying diagnosis. It may also be done for patients with chronic lung diseases to evaluate the progression of the disease.

In an adult young male, **Tidal Volume (TV)** is the amount of air we breathe in or out, which, when done normally, is about 500 ml. On taking a deep breath, the volume of air in the lung increases. **Inspiratory Reserve Volume (IRV)** i.e., air inspired with maximum inspiratory effort, usually 3 liters (L) over the TV.

The amount of air, in addition to the TV, that is expired from the lung with maximal effort is the **Expiratory Reserve Volume (ERV)**, which is about 1.5 Liter. There is always some volume of air that remains in the lungs which is known as the **Residual Volume (RV)** and is about one liter.
In addition to lung volumes, there are four different lung capacities.

Vital Capacity (VC) is the maximum volume of air expired from the fully inflated lung (TV + IRV + ERV = 4.7L). The maximum volume of air inspired from an end-expiratory level is **Inspiratory Capacity (IC)** (IRV + TV = 3.5L). The volume of air in the lungs after the expiration of normal breath is the **Functional Residual Capacity (FRC)** which is RV + ERV = 2.5L. The sum of these lung volumes is the total lung capacity of 6L in males (please see Fig 1.).

Forced Vital Capacity (FVC) is almost the same as VC and is the largest amount of air that can be expired after a maximal inspiration. It usually acts as a surrogate for the strength of respiratory muscles. In the graph depicting (Fig. 2) volume & time, the fraction of the VC expired during the first second of the forced expiration is the **Forced Expiratory Volume (FEV1).** In a normal individual, if we look at the graph, we can understand FEV1 (4L) and FVC (5L); hence the ratio is 0.8 or 80%.

In **Obstructive Lung Disease,** we have an increased TLC, an intact TV, decreased IRV, and an increased

ERV & RV. Therefore, the FVC is almost the same or slightly decreased, but the FRC is increased. This is mainly due to the reduction in airflow to the lungs, which is also due to air trapping that leads to air remaining in the lung at the end of expiration. Consequently, there is hyperinflation and an increase in FRC.

The flow volume graph shows a shift to the left due to an increase in lung volumes and the TLC. At the first second of forced expiration in the volume time graph, the FVC is almost the same or slightly reduced, but the FEV at the first second has reduced significantly.

Restrictive Lung Disease, seen in many conditions such as sarcoidosis, interstitial lung diseases, and pulmonary fibrosis, amongst many others, as the name implies, causes restriction, and decrease in compliance of the lung. Here the TV remains the same but the IRV, ERV, and RV are reduced; hence the FRC and TLC are also decreased. There is a shift of the graph to the right, which is due to a reduction in TLC, with reduced RV. Consequently, FVC is reduced too. On the time axis, it can be seen that FVC has reduced; however, the FEV1 is not affected and can be normal or reduced.

If the FEV1/ FVC is less than 70% or 0.7(6):

- Then, check the FVC levels. If it's NOT less than 80% of what has been predicted, it denotes an obstructive pattern, and the clinician should proceed with the bronchodilator challenge test. If there is an increase in FEV1 or FVC to >12% and 200ml, then it is a reversible obstructive pattern, and if not, then it's irreversible.
- If the FVC is <80% of what is predicted, then it's a mixed pattern, the clinician should proceed with bronchodilator therapy, and if there is an increase in FVC it's a pure obstruction with air trapping.

If the FEV1/ FVC >70% (6):

- And FVC is <80%, it is a restrictive pattern, and the clinician should proceed for full pulmonary function testing, including DLCO, an advanced type of testing the lungs. (Diffusing Capacity for Carbon monoxide).
- But if FVC is not <80%, then it's a normal study.

In essence, the above tests are done by a fully experienced technician after a complete explanation of the test to the subject. Pulmonary function testing is largely effort dependent from the patient side as it must fit into the criteria given by the American and British thoracic society.

Since one's breathing is not effort-dependent, it is usually taken for granted. Humans have a natural defense system designed to protect our lungs by keeping dirt and germs from entering them. Some effort needs to be made on our part to keep the risk of developing lung diseases low such as avoiding smoking (first or second hand), reducing exposure to pollution, and adequate exercise, to name a few. ■

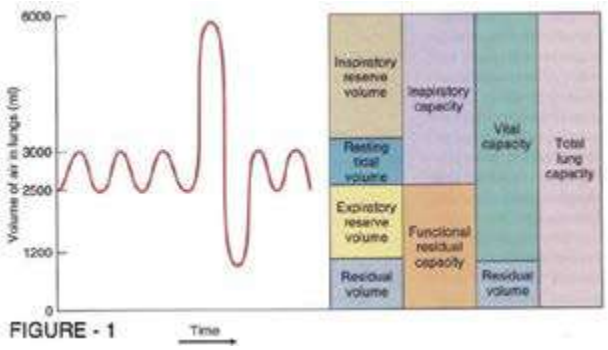


FIGURE - 1

Lung functions showing volume and capacity

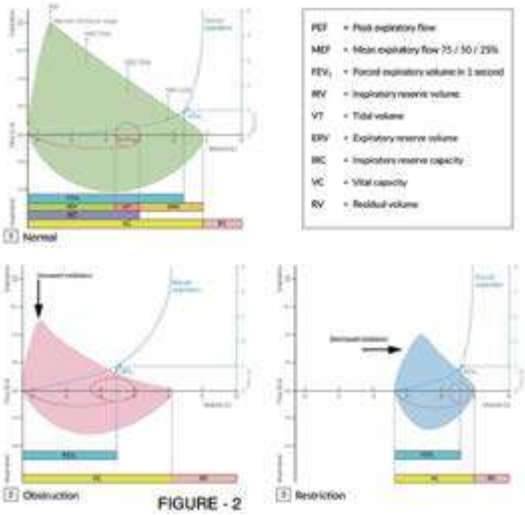


FIGURE - 2

Lung functions showing normal/obstructive/restrictive patterns

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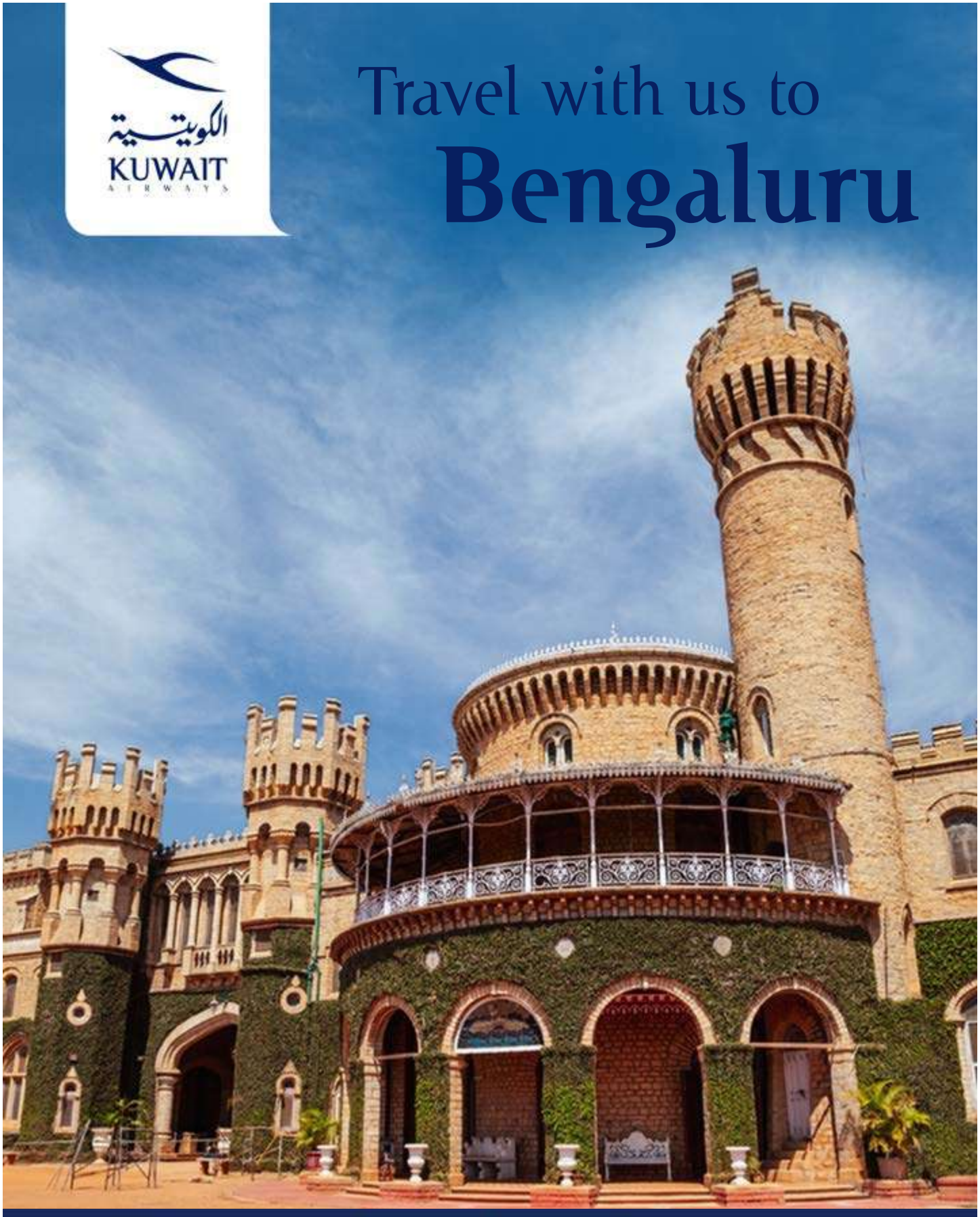

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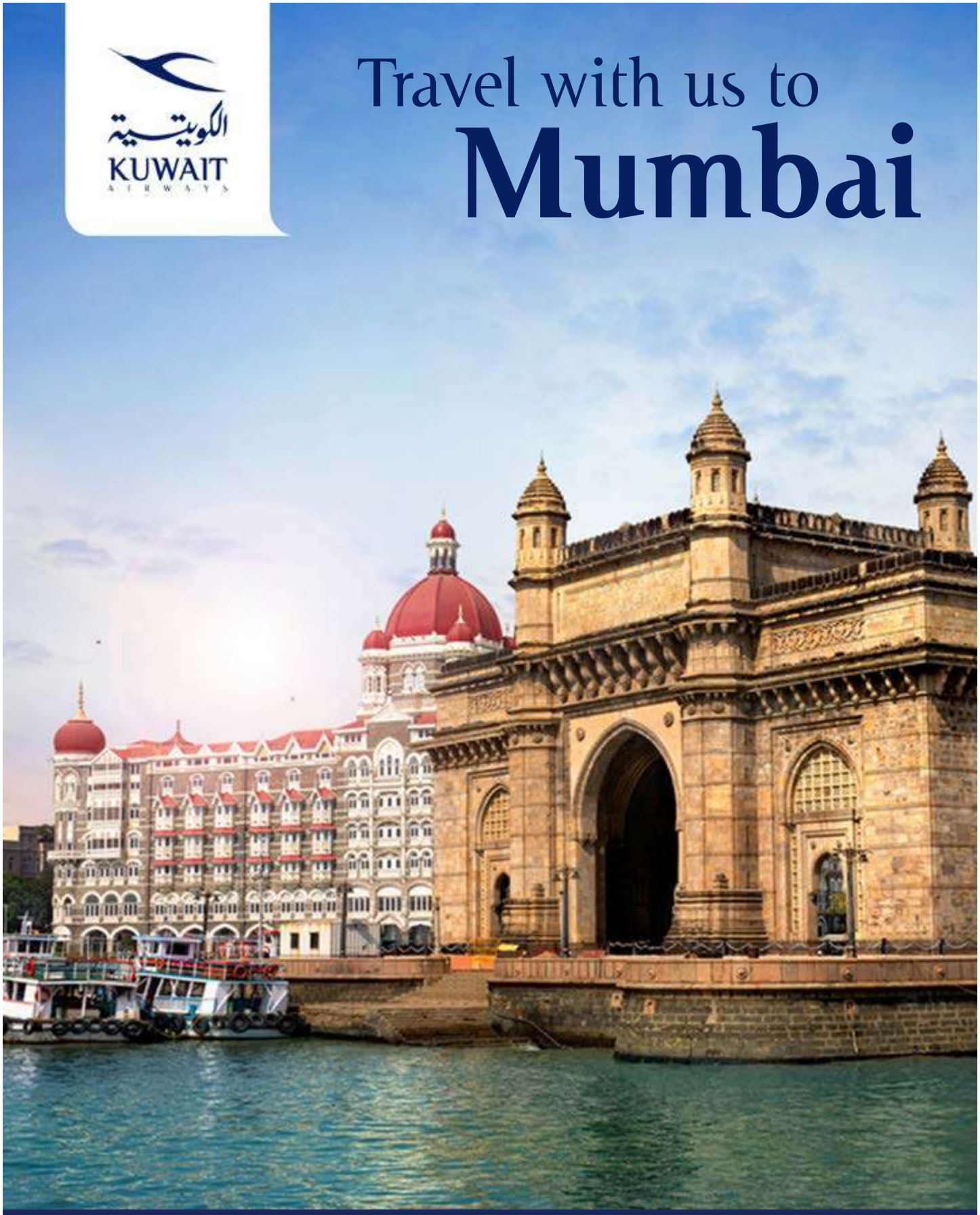

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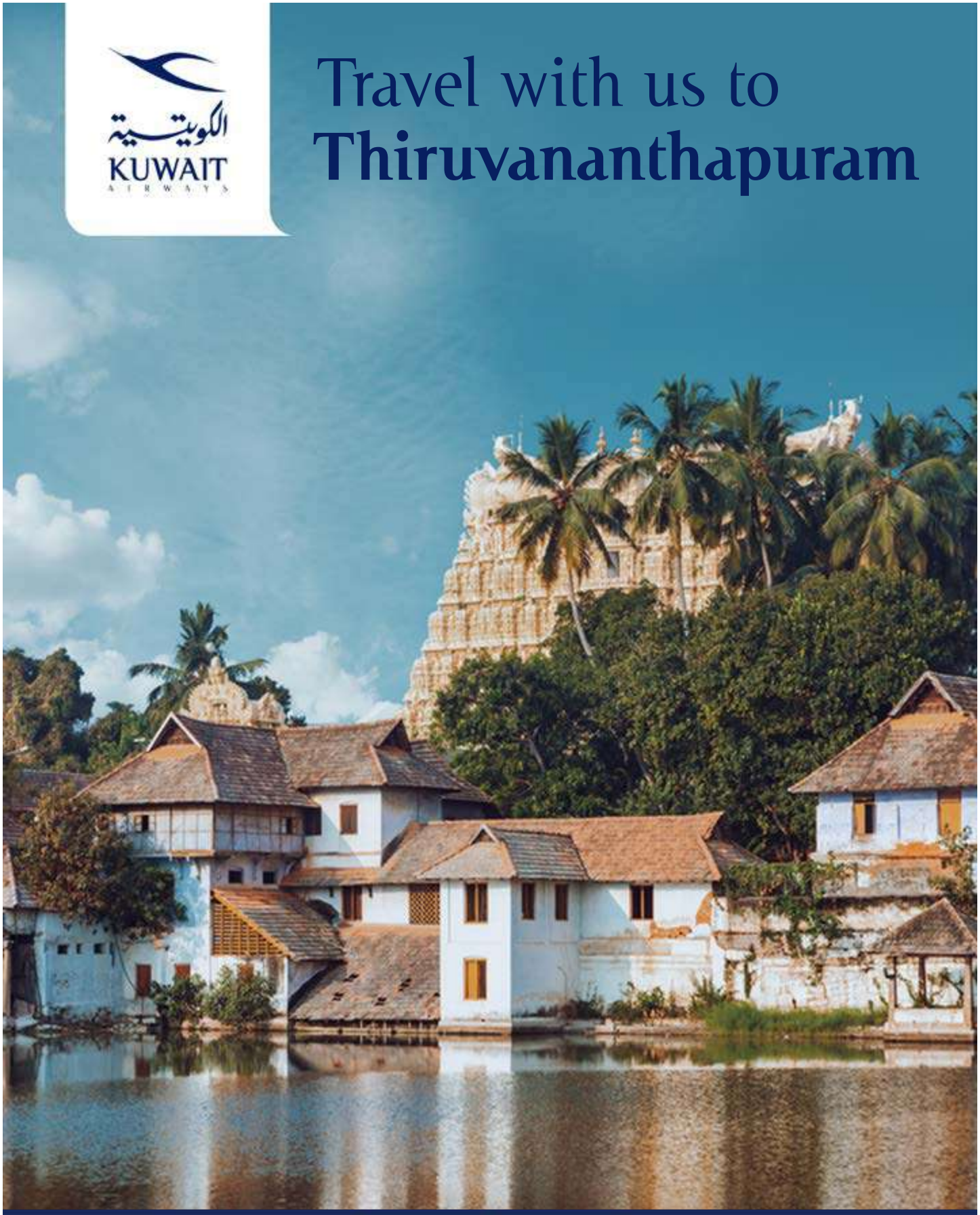

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