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MESSAGE FROM THE DESK OF THE EDITOR

With the advent of novel technologies in pharmacy, like customised drug delivery systems, personalized medicines, 3D-4D printing, artificial intelligence, tele-medicines, bioelectronic medicines and many more, pharmacy has become a very sophisticated profession and undergone metamorphic changes with the inclusion of multidisciplinary concepts and technologies in it. The 'Pharma Innovations' is also on the path of gradual progress with respect to selection of topics, improvement in writing skills, inclusion of articles on novel technologies and thereby moving at the same pace with the technological advancements. Hope, in very near future this e-magazine will turn into a stepping stone for the rising scientists of the pharma field.

DR. R. MAZUMDER
PROFESSOR AND DEAN (R & D)
NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY
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MESSAGE FROM THE DESK OF THE ASSOCIATED EDITOR

I am delighted in bringing out the second issue of 2019 with good quality articles. I wish the magazine for its attempt and continuity of its tempo in the same direction in the days to come. Pharma Innovations provides an important platform for researchers, faculty and students to share findings and discuss all aspects of Pharmacy, basic research, health and medicine in the development of future innovations. The primary goal of Pharmainnovation is to implement suitable forum for both the faculty and students to look into the arena of these fields.

DR SANJITA DAS
PROFESSOR AND HOD (PHARMACOLOGY)
NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY
(PHARMACY INSTITUTE)
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FACULTY FORUM

VITAMIN D AND ITS IMPORTANCE IN CURRENT HEALTH CARE SYSTEM

DEEPA BAJETHA

Assistant Professor

Noida Institute of Engineering and Technology (Pharmacy Institute)



Introduction:

Vitamin D comes in the category of vitamins soluble in fats. Vitamin d is very important as it have a very dynamic role in physiology of human life, but out of them it is most importantly known for its antirachitic activity. The production of vitamin D occurs in the skin of humans on exposure of sunlight which makes it unique and different from other vitamins. Vitamin D occurs mainly in the two forms i.e. vitamin D₂ and vitamin D₃. Vitamin D₂ is synthesized in the yeast sterol ergosterol after UV irradiation and also found in mushrooms which have the regular exposure of sunlight. vitamin D₃ is synthesized in the skin of humans on exposure of sunlight that's why it occurs in the utmost "natural" form. Vitamin D can be synthesized in human skin, even then the deficiency of vitamin D is very much prevalent across the whole world in present time. It affects about 50% of the population of world in different countries. An estimated 1 billion people worldwide, across all ethnicities and age groups, have a vitamin D deficiency (VDD). At present, deficiency of vitamin D becomes a very important issue related to public health because reduce level of vitamin D is an independent factor which cause the death of commo people. The patients of deficient vitamin D level continues to rise day by day which leads the importance of vitamin D hormone and becomes a more interesting area of future research for the prevention of chronic diseases cause due to its deficiency. Some of the factors which attributes the deficiency of vitamin D are as follows:

Lifestyle- reduced outdoor activities

Environment- air pollution

Clinical Benefits of Vitamin D

Cancer: vitamin D plays an anti-inflammatory action in the body. Vitamin D causes the reduction in process of proliferation of cell and intensifications in cell differentiation process and stops the formation of newly form blood vessels. On the basis of some evidences it is also found that the high intake of vitamin D is lessen the chances of breast cancer.

Heart Disease: From the several researches and studies, it was evidenced that vitamin D contributes heart protective action which can be due to the renin–angiotensin hormone system, via inflammation suppression or directly on the blood vessels and cells of the heart.

Obesity: Low concentrations of circulating vitamin D are common with obesity and may represent a potential mechanism explaining the elevated risk of certain cancers and cardiovascular outcomes.

Sources of Vitamin D

A major source of vitamin D for most humans is synthesized from the exposure of the skin to sunlight typically between 1000 h and 1500 h in the spring, summer, and fall. As few foods contain vitamin D, guidelines recommended supplementation at suggested daily intake and tolerable upper limit levels. Main dietary sources are fish, fortified food, and supplements. Vegetables and grains are poor sources.

Diagnosis and Treatment Approach for Deficiency of Vitamin D

It is also suggested to measure the serum 25-hydroxyvitamin D level as the initial diagnostic test in patients at risk for deficiency. A variety of factors reduce the skin's production of vitamin D₃, including increased skin pigmentation, aging, and the topical application of a sunscreen. Treatment with either vitamin D₂ or vitamin D₃ is recommended for deficient patients. Black people absorb more UVB in the melanin of their skin than do white people and, therefore, require more sun exposure to produce the same amount of vitamin D.

Conclusion

Numbers of people with VDD are continuously increasing; the importance of this hormone in overall health and the prevention of chronic diseases are at the forefront of research. Treatment with either vitamin D₂ or vitamin D₃ is recommended for the deficient patients. More research is required to recommend screening individuals who are not at risk for deficiency or to prescribe vitamin D to attain the noncalcemic benefit for cardiovascular protection.

ADENOSINE RECEPTORS IN NEURODEGENERATIVE DISEASES

BHAVANI PENTELEA

Assistant Professor

Noida Institute of Engineering & Technology (Pharmacy Institute)



Adenosine acts as a neuro modulator and as a homeostatic modulator in the central nervous system. Adenosine acts as a neurotransmitter in the brain by the activation of four most specific G-protein-coupled receptors named as A1, A2A, A2B, and A3 receptors. Its neuro modulatory role depends on a balanced activation of inhibitory A1 receptors (A1 R) and facilitatory A2A receptors (A2AR), mostly controlling excitatory [glutamatergic synapses](#). The impact of adenosine on brain function might mostly depend on the actions of A1 receptor and A2A receptor. Long been the A1 receptor has known to mediate neuroprotection, mostly by blockade of Ca²⁺ influx, which results in inhibition of reduction of its excitatory effects and glutamate release at a postsynaptic level. Postsynaptic A2A receptor can control NMDA receptors. Adenosine receptors regulate neuronal and synaptic function in a range of ways that may make development and treatment of brain ischemic damage and degenerative disorders. A1 adenosine receptors tend to inhibit neural activity by a predominantly pre synaptic action and A2A adenosine receptors promote transmitter release and postsynaptic depolarization. Much evidence argues for a role of adenosine receptors in neurological disease. The adenosine receptors can modulate the release of cytokines such as interleukins and tumor necrosis factor- α from immune-competent leukocytes and glia. Long-term burden of brain disorders in different neurodegenerative conditions such as ischemia, epilepsy, Parkinson's or Alzheimer's disease and also seem to afford benefits in some psychiatric conditions.

MANAGEMENT OF FEBRILE ILLNESS IN CHILDREN

DEEPIKA PATHAK

Assistant Professor

Noida Institute of Engineering & Technology (Pharmacy Institute)



Fever is the most common illness in pediatric. Fever in age less than 5 years signifies systemic inflammation, typically in response to a viral, bacterial, parasitic, or less commonly, a noninfectious etiology. In countries such as in India, a distinct spectrum of common tropical illnesses particularly seen in post-monsoon season such as dengue, rickettsial infections, scrub typhus, malaria, typhoid and leptospirosis. As a management of febrile illness in ill-appearing neonates and young infants, empiric antibiotics should be given via intravenous (IV) access. Up to 28 days of age, ampicillin 100 to 200 mg/kg/day divided 8 hourly and gentamicin 7.5 mg/kg/day divided 8 hourly should be started, whereas in older infants, intravenous Ceftriaxone 100 mg/kg/day or 75 mg/kg/day divided 12 hourly is given, depending on presence or absence of meningeal involvement. Advances over the past 30 years allow for more precise risk stratification for infants at high risk of serious bacterial infection. With appropriate testing at the initial visit, much of the diagnostic testing and empirical treatment can be avoided for infants younger than 90 days. In the vaccinated child aged 3 to 36 months, the only bacterial infection of concern is urinary tract infection.

HERBAL NUTRACEUTICALS IN HEALTH CARE

NIDHI SHARMA

Assistant Professor

Noida Institute of Engineering & Technology (Pharmacy Institute)



Introduction:

The term “Nutraceutical” was coined by Dr. Stephen DeFelice from “nutrition” and “pharmaceutical”. According to him, Nutraceutical may be defined as “a food or part of a food that provides medicinal and health benefits, including the prevention and/or treatment of a disease”. Nutraceutical may range from isolated nutrient diets to genetically engineered designer foods and herbal products.

Basically the term Nutraceutical is to describe substances which are not traditionally recognized nutrients but which have positive physiological effects on the human body. Nutraceutical are obtained from various sources such as medicinal plants, marine organisms, vegetables and fruits.

According to Homeopathic system of medicine; Hippocrates emphasized that ‘let food be your medicine and medicine be your food’s. Basically Nutraceutical are used as food or part of food that provide medical value or health benefits including prevention, cure or treatment of disease. Herbal Nutraceutical are powerful instruments in maintaining health and act against nutritionally induced acute and chronic diseases by promoting optimal health, longevity and quality of life.

Advantages of Nutraceutical

1. May increase the health value/benefits of our diet.
2. May help to avoid particular medical conditions.
3. Less unpleasant side-effects.
4. Easily available and cheap.
5. Provides food for populations with special needs (eg: nutrient-dense foods for the elderly).

Limitations of nutraceuticals

1. Nutraceuticals have poor bioavailability, easily eliminate from the body and do not provide sufficient medicinal benefit.
2. Lack of regulation may compromise the safety and effectiveness of products.
3. Many products are not having proper information about their safety and effectiveness, possible side effects, interaction with prescription medicines or the effect they have on existing medical conditions.

Probiotics and prebiotics

Probiotic category includes the live microbial food ingredients which are advantageous to health. Their action includes adhesion to gastrointestinal tract at specific sites and their survival lead to elimination of pathogens. Probiotic category includes selectively fermented ingredients or a fiber that promote changes in gastrointestinal microflora and its activity providing good effects to the health of host. They are the fertilizing agents for the probiotic bacteria in colon. These are not affected by gastric pH and digestive acids. The example includes inulin which on further hydrolysis gives oligofructose and galactoligosaccharide.

Conclusion

Nutraceutical have proven health benefits and their consumption (within their acceptable Recommended Dietary Intakes) will keep diseases at bay and allow humans to maintain an overall good health. Although nutraceuticals have significant promise in the promotion of human health and disease prevention, health professional, nutritionists, and regulatory toxicologist should strategically work together to plan appropriate regulation to provide the ultimate health and therapeutic benefit to mankind. It is important for providers to discuss the benefits and consequences of nutraceuticals with patients and to mention the importance of a recommended daily allowance as most things consumed in excess have the potential to cause adverse effects.

STUDENT FORUM

ARTIFICIAL BLOOD: RESPIROCYTE

ABDUL MANNAN

B.Pharm Ist Year

Noida Institute of Engineering and Technology (Pharmacy Institute)



It is very difficult to find a blood group match when a patient needs blood transfusion. The concept of Respirocyte was introduced to cope up with this problem. Prior to this approach many attempts were made to produce synthetic blood by chemical processes (eg, Hemopure, Fluosol-Da-20) but all failed due to significant drawbacks.

Respirocytes are hypothetical nano machines capable of mimicking the action of red blood cells. In other words Respirocytes are artificial red blood cells. The concept of Respirocytes was proposed by

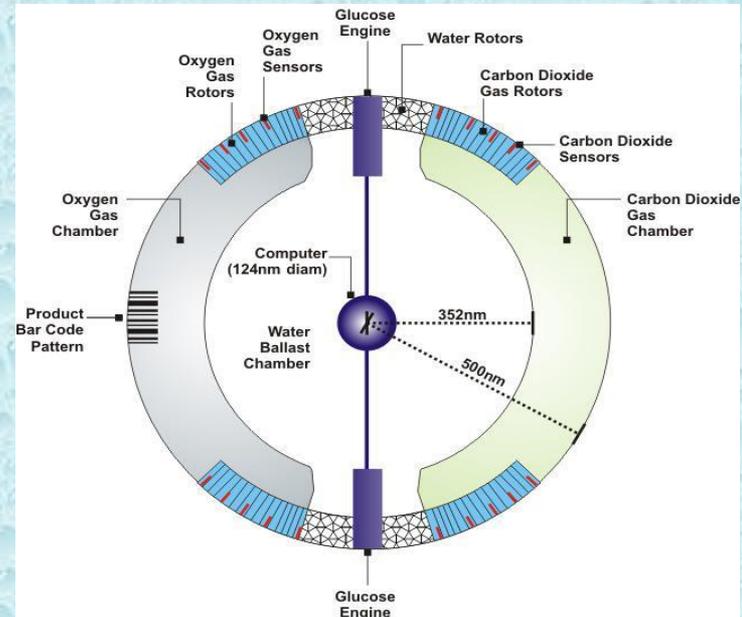
Robert A. Freitas Jr in 1998 in his research paper titled: "A Mechanical Artificial Red Blood Cell: Exploratory Design in Medical Biotechnology".

Respirocytes are categorized under Molecular Nanotechnology field which is still at its infant stage. The original proposed structure of Respirocyte had a diameter of 1 micrometer significantly smaller than RBC (6-8 micrometer). Small size allows for delivery of oxygen even to the farthest tissues. The outer shell will be made from any crystal with diamond like structure eg;- sapphire.

A working Respirocyte would need- Molecular rotors, to pump gases in and out of the pressurized gas chambers and collect glucose for energy; A Power Generator, with similar operation as that of a fuel cell using glucose as energy source; Water Ballast Chambers, to control buoyancy; Sensors, to determine oxygen and carbon-dioxide concentration; A Tiny Computer to interpret information from sensors and to control flow rate of gages; Pressure transducers, on the outside to act as receiver of programming instructions.

The applications and medical opportunities of Respirocytes are clearly limitless. A Respirocyte can carry 236 times more oxygen than a natural RBC. Respirocytes can be used for supplementing blood loss during wars, accidents, etc. They may also be used for enhancing the potential of athletes.

So, as I conclude my words I would just like to say that Respirocytes may seem hypothetical now but they are undoubtedly the future of medicine and haematology. What seems impossible today will one day become our reality!



EFFICACY RATIO: A TOOL TO ENHANCE OPTIMAL ANTIMICROBIAL USE FOR INTRA-ABDOMINAL INFECTIONS

RENU SINGH

M.Pharm (Pharmacology) 1st Year

Noida Institute of Engineering and Technology (Pharmacy Institute)



Antimicrobial resistance and inappropriate anti-biotic regimen hamper a favourable outcome in intra-abdominal infections. Clinicians rely on the minimum inhibitory concentrations value to choose from the susceptible antimicrobials. However, the MIC value cannot be directly compared between the different antibiotics because their breakpoint are different. For that reason efficacy ratio(ER), a ratio of susceptible MIC breakpoint and MIC of isolate, can be used to choose the most appropriate antimicrobial.

A prospective, observational study conducted during 2015 and 2016 included 356 Escherichia Coli and 158 Klebsiella Spp. Isolates obtained from the intra-abdominal specimens. MIC was determined by microbroth dilution method, and ER of each antibiotic was calculated for all the isolates.

For both E.coli and Klebsiella spp., Ertapenem, Amikacin and Piperacillin/Tazobactam at the best activity among their respective antibiotic classes.

This is the first study calculating ER for deciding empiric treatment choices. ER also has a potential additional value in choosing the use of susceptible drugs as monotherapy or combination therapy. A shift in ERs over a period of time tracks rising MIC values and predicts antimicrobial resistance development.

To surmise, an estimation of ER could be a meaningful addition to the interpretation of an AST report helping the physician to choose the best among susceptible antimicrobials for patient management. The potential use of ERs in predicting combination therapy remains to be explored.

CANCER AND ITS TREATMENT AND PREVENTION

NAVEEN KUMAR

M.Pharm (Pharmacology) 1st Year

Noida Institute of Engineering and Technology (Pharmacy Institute)



Cancer is a serious public health problem and very common disease in the world .In recent year cancer cases are steadily increasing due to no effective treatment has not been found. The possible sign of cancer include lumps, abnormal bleeding, prolonged cough, weight loss, change in bowel movement . The cancer can be of two types benign and malignant.

Cancer occur due to change in the cell cycle the cell lose the ability to stop it division and this cause the uncontrolled cell division the cell have mechanism to stop the division of cell and maintain the appropriate number of cell but in cancer cell they divided uncontrolled and this cause the increase in number of cell at a particular site and this cause the formation of lumps in this part and certain allergic reaction .

The major cause of cancer include tobacco use, obesity , excessive use of alcohol and environment pollutant. The cancer can also cause due to certain infection include infection of helicobacter pylori, Hepatitis B , Hepatitis C **etc.** On the basis of it site of occurrence it can be lung cancer. Prostrate cancer, colorectal cancer, stomach cancer, etc.

Prevention of cancer

There are various method by which we can stop the cancer but it does not give us complete assurance. The prevention method includes stop smoking and narcotic product as it causes tongue and lungs cancer. healthy diet eating vegetables .maintaining the proper health of the body by exercising another method include vaccination all these cause the increase in immunity of the body so that all the cell and tissue in the body can function in the proper way.

Avoid risky behavior this include practice safe sex this include use of condoms the sexually transmitted disease such as HIV or HPV these people are at high risk of cancer

Don't share needles –Sharing needle cause HIV and infection of various type of hepatitis which can increase the chance of liver cancer?

Get regular medical care – Regular self exams and screenings of various type of cancer- such as cancer of the skin , colon cervix, and breast, can increase your chance of discovering cancer early, when treatment is most likely to be successful .

Treatment of cancer

Natural products derived from different organism has proven to be useful for the treatment of cancer. Synthetic molecule isolated from fungus, microorganism and plant has therapeutic effect against cancer.

Lichen are source of important anticancer property. Lichen they are morphologically and physiologically are symbiotic association with fungus and algae one of the major compound that has anticancer activity is **Vulpinic acid** it cause apoptosis of the cancerous cell it alter the mRNA level other compound is usinic acid.

By **chemotherapy** the cancer can be treated it prevent the cell from quickly dividing the side effect of chemotherapy include the areas adversely effected include blood, hair, skin, lining of the intestinal tract other major side effect include fertility change, sexual change, insomnia, memory problem lymphodema, pain from nerve damage, etc.

Other method to prevent cancer include targeted therapy

The bioactive portion of cow urine is effective in the treatment of cancer.

Surgery therapy, radiation therapy hormonal therapy, targeted therapy are also very useful method in the treatment of cancer.



***“See you in Next
Edition”***

**NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
(PHARMACY INSTITUTE)**

19, Knowledge Park-II, Institutional Area, Greater Noida-201306, UP

