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Editorial

On Cyborgs

Neil Harbisson is the world's first cyborg (short for cybernetic organism), a being with both organic and biomechatronic body parts. He was born with achromatopsia, resulting in an inability to perceive any colour. Not content with his condition, he sought out an unnamed surgeon who in 2004 implanted a device which is osseointegrated into his skull and is partially outside it like an antenna. It has a fibreoptic sensor which identifies colours and transmits them to a microchip which converts their frequencies into vibrations on his skull. Thus, each colour gets converted into a specific frequency vibration which helps Harbisson identify different colours.

Until recently, cyborgs have been the domain of science fiction with characters such as the Terminator having superhuman abilities due to their implanted mechanical parts. In the near future, human abilities will be enhanced with the help of powerful machines. Thus, vision could be extended with lens implants to include currently invisible frequencies such as infrared and ultra violet and possibly to even include X-ray vision. Cognitive abilities would be amplified with microchips more powerful than human cerebral capacity.

Implantable devices known as electroceuticals have been around for a long time. These include pacemakers, stents, vagal and cerebral stimulators. Millions of patients have these devices in them and soon insulin pumps and artificial kidneys are likely to be added to the list. However, the implantation of devices not merely to ameliorate illnesses but to enhance human abilities is a recent development. Soon, smart phones, remote controlled birth control chips and brain computer interphases are likely to be added to the list of mechanical implants that enhance human abilities.

The creation of cyborgs will undoubtedly raise social, ethical and legal concerns. Can an athlete with speed enhancing implants be permitted to compete? How do we deal with the enhanced cerebral powers of a brain-microchip cyborg? Will there be forensic implications of enhanced strength? Should we create a new species that may take over the planet?

Thus, a field that began with the curing of medical illnesses is moving into a different realm leading to the possibility of a cyborg physician, accurately diagnosing and treating illnesses in a cyborg patient! The physician would be programmed with algorithms that would rapidly process the patient's history, symptoms and signs and process them through humongous data in the published literature to rapidly arrive at a probable diagnosis and suggest a route of investigations followed by a treatment plan. The patient may have devices that would communicate with the physician to facilitate rapid diagnosis and treatment. Those of us who do not keep pace with these accelerating technological advances might find ourselves redundant, depressed and in need of a cyborg psychiatrist.

Rajesh M. Parikh, M.D., D.P.M., D.N.B.
Director, Medical Research

Research News

Clinical associate in gastroenterology, Dr. Preet Shah won the 1st Prize for his poster, **"Mixed connective tissue disease presenting first as pleural effusion and then as superior sagittal sinus thrombosis"**, at the 72nd Annual Conference of the Association of Physicians of India (APICON 2017) in Mumbai in January 2017.
The co-authors were Drs. Anand Bhabhor and Abhijeet Prasad. The abstract is given below.

Best Poster Abstract

INTRODUCTION: Mixed Connective Tissue Disease **(**MCTD) is an overlap syndrome associated with anti-U1 RNP antibodies that incorporates selected clinical features of SLE, Systemic Sclerosis, and Polymyositis. Incidence of pleural effusion in MCTD is 50%, which is usually exudative and PMN cells predominate. The most common CNS feature is Trigeminal neuropathy, with CVST being a rare manifestation.

CASE REPORT: A 21 year old male presented with fever without chills and left sided chest pain both since 4 days. On examination, he was tachypnoeic, tachycardic, febrile, and had stony dull note on the left side of the chest, with decreased vesicular breath sounds on the same side.

INVESTIGATIONS: B/L (left>right) pleural effusion on USG Chest, which was found to be exudative in character, and there were 2100 cells with 65% PMN cells and ADA, Gene Xpert, culture, staining & cytology were negative; ESR was 65; ANA was 4+ (speckled pattern) & C3,C4 were low, Anti U1RNP ab - 10.15 (high positive), Anti Sm ab - 9.55 (high positive), Anti RO Ab - 7.33 (high positive), Anti LAAb - 2.77 (Positive), Anti SCL, Anti JO-1 Ab, Anti CCP, p and c-ANCA were negative; CT showed enlargement of cervical, axillary, mediastinal, abdominal, inguinal lymph nodes and biopsy revealed them to be reactive, but non-necrotic and no granuloma, with no e/o malignancy/Koch's. These findings suggested a diagnosis of MCTD. Therapeutic pleural fluid aspiration was done & he was started on Prednisolone after which his fever & symptoms improved.
A month later, he presented with headache which was continuous in nature, dull aching, bifrontal in location, without phonophobia or any postural variation, associated with multiple episodes of projectile vomiting. Examination showed Kernig's sign +ve, bilateral brisk DTR, and B/L plantars extensor, with normal fundoscopy. Superior sagittal sinus thrombosis was seen on Neuroimaging. Anti-oedema measures were started, and then he was started on LMWH and Warfarin. His steroid supplementation continued. Gradually the patient's symptoms resolved and he was advised to continue the steroid.
REFERENCES
1.Ilan Y, Ben-Yehuda A, Okon E, et al. Mixed connective tissue disease presenting as a left sided pleural effusion. *Annals of the Rheumatic Diseases*. 1992;51(10):1157-1158.
2.Wang B, Moon S-J, Olivero WC, et al. Cortical blindness as a rare presentation of cerebral venous thrombosis. *Journal of Surgical Case Reports*. 2013;2013(5):rjt035.

Abstracts

Sonographic evaluation of uterine volume and its clinical importance.
Sheth SS, Hajari AR, Lulla CP, Kshirsagar D
Journal of Obstetrics and Gynaecology Research 2017;43:185-9.

AIM:
The study was conducted to: (i) measure uterine volume in adolescent and perimenopausal age groups with normal pelvic findings and in women with pathological uteri scheduled for surgery, and (ii) utilize uterine volume as a parameter for the management of perimenopausal women scheduled for vaginal hysterectomy.

METHODS:
Data of 800 clinically non-gravid uteri of 16 weeks or smaller size with benign pathology scheduled for vaginal hysterectomy, and 150 adolescent women and 150 perimenopausal aged women with clinically and sonographically normal pelvic findings with normal uteri from the authors private practices were studied to find related sonographic uterine volume. Cases clinically more than 16 weeks size were not included in the study. Normal and pathological hysterectomized uteri were weighed postoperatively to compare their weight with preoperatively estimated uterine volume. Additionally, 200 pregnant women clinically diagnosed as 12 weeks pregnant and without pathology also underwent sonography to estimate their uterine volume.

RESULTS:
Uterine volume varied from 15 to 56 cm^3 in women with a normal uterus. In 12 week sized non-pregnant benign pathological uteri, as well as pregnant uteri, uterine volume averaged 240 cm^3. Uterine weight was higher when compared with preoperatively estimated uterine volume.

CONCLUSIONS:
The study results emphasize uterine volume as an important parameter for the management of young and elderly women, particularly with menorrhagia. The uterus is anticipated to weigh more than the uterine volume, which can assist with diagnosis and management.

Spontaneous clearance of HCV infection in a renal allograft recipient
Vishal V. Ramteke, Bhupendra V. Gandhi, Ajay Jhaveri, Parijat Gupte
Indian Journal of Transplantation 2015; 9:113-5.

Spontaneous clearance of hepatitis C virus occurs exclusively after acute infection with an associated robust cellular immune response. In immune compromised patients like renal transplant recipient, this is rarely seen. Although it has been reported in recipients who have received interferon in the past, very few cases of spontaneous clearance of hepatitis C virus (HCV) have been described in interferon naive patients. We report a case of a 43-year-old renal transplant recipient who had spontaneous clearance of HCV infection with reduction of immunosuppression to minimum without antiviral therapy. To the best of our knowledge, this is the first reported case in Indian literature.

Cellular, molecular and therapeutic advances in Type 2 Diabetes Mellitus
Pravin D. Potdar, Mayuri B. Chaudhari
Journal of Clinical Diabetes and Practice 2016;1:30–44.

Type 2 Diabetes Mellitus (T2DM) is an ancient disease, discussed 3500 years ago in literature. Vast population worldwide is suffering from this disease and yet it is found to be untreatable. As per WHO statistics 2012, the number of deaths in the world due to T2DM almost reached to 1.5 million. The number of people suffering from T2DM in India is expected to rise from 40.9 million in 2007 to 69.9 million in 2025 due to change in their life style. Of the two types of DM- Type 1 and Type 2, the latter is most common, affecting 80% of DM patients. Modern lifestyle and food habits have been responsible for tremendous rise in the number of patients all over the world. Even though, the symptoms of T2DM are seen in the later stages of life, the onset of the disease occurs quite early. Insulin resistance and β cell dysfunction are the main causative abnormalities. Several mutations in the genes important for glucose homeostasis and β cell development have been related to progress of hyperglycemia, while this progress is related to various metabolic syndromes arising in the patients' body. Thus, forming a vicious circle of the causes and effects of hyperglycemia interlinked together forming the whole picture of T2DM in the patient. This review discusses these causes and effects at the molecular and cellular levels. The current therapy practices use of oral therapeutic drugs, which controls hyperglycemia and related complications but fails to cure the disease permanently. Hence, stem cell therapy has drawn interest of the researchers in recent times, which seems to be a promising source of remedy for this notorious disease. This review will provide a better understanding of T2DM and associated complications, recent advances in the therapy and the molecular and cellular insights of the disease to the students, clinicians, endocrinologists and diabetologists.

Skin hyperpigmentation in Indian population: Insights and best practice
Nouveau S, Agrawal D, Kohli M, Bernerd F, Misra N, Nayak CS
Indian Journal of Dermatology 2016;61:487-95.

Skin pigmentation is one of the most strikingly variable phenotypes in humans, therefore making cutaneous pigmentation disorders frequent symptoms manifesting in a multitude of forms. The most common among them include lentigines, postinflammatory hyperpigmentation, dark eye circles, and melasma. Variability of skin tones throughout the world is well-documented, some skin tones being reported as more susceptible to pigmentation disorders than others, especially in Asia and India. Furthermore, exposure to ultraviolet radiation is known to trigger or exacerbate pigmentation disorders. Preventive strategies for photoprotection and treatment modalities including topical and other medical approaches have been adopted by dermatologists to mitigate these disorders. This review article outlines the current knowledge on pigmentation disorders including pathophysiology, molecular profiling, and therapeutic options with a special focus on the Indian population.

Clinical translation of (177)Lu-labeled PSMA-617: Initial experience in prostate cancer patients

Das T, Guleria M, Parab A, Kale C, Shah H, Sarma HD, Lele VR, Banerjee S

Nuclear Medicine and Biology 2016;43:296-302.

OBJECTIVE: PSMA-617 is reported to exhibit very high binding affinity towards PSMA receptors, over-expressed on prostate cancer cells and therefore, (177)Lu-labeled PSMA-617 is expected to play a pivotal role in the clinical management of patients suffering from ca prostate. The objective of the present study is to formulate the patient dose of (177)Lu-labeled PSMA-617, pre-clinical studies in animal model and clinical investigation in limited number of prostate cancer patients as well evaluating its potential for theranostic application.

EXPERIMENTAL: Patient dose of 7.4 GBq (200 mCi) of (177)Lu-labeled PSMA-617 was prepared by incubating 100 μg of PSMA-617 with (177)LuCl3 at 95 °C for 15 minutes. Radiochemical purity as well as in-vitro stability of the preparation was determined by PC and HPLC methods. The pharmacokinetic behavior and in-vivo distribution of the agent were studied by carrying out biodistribution studies in normal male Wistar rats. Preliminary clinical investigation was performed in 7 patients suffering from prostate cancer.

RESULTS: The complex was prepared with >98% radiochemical purity under the optimized reaction protocols and the preparation exhibited adequate in-vitro stability. Biodistribution studies revealed no significant uptake in any of the major organ/tissue along with major clearance through renal pathway. Clinical studies showed similar distribution in lesions and physiologic areas of uptake as seen in diagnostic (68)Ga-PSMA-11 PET scans performed earlier.

CONCLUSION: Preliminary clinical studies indicated the promising potential of the agent for theranostic applications. However, further investigations in large pool of patients are warranted to establish the theranostic potential of the agent.

Reversible man-in-the-barrel syndrome in myasthenia gravis

Poornima A Shah, Pettarusp Murzban Wadia

Annals of the Indian Academy of Neurology 2016;19: 99–101.

Man-in-the-barrel syndrome (MBS) is an uncommon presentation due to bilateral, predominantly proximal muscle weakness that has not been described to be associated with myasthenia gravis. We describe a case of myasthenia gravis presenting as MBS. Additionally, he had significant wasting of the deltoids bilaterally with fibrillations on electromyography (EMG) at rest and brief duration (3-6 ms) bi/triphasic motor unit potentials (MUPs) on submaximal effort apart from a decremental response on repetitive nerve stimulation (RNS) at 2 Hz.

While electrophysiology is an important tool in the diagnosis of myasthenia gravis, pathological EMG patterns do not exclude the diagnosis of myasthenia gravis.

Ph.D. Awarded: Dr. Namrata Shindekar

Correlative study of adipokines, insulin, proinsulin, Hs-CRP and endothelial progenitor cells in metabolic syndrome

RESEARCH GUIDE: Dr. G.S. Sainani

INTRODUCTION: Metabolic syndrome (MetS) is an important diabetes and cardiovascular disease (CVD) risk factor. The Asian Indian phenotype is characterized by low BMI and high visceral fat. This visceral fat secretes adipokines which cause metabolic derangements leading to endothelial cell dysfunction. Endothelial cells derived from circulating endothelial progenitor cells (EPCs) (which are released from bone marrow), seed the intimal lining with new cells.

METHODOLOGY: 100 MetS cases (IDF criteria) and 50 controls were included in the study. All cases were in the age group 30-60 and the ratio of males to females was equal in both groups. Adipokines (HMW adiponectin, Chemerin, Omentin and Visfatin) were measured using ELISA assay. EPC enumeration namely CD 34+ KDR+, CD 34+ 133+ and CD 34+ KDR+ 133+ was carried out using flow cytometry. Complete blood count, lipid profile, fasting plasma glucose, homeostatic model assessment of insulin resistance (HOMA-IR) and high sensitivity c-reactive protein (hs-CRP) were estimated for all subjects. The anthropometric measurements of body mass index (BMI), waist circumference (WC) and waist hip ratio (WHR) were recorded.

RESULT: High molecular weight (HMW) adiponectin was decreased and chemerin was elevated in MetS cases. Visfatin and Omentin did not show any significant changes. Of all the adipokines chemerin was strongly associated with MetS. As regards to the EPCs, of all the five cell populations, CD 34+309+ cells were significantly reduced in MetS as compared to controls. Of all the anthropometric measures, WHR was significantly associated with adipokines, EPCs and MetS.

CONCLUSION: Our study suggests that in community based survey, WHR should be used in primary screening of MetS as it gives further clue to investigate for CV risk. Chemerin and EPCs are good markers of MetS in the Asian Indian phenotype. The diagnostic cut off value for chemerin is 120 ng/mL, and can be used for diagnosis of MetS. We suggest that chemerin should be introduced as a test for routine health check-ups in the Asian Indian phenotype. Exhaustion of CD 34+309+ cells is a good marker of vascular health and should be utilized in sophisticated set ups for confirmation of CV risk. As regards the role of chemerin and EPCs, ours is the first report in the Indian phenotype. However there are reports from other ethnic groups which are in concordance with our findings.