2013, Vol 1; Issue 1 & 2

SCTIMST

Chitra Dhwani

Quarterly e-magazine of SCTIMST

Contents

A Letter from the Editor

Dear All,

It's a great pleasure to share with you our much awaited venture "**Chitra Dhwani**".

"Chitra Dhwani" is a quarterly electronic magazine, the voice of Chitra, a pure scholarly endeavor, to portray the Institute's activities from clinical, technological, public health point of view. It features the Historical milestones, New Directions, Innovations, Biomedical and Technological research carried out by the SCTIMSTians. It also highlights the achievements of its employees, showcase the activities in various departments, different events held, and propose to provide information on future events in each issue. The creative contributions in the form of artistic pictures, articles, cartoons, poems and remarkable experiences from the SCTMSTians are the Special Attractions.

The e-magazine aims to strengthen the special bond of Caring and Sharing together through this literary mission. It is for in-house circulation, the 1st and 2nd issues are compiled together to match the time of year.

We welcome suggestions from you about this endeavor, and looking forward to your co-operation, support and blessings to make it a success.

Thanks and best regards
Kamalesh K Gulia
Editor
Sleep Research Lab
Comprehensive Center for Sleep Disorders
SCTIMST

New Directions .....

FOREWARD .....

I am very pleased to write a foreword for the inaugural issue of the E-magazine of the Institute. This quarterly magazine will highlight the important events - research, academic and extracurricular - happening in the Institute. The first issue is quite impressive and takes you through a historical journey from the inception to the present status of the Institute. Dr. Kamalesh K Gulia, Dr. Neethu Mohan and the Editorial team who took the initiative to launch this magazine, deserve our special congratulations. I sincerely wish that the E-magazine will have an uninterrupted and long life, and will keep us informed about the new developments in the Institute.

My best wishes
Kurupath Radhakrishnan
Director
SCTIMST

"Innovation - any new idea - by definition will not be accepted at first. It takes repeated attempts, endless demonstrations, monotonous rehearsals before innovation can be accepted and internalized by an organization. This requires courageous patience"

VISION of the VISIONARY

The hallmark of medicine in the twentieth century was its technological transformation which spared no specialty and no practice at any level. However, India's record in the development and industrial application of medical technology was dismal and the high cost of imported instruments and devices had limited their availability for the bulk of India's patients. Against this background, Chitra Medical Centre blazed a new trail by harnessing high quality patient care and innovative programmes for technology development under one roof in the nineteen seventies. It was solely the high promise and serious need of this initiative that made the Medical Centre an Institute of National Importance in 1980.

Though Chitra Institute has a proud record of achievements, it has miles to go in setting up innovative programmes in patient care and technology development, which would win global recognition and command emulation in India and abroad. As long as India lags behind in innovation and needs to import most of its requirements in medical technology, as happens today, Chitra Institute's mission will remain unfulfilled. The substantial, if not full, accomplishment of the three original objectives enshrined in the Parliamentary Act of the Chitra Institute is the vision that should animate us on this occasion.

Padma Vibhushan
M. S. Valiathan
Founder Director
SCTIMST

Notions: Technology to cater masses in country like India..

The annual global market of Medical Devices is about US $ 300 billion. Indian market is only about US $ 4 billion with no significant share of Indian Medical Industry. With this scenario, the role of our Institute is extremely important in the promotion of Biomedical Technology in India. We certainly face challenges as our population is large and affordability is important. Optimizing Quality with affordability in absence of proper Regulatory Guidelines makes it even more difficult. Therefore, the efforts of our Institute to develop and commercialize products and various medical devices are very encouraging and signify our uniqueness as an Institute of National Importance. However, to make the medical devices reaching the masses must be the priority of Govt. of India to encourage the Industry Institute partnerships with initial government funding and Research Parks to facilitate the closer interaction and working culture with industries and academia supporting the development and maintaining quality.

This close interaction of Industrial and Institutional partners should also be encouraged at International level through various link programmes/projects and conferences/specialized workshops/industrial meets etc. to broaden the outlook towards the importance of Quality following global harmonization Task Force (GHTF) / International Medical Device Regulators Forum (IMDRF) guidelines, until similar guidelines for medical devices are approved by Govt. of India. Our comprehensive progress at national level on these aspects needs to be faster in this competitive global market to make affordable and quality medical devices available to our fellow citizens, and our Institute's role is to provide the leadership to achieve this noble mission.

CP Sharma
Head, BMT Wing
SCTIMST

SATELMOND PALACE

A ROYAL THOUGHT EXPANDED TO A RESEARCH HUB!

On the banks of the river Karamana is a beautiful place - The Satelmond Palace, at Muduvanmugal, which was the residence of Sethu Lakhmi Bayi, Maharani Regent of erstwhile Travancore , ruled on the behalf of boy Maharajah Sree Chithira Thirunal Balarama Varma from 1924 to 1931. She was involved in the progressive tradition of the Travancore rulers and thus sustaining all the social and economic reforms prevailed that time.

"No one who met her once could ever forget her. She stands as a shining example to womanhood as a great queen and a great woman" Lord Mountbatten on the Maharani.

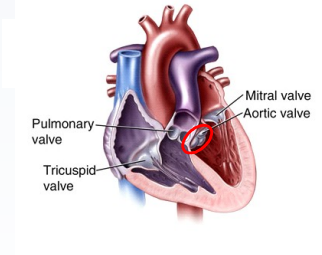
The palace was later acquired by the government and it presently houses the **Biomedical Technology wing** of the **Sree Chitra Tirunal Institute of Medical Science and Technology**. Today, the palace is the epicentre of ideas and information that has been consistently blossoming into novel inventions in biomedical technology. The ground floor of the palace is now a Library in continuation with seat of knowledge; first floor Hall contains splendid exhibition of the products devised by the Chitra team, Director and BMT wing Head's office, Technology transfer section, Seminar halls and a hub of Emeritus Scientists. The labs spread around the palace making the bouquet complete in the eco-friendly environment. Tall trees blossoming with coconuts, flowers and fruits, chirping of birds, fountains in the garden add charismatic dimension to this exclusive Research Centre. Large contingents of scientists are women here symbolizing equality carrying the scientific heritage forward. The highly innovative team of the BMT wing, engrossed in magnificent Research, with its deep rooted Royal heritage, is making its impact on the human lives and health.....**a unique Scientific Treasure that the SCTIMST can be proud of and cherish !!**

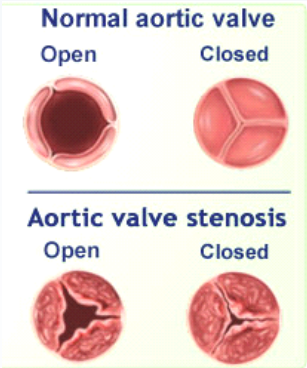
Special Feature

CHITRA HEART VALVE: A PRIDE STORY TO EMULATE

A Journey to Success

The **Chitra Heart Valve Prosthesis** (CHVP), a flagship enterprise of the SCTIMST fleet, stands today as a true testament of an indigenous, resource intensive and cost effective biomedical device even after 23 years since its first implant in 1990. As in most developing nations, during late 70's and 80's, India was also plagued with a high incidence of rheumatic heart disease. The disease affects the valves (namely mitral and aortic valves) in the major blood vessels of the heart, producing a condition called stenosis. This results in abnormal narrowing, and improper functioning of the valves. The only treatment available in most cases was valve replacement, a 5 hour operation during which the patient's circulation is maintained with the help of a heart lung machine. During this period the heart beat is stopped temporarily, its chambers opened, the diseased valve removed and replaced with a mechanical device, i.e. heart valve prosthesis. After that the heart is restarted and the patient is weaned off from the heart lung machine. CHVP, based on the tilting disc concept, was conceived in early 1978 as a viable alternative to expensive imported heart valves. Prof. MS Valiathan's vision and will, integrated with the dauntless pivotal efforts of a team of technologists, clinicians and scientists for 12 years, amalgamated the patient's need with available technology, yielded a unique biomedical device of low cost, comprising durable biomaterials.





HISTORY OF DEVELOPMENT: TECHNOLOGICAL ASPECT

Rheumatic disease continues to be a major indication for valvular heart surgery in India. The Indian Council for Medical Research, during early 1980s, had estimated that 6 in every 1,000 children are at risk of acquiring rheumatic disease. In this background, a project for development of an indigenous cardiac valve was initiated by Sree Chitra Tirunal Institute for Medical Sciences & Technology at a time when hardly any expertise and facilities for biomedical device research existed in the country.

Any material for use in a medical device should be biocompatible. In the case of artificial heart valve, not only should the material qualify for long-term implantation, but should meet the stringent demands of continuous service in the flowing blood stream. The development of the Chitra Heart Valve was a fascinating journey into various aspects of material science, engineering and medical device evaluation. Like other groups, Chitra team soon discovered that the course of valve development never runs smooth. The valve model, which entered clinical evaluation, was the fourth in a series involving design and material changes. The first valve model developed in 1981-1983 period incorporated a titanium cage and a polyacetal (Delrin) disc. Delrin disc tended to absorb moisture during steam sterilization leading to an increase in its diameter and disc lock-up, and the welded struts in the valve cage were prone for fracture. For these reasons, the first model had to be given up in 1984.

During this period, considerable data became available on the biocompatibility of ceramics. This led to the evaluation of synthetic sapphire, a potential material for the disc. The cage was redesigned without any welds or joints. The titanium/ sapphire model underwent a series of tests including accelerated durability and functional efficiency, followed by implantation in sheep to study the functional reliability and tissue healing response.

The implanted valve showed unacceptable levels of wear in the titanium cage that led to rejection of this model in 1985. The search for new counterface for sapphire led to the evolution of the third model in 1986, in which the cage was fabricated from a cobalt based alloy (Haynes-25) and coated with titanium nitride (TiN) for improving the wear resistance. The sapphire disc was retained. Though this third model passed all laboratory tests over a two year period, its fall occurred in 1986, when two sapphire discs fractured in animals after a few months of implantation. Adequate quality control techniques to screen the faulty discs were not available and hence, despite its excellent performance and biocompatibility features, this model had to be abandoned by 1987.

Search for a new combination (especially a metal-polymer one in the wake of problems associated with ceramic materials) started in 1987, in parallel to the failure analysis of sapphire discs. Haynes-25 was retained as cage material because of its excellent tissue and blood compatibility and the ability to take very good surface finish. A group of potential polymers underwent a series of abrasive and adhesive wear tests and fluid adsorption studies under controlled conditions. Later, a polymer 'Ultra High Molecular Weight Poly Ethylene' (UHMW-PE) clearly emerged as the most suitable disc. The current valve model incorporates a Haynes-25 cage, UHMW-PE disc and a polyester sewing ring. Sewing-ring remained same in all models and was made from warp knitted polyester, polyethylene terephthalate, using hand fabrication techniques.

DEVICE QUALIFICATION

During the 1980s, there were no specific Indian standards for cardiac valve prosthesis. The ISO standard 5840 - Cardiovascular Implants - Cardiac Valve Prosthesis was chosen as the reference for all qualification evaluations. The Chitra valve was shown to be marginally superior to the clinical controls in the hydrodynamic performance. With a conservative extrapolation of the durability study results, it was estimated that the valve model will have a life of over 50 years. It showed smooth healing, good hemodynamic function and no evidence of organ or blood damage during animal experiments.

On the basis of the engineering and animal data, the Ethics Committee of the Institute approved the clinical trial of the Chitra Valve in October 1990. The first valve implantation was carried out on December 6, 1990 at the Institute. In the first mono-centric clinical trial phase, spanning from December 1990 to November 1991 period, 40 valves were implanted in the Institute. Based on the encouraging results from the first phase clinical trials, a multicentric clinical trial was conducted including five additional centres spread over the country. Based on these data, the Monitoring Committee cleared the valve for commercial production and sale in February 1995.

TECHNOLOGY TRANSFER

The technology for production of Chitra Heart Valve was transferred to M/s. TTK Pharma Ltd through the National Research Development Corporation, New Delhi. Since March 1995, this model is commercially available as TTK-CHITRA tilting disc heart valve prosthesis. During the last two decades, more than 75,000 valves have been used in patients with outcomes comparable to any mechanical heart valve in the market. This soft occluder valve is found to have less complication due to cavitation damage, shows lower closing impact forces and is found to be more silent in working than the other mechanical valves in the market. Now, the valve is also exported to Kenya, Myanmar, Philippines, Sudan, Thailand and South Africa.

It is a matter of utmost satisfaction to all concerned that this technology was awarded the National Technology Award 2001 by the Government of India, the National Award for the successful commercialization of indigenous technology. The Chitra Valve Development team had earlier bagged the prestigious NRDC Republic Day Award in 1994 from the National Research and Development Corporation, New Delhi and the FIE Foundation National Award in 1995 from FIE Foundation.

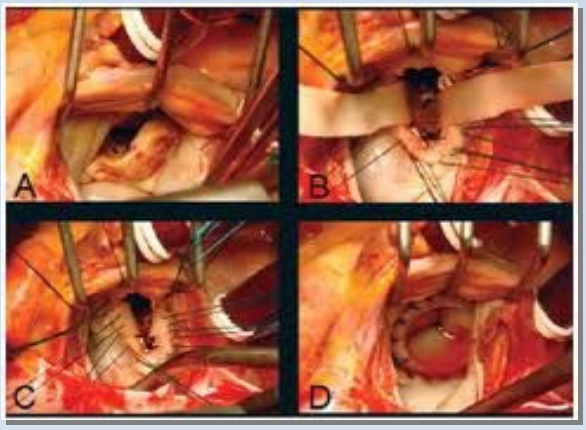
CONTINUED RESEARCH & DEVELOPMENT

Based on the clinical feedback, continued Research & Development to develop an improved tilting disc heart valve was initiated during 2005. This project, completely sponsored by the industry, was aimed at developing a better valve model. The new model incorporates a titanium valve cage coated with titanium nitride which has better MRI compatibility than the cobalt based alloy used in the current model of the valve.

Current model of the TTK-Chitra Heart Valve (A), and the improved model with titanium nitride (B)

The cardiac surgery department at SCTIMST is the largest one of its kind in the state with 3 functional specialties: adult cardiac, pediatric cardiac and vascular/ thoracic divisions that operate over 2000 patients a year with world class results. The clientele ranges from neonates to octogenarians. The adult division focuses on disease of heart valves, coronary bypass operation for coronary artery disease, surgery for heart failure, adult congenital lesions and aortic surgeries for aneurysm. The pediatric division undertakes surgeries for simple and complex congenital heart lesions. The vascular/thoracic division tackles complex lung pathologies in addition to open surgical and endovascular options for aortic and peripheral vascular pathologies.

The surgeries of the heart and blood vessels are complex which last anywhere between 3 to 8 hours operating time, 3 days of intensive care unit stay and around a week of hospital stay. Though these procedures are undertaken with the utmost degree of caution and competence, certain risks inherent in the disease and procedure are a reality. These include bleeding, heart rhythm abnormalities, residual defects, post-bypass ventricular dysfunction, respiratory problems, and wound infections.



Valve replacement operation showing the damaged valve exposed (A), stitches on the walls after partial removal of native valve (B & C), and bioprosthetic valve implanted (D)

The success of the CHVP program instills pride and contentment, and works as a beacon signaling hope in the efforts to develop more biomedical devices that suit the requirements of an upcoming nation. The true significance of the Chitra Heart Valve lies in the triumphant demonstration that the technology of heart valve substitutes, an oligopoly of rich nations, could be mastered by a developing country like ours with determination and perseverance. The development of Chitra Heart Valve also laid the foundation for establishing an indigenous knowledge base, which fostered further developments in the medical devices technology in India.

(Contributed by CV Muraleedharan, Associate Head, BMT wing, who has been deeply associated in this project . Surgical details are provided by Dr Vivek V Pillai, cardiothoracic surgeon at SCTIMST)

"*Kind hearts are the gardens,*
Kind thoughts are the roots,
Kind words are the flowers,
Kind deed are the fruits,
Take care of your garden
And keep out the weeds,
Fill it with the sunshine,
Kind words and kind deeds"

HW Longfellow

Top Medical News

Sentinel to Heart: Sree Chitra on frontiers...

Comprehensive Heart Failure Program

SCTIMST has initiated a dedicated heart failure (HF) program with the inauguration of the heart failure clinic on January 1, 2012. The Comprehensive Heart Failure Program (**CHFP**) is also supported by funding from the Indian Council of Medical Research (ICMR) through an adhoc research grant. CHFP is one of the few initiatives in the country which is aimed at assessing the burden of HF as well as to provide dedicated care to heart failure patients.

In addition to the heart failure clinic, the other component of the program is the Trivandrum Heart Failure Registry (THFR). Data regarding HF is not available from India so far and this registry is expected to bridge this gap. This registry collects data of consecutive heart failure admissions in one year (2013) in all the hospitals in Trivandrum city and also from Athiyannoor, a rural area 25 kms from the city. We have collected the data of over 500 patients in the last five months and the registry is on-going.

The in-hospital program has three main components - out-patient care, in-patient care and rehabilitation. The "Heart Failure out-patient clinic" functions on all Wednesdays from 9 AM to 4 PM and caters to about 20 patients per day presently. The clinic has enrolled 320 patients enrolled so far and they are on regular follow-up. As a result of focused care, the management of these HF patients has been streamlined. The scope of the clinic extends to post-surgical patients requiring medical optimization as well.

The in-patients with HF are currently being managed in the existing Cardiology Intensive care units and wards. The in-patients are later followed up in the HF clinic. A state-of-the-art HF intensive care facility is coming up in the second floor of the existing medical block, which we hope will start functioning by the end of this year. The program runs in close collaboration with the departments of cardio-thoracic surgery and cardiac anesthesia. Those patients with medically refractory HF are referred for special surgical processes like Dor procedure and valve replacements or repair. Rehabilitation of HF patients with focus on improvement of functional capacity forms another important component of the program. The rehabilitation program is a joint initiative by the departments of Physical Medicine and Cardiology.

A public awareness event was organized as part of Heart Failure awareness week on February 13, 2013. The event included awareness lectures with interactive sessions and was attended by about 100 patients and families and was very well appreciated. New facilities for the HF program are envisaged in the upcoming new medical and surgical blocks. The aim of this comprehensive HF program is to develop a facility which is unique in the country which will provide evidence -based, ethical and affordable care to patients with all stages of heart failure, from secondary prevention to cardiac transplant.

Top Technology News

Emily: New Intrauterine Drug Releasing Device developed in India

Another feather to the cap of SCTIMST and HLL Lifecare !!

A novel intrauterine device (IUD), named Emily, has been developed jointly by Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum and HLL Lifecare, Trivandrum for the first time in India, heralding a big breakthrough in the medical devices area. In this era of women empowerment and health enhancement of families across India, the launch of Emily, an indigenous product and first of its kind in the Indian market which is expected to be available from March 2013 onwards at a ground breaking price of Rs 2424 compared to imported ones costing nearly Rs.10,000, is expected to revolutionize the contraceptive area. The development team was headed by Dr V Kalliyana Krishnan, Senior Scientist at SCTIMST and Dr Aby Aprem of HLL Lifecare. Dr Krishnan's team at SCTIMST was also instrumental earlier in developing and transferring technologies of Blood Bag, Dental restorative composites, Bonding agents etc to various industries which have been commercialised and currently available in the market. Emily, over and above being an effective contraceptive, has the potential to specifically treat a range of pre-existing gynaecological conditions. Cost effective management of Dysfunctional uterine bleeding (DUB), endometrial hyperplasia, uterine fibroids, adenomyosis and endometriosis are made possible with the use of Emily. Emily releases levonorgestrel hormone in a controlled fashion for a period of 5 years to offer therapeutic action for contraception and to prevent heavy menstrual bleeding.

After conducting all physicochemical studies and exhaustive toxicological evaluation of Emily, the technology transfer documents were handed over last year by Prof. K. Radhakrishnan, Director, SCTIMST to Dr. M. Ayyappan, CMD, Hindustan Lifecare Ltd and subsequently HLL undertook the clinical trials which has been successfully completed and the product is now *ready to be launched into the market*.

BioGraft-CPC:

Development of Calcium Phosphate Cement

A new-generation bone substitute product CALCIUM PHOSPHATE CEMENT has been developed in the Bioceramics Lab, BMT Wing, SCTIMST. This is a two-component cement, provided in powder-liquid combination, intended for bone defect filling. Mixing of the components gives a self-setting putty or paste which sets into hydroxyapatite, the basic mineral of bone and teeth.

The Calcium Phosphate Cement is an attractive skeletal-repair material owing to the unique combination of mouldability, biocompatibility and osteoconductivity. It finds use as filler cement or an augmenting material in the management of fractures and pathogenic bone defects. Also, it could be used as a periodontal graft material in dentistry. Chitra-CPC has been developed according to the guidelines of FDA for Bone Void Fillers and tested for safety and efficacy as per the International Standard ISO 10993. The technology of the cement is protected with 2 Indian Patents. The know-how has been transferred to M/s IFGL Bioceramics, Calcutta and product will be marketed in the trade name "Biograft-CPC".

Top Public Health News

Joining Hands for War Against Smoking.....

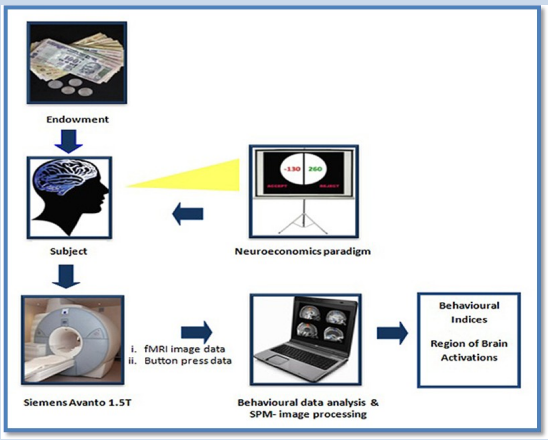
Dr. K. Radhakrishnan, Director, SCTIMST is receiving Sri. Oommen Chandy, Honorable Chief Minister, Government of Kerala during his visit to the Institute in connection with the Inauguration of ***World No Tobacco Day*** on May 31, 2013. Dr Paul Sebastian, Director, RCC, and Dr KR Thankappan, Professor and Head, AMCHSS, SCTIMST are sharing the pride magnificent steps taken for War against smoking.

Emerging Trends in Science....

Exploring Brain Economics!

Neuroeconomics is an emergent field, which works with the synergy from multiple disciplines like neuroscience, economics, psychology, decision-making and statistics. Neuroeconomics is one of the prominent research areas in cognitive neuroscience, lots of studies are being carried out in neuroscience labs across the globe. The Neuroeconomics team at SCTIMST is interested in economic decision making under uncertainty.

Economic Decisions and aversion towards loss is varied across populations with respect to the presence of Gain/loss, it can also depend on a person's frame of mind, variability in endowment, financial profile etc. It will also be influenced by the effect of behavioural pathologies. For a healthy individual, loss aversion coefficient is 2 or above and there is a sustained activation of both ventral striatum and medial prefrontal cortex together with loss aversion. The current understanding is limited with loss aversion study engaging different pathological groups. The aim of this study is to uncover the neurobiological markers, which are able to explain diverse behaviour of loss aversion and decision-making and its correlation towards brain activation. This is achieved with the help of Neuroeconomics-fMRI session, which involves selection of choices upon variably rewarded gambles. The behavioural indices and fMRI images of anxiety and depression patients are acquired, and are contrasted with those of healthy individuals. The study can makes significant contribution towards various neuropsychiatric and behavioural disorders with increased risk taking and impulsive behaviour. In addition, this would also accelerate studies on Neuroeconomics, Affective and Social neurosciences and Neuromarketing.



This study is a joint venture and the partner institutes include (i) Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum (ii) Centre of Behavioural and Cognitive Sciences, University of Allahabad, (iii) Institute of Medical Psychology and Behavioural Neurobiology, Eberhard-Karls-University, Tübingen, Germany. Neuroeconomics Team at SCTIMST is headed by Dr C Kesavadas (Principal Investigator). Dr VS Chandrasekhar Pammi (Principal Investigator) from University of Allahabad, and Dr Ranganatha Sitaram (Advisor), from Institute of Medical Psychology and Behavioural Neurobiology, Eberhard-Karls-University, Tübingen, Germany are the key research partners. The study is funded by the Department of Biotechnology, Govt. of India.

(Contributed by Rajesh PG, Research Fellow and Dr C Kesavadas, Imaging Sciences & Intervention Radiology Dept)

Neuronavigation

A tool assisting the brain surgeries.....

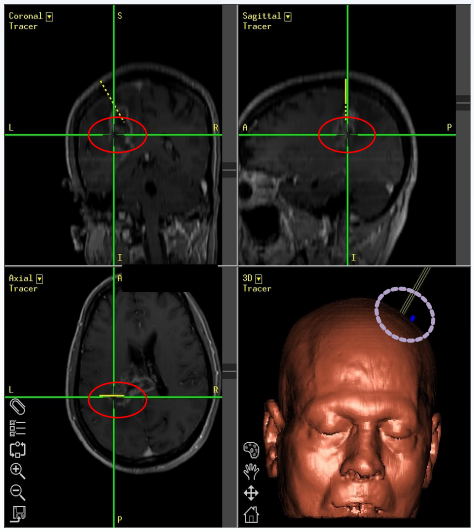
Neuronavigation is a computer-assisted 3-dimentional (3-D) navigation and guidance system generally used during neurosurgical operations for tracking surgical tools and localizing them with respect to the patient's 3-D anatomy within hard skull or spinal cord. The pre-operative diagnostic scan is used as a reference and is transferred onto the operative field during surgery. This system is being used by the Neurosurgeons in the Department of Neurosurgery since 2006. According to Neurosurgeons, Prof Suresh Nair and Dr K Krishna Kumar, neuronavigation aids them in accurate planning and safe execution of the surgical procedural steps. It helps them to reduce the size of the surgical incision and hospital stay for the patient. In many cases, it saves resources for the hospital too.

Image guided systems fundamentally integrate the pre-operative images of the patient with the surgical instruments so that the spatial location and trajectory are accurately depicted on a computer screen. These images guide the neurosurgery team in safest planning of the craniotomy flap/ trajectory for safe resection of lesions without damaging the adjoining area or blood vessels.

Apart from routine use as a surgi-planner, neuronavigation helps in other avenues also like

1. Intracranial vascular malformations: To identify and locate the malformed blood vessels in brain and choosing the safe path.
2. Neuro-sono navigation: real time ultrasound integrated navigation probe for precision aided removal of abscess and tumours.
3. Depth electrode placement: frameless technique – makes the procedure safe and efficient for patient and surgeon
4. Deep brain stimulation and neuronavigation guided transcranial magnetic stimulation: for treatment of movement disorders
5. Image guided surgery of the cranio-vertebral junction: useful for planning accurate screw measurements and safe placement of pedicle / pars screws and to avoid injury to vertebral artery
6. Biopsy of lesions: frameless and pinless techniques can be employed
7. Pituitary surgery: useful in cases where anatomy is distorted as in re-do surgeries

In centers where intra-operative MRI is available, the intra-operative images can be integrated with the pre-loaded ones to get clear idea about extent of resection and regional anatomy.



Planning the site for biopsy for a deep seated tumour (red circle) in 3 planes

A day at the Department of Transfusion Medicine……

8 AM…An energetic team of 4 Doctors, MSW, 2 Scientific Officers, 8 Technicians, Staff nurse, Unit helper, Cleaner, get ready to take on their positions to collect blood from donors, waiting in queue for their turn. Most of them are scared seeing pointed needle but the nurse with a stern calmness displays her efficiency in near painless withdrawal of a 350/450 ml of red fluid from their blue prominent blood vessels on the arms reassuring everyone around that blood is replaceable but life is not.

Yes, this is the scene at the blood bank on the 2nd floor, Middle Block, where the day starts with blood collection from donors. For the patients, samples are collected from OP/wards/ICU for cross matching, antibody detection and grouping. Donors give their blood for a noble cause. Their blood before transfusion is tested for Transfusion Transmissible Infections, grouping and antibody detection. Blood is collected from persons who are physically and mentally healthy, and without any risk behaviour. Donors are screened carefully and those who fulfill the criteria are qualified as a donor. The procedure is safe. Single use needle and blood bag is used for each blood collection. And the needle is destroyed after each donation.

Blood is collected in special pouches/ bags that remind the illustrious history of product development from Biomedical engineering group of the SCTIMST manufactured by Penpol/HLL. The bag contains anticoagulant, Citrate Phosphate dextrose adenine (CDPA) to prevent clotting of blood and this, preserve its function for 35 days. It takes only 8-10 min for the donation and the donor can leave the Blood Bank in half an hour. All blood collections are over by 3 pm, nearly collecting about 30-40 units of blood from donors.

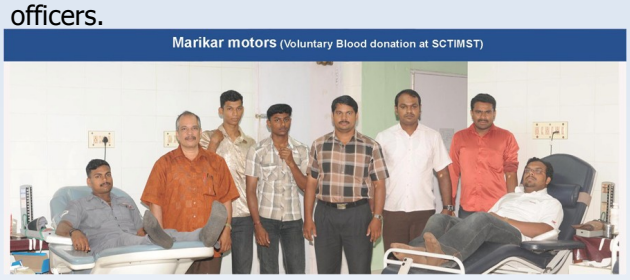
The well labelled blood samples are carefully sent to lab in the Blood Bank and are tested, and stored for further analysis, if needed. The next of team of technicians process the collected blood samples- for blood grouping, antibody screening and cross-matching. Collected blood is separated into different blood components as per the need. Blood is tested for five mandatory tests - Hepatitis B&C, HIV, Syphilis and Malaria mainly by ELISA method.

Each whole blood unit is separated in to 2/3/4 components depending on the type of bag selected as RBC concentrate, Platelet concentrate, Plasma (FFP) and Cryoprecipitate. RBC carries O_2 to tissues and is given to patients with anaemia. RBC concentrate has a shelf life of 35/ 42 days depending on the preservative used and is stored at 4^0C. Platelets control bleeding. Platelet concentrates are stored at 22^0C with agitation, with a shelf life of 5 days. FFP contain all clotting factors and is used to control bleeding in patients with deficiency of clotting factors. FFP has a shelf life of 1 year. Cryoprecipitate is prepared from FFP, contain factor VIII and fibrinogen to treat hemophilia, to control bleeding and few other clotting factors like vWF and factor XIII. We have a cold room and several temperature regulated refrigerators to store blood. The technician monitors the temperature at every shift.

Blood requirement during, and post surgery varies from day to day and are generally met. According to the patients' requirement, the various components of blood will be selected and provided on request. RBC transfusions need cross matching with the patients' blood sample and only compatible blood can be transfused. The Department of Transfusion medicine issues different components on request to various surgical departments in the Institute.

Another procedure done in the blood bank is Plateletpheresis. Apheresis is basically a process

of collecting platelets, a component of blood involved in blood clotting. Doctors carry out this procedure. Donor is connected to a cell separator, blood is collected and platelets are separated continuously while red cells and plasma are given back to the donor. Procedure takes 60-90 minutes. Advantage is that patient will have better platelet increment with reduction in multiple donor exposures. During emergencies, a fast blood typing is done to meet the demands. The concerned doctor is alerted that only emergency cross match has been done. This is later followed by the routine testing to confirm the emergency cross matching. In cases unavailability of a rare blood type, autologous blood is administered. The entire processes are smoothly performed under able supervision and guidance of staff and Medical officers.



The department of Transfusion Medicine plays a critical role in the hospital services. In the words of Dr Jaisy Mathai, the Head of this department **"Everyday is a challenge especially when you work within a narrow confine and guidelines from which you cannot deviate".**

Recognized for its excellence, the Department of Transfusion Medicine has won ***"THE BEST BLOOD BANK AWARD"*** in the Kerala state for retaining maximum blood donors for repeat regular voluntary blood donation for the year 2013.


KERALA STATE BLOOD TRANSFUSION COUNCIL

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Phone : 0471 - 2304882, Fax : 0471 - 2305183, E-mail: sbtckerala@gmail.com, www.ksacs.in

Certificate

On the occasion of World Blood Donor Day, 14th June 2013 Kerala State Blood Transfusion Council has the pleasure to honor Blood Bank, Sree Chitra Thirunal Institute of Medical Sciences and Technology, Thiruvananthapuram for retaining maximum donors for Regular, Repeated Voluntary Blood Donation. We salute your valuable effort.

Thiruvananthapuram
14.06.2013

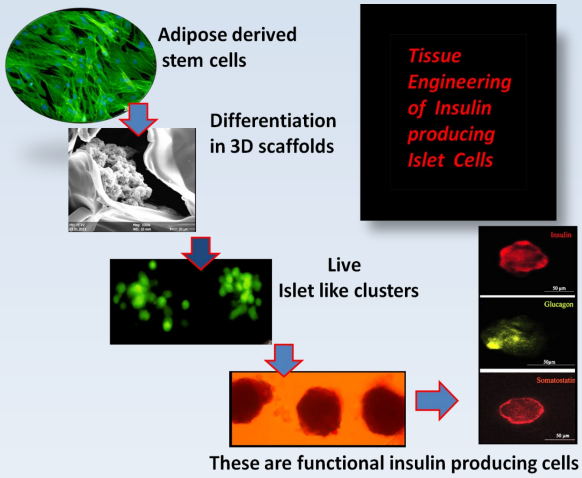
Vice Chairman
Kerala State Blood Transfusion Council

World Blood Donor Day

Tissue Engineering: Diabetes in focus

Translational Research: bench to bedside

One of the major translational researches at SCTIMST is the multi-disciplinary approach of "Tissue engineering", that has a long term goal of addressing the shortage of donor organs for transplantation. Our research programmes aim to create "organs" such as pancreas, cartilage, bone, blood vessels, skin, liver etc that may be available "off the shelf" and impact clinical applications.



The "Division of Tissue Engineering & Regeneration Technologies"(DTERT), is a lead lab of the DBT funded Centre of Excellence in Tissue engineering program. The lab has a focused approach to "Tissue Engineering and Regenerative Medicine" that progress through the development of "smart" biomaterials that actively participate in the formation of functional tissue. These are used in conjunction with adult cells, stem cells, bioactive signals and bioreactors. The biomaterials and bioactive signals direct the differentiation of stem cells, and the bioreactors facilitate physiologically relevant mechanical and biochemical stimuli to guide neo tissue development.

One of the major ongoing programs at this lab aims at engineering of pancreatic islets in the treatment of diabetes. "Diabetes mellitus, the metabolic disorder is rapidly on the rise, becoming one of the main threats to human health and imposing large socio-economic burden on the society in the 21st century. In Type I Diabetes the lack of precise control over insulin delivery leads to

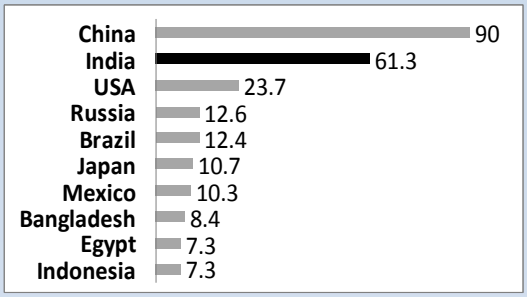
a higher risk of angiopathic lesions; that often result in diabetic neuropathy, nephropathy, retinopathy or early mortality. Beta cell transplantation has the promise of a long term cure for this disorder. At DTERT the research demonstrates that it is possible to generate functional insulin producing "Islet like clusters" (ILCs) from various stem cell sources like human placenta, bone marrow, umbilical cord as well as adipose tissue. The MSCs derived beta cells have been shown to cure experimental diabetes in mice and rats, without the use of immunosuppressive drugs. The approach is to administer the cells inside simple devices developed in our lab, which we implant intraperitoneally. The current focus is to develop smart biomaterials as scaffolds for the islets and optimize the devices for successful transplantation of these engineered functional islets in clinics.

Research Highlights ....

Prevention and Control of Non-Communicable Diseases: A Challenge !!!

Noncommunicable diseases (NCDs) are the diseases which are not contagious (not passed from one person to another). The main types of NCDs are cardiovascular like heart attacks and stroke, cancers, chronic respiratory diseases such as chronic obstructed pulmonary disease and asthma, and diabetes. The United Nations (UN) political declaration on prevention and control of NCDs in 2011 was endorsed by the World Health Assembly in 2012 with a new health goal to reduce avoidable mortality from NCDs by 25% by 2025 (the 25 by 25 goal). The Lancet NCD action group has recommended a stepwise approach for the member countries to meet the UN commitments on NCDs (Published in Lancet 2013, vol 381, 575-84). The three major steps are 1) plan and mobilize multisectoral response, 2) implement priority interventions (tobacco control, dietary salt restrictions, treatment for people at high risk of cardiovascular diseases) and 3) account for progress. It is the responsibility of the research community in each country to produce and publish country specific data to ensure that implications of NCDs are understood and acted upon by policy makers and politicians.

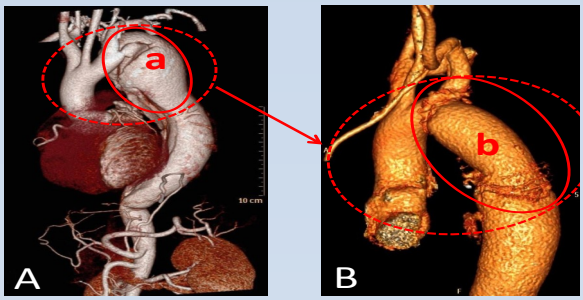
Top 10 countries of number of people with diabetes (20-79 years) 2011 (in million)



Dr KR Thankappan, Professor and Head of The Achutha Menon Centre for Health Science Studies of the SCTIMST, has recently completed a major intervention project to find out the feasibility of reducing NCD risk factors in selected communities in Kerala. This was a pilot project implemented in three countries namely China, India and Mexico supported by the Oxford Health Alliance, UK to find out the feasibility and effectiveness of community based interventions in developing country settings. Another project being implemented is the Kerala Diabetes prevention program. This is a community based cluster randomized controlled trial implemented in Trivandrum district to find the effectiveness of a life style intervention program to prevent the incidence of type 2 diabetes. This project is supported by the national health and medical research council (NHMRC) of Australia.

Repair of the by-birth malformed aorta, the key blood vessel in human body: *A successful operation on a rare case by Vascular Surgery Team*

Coarctation of Aorta is a congenital (by-birth) defect causing severe narrowing of aorta- the main blood vessel carrying blood from the heart to the body. This results in inadequate blood circulation to lower half of our body and very high blood pressure in upper half of our body. Aneurysm is an abnormal dilatation of aorta or arteries in our body which in due course can rupture leading to even loss of life, unless detected and treated in time. The co-occurrence of these conditions in combination is a rare event. Untreated and undiagnosed cephalo-brachial hypertension, in rare settings, can cause a high velocity jet lesion in the aorta that can lead to its rupture.



CT angiogram image before surgery (A) showing (a) Constriction due to coarctation of aorta, and a dilated aorta (aneurysm); (B) after surgery image showing intact repair and graft sutured after removal of diseased segment of aorta (b)

A 41 year old physical trainer while being evaluated for left side chest pain and hypertension of 5 months duration was diagnosed with the above condition under CT angiogram (Fig. 1A). The patient was initially treated for hypertension with medicines and was stabilized. He later underwent repair of both the defects with the prosthetic – coated polyester vascular graft (Albograft) after removal of the malformed and defective segment of aorta. This complex and major surgery was done under cardiopulmonary bypass and total circulatory arrest by Dr Unnikrishnan and his team (Published in *J Vasc Surg.* 2013, vol 57, 1126). The person had almost complete recovery with his check CT confirming intact repair and a patent graft (Fig. 1B). The person was discharged from the hospital 10 days after surgery and was prescribed medicines to control high blood pressure. At 2 years follows up, he is fully active and back to profession and hypertension easily controlled with a single drug.

Q-dots, A New hope for the efficient drug delivery system

Quantum dots (Q-dots) such as CdSe, CdTe, CdS, ZnTe, ZnSe etc. are metal clusters in the nano sized system. These exhibit quantum confinement and possess special photo quality caused by widening of the band gap. Their discovery has also generated great interest in the areas of information technology, optoelectronic, memory and miniature laser beam emitting devices. Q-dots conjugated with biomolecules have been used in diagnostics and imaging because of their advantages over conventional fluorophores in terms of longer lifetime and higher fluorescence intensity. Synthesis techniques and surface engineering of Q-dots have shown a quantum jump during the last decade due to promise of enhanced potential applications in biology.

Visible water soluble Q-dots with increasing particle size (left to right) emission wavelength 560 nm to 620 nm

Two main approaches have been adopted to synthesize water soluble Q-dots: (1) To replace the organically soluble surface capping molecule on the particles with water soluble thiols or silica shell and (2) direct synthesis in aqueous medium. The aqueous synthetic strategies are simpler, cheaper, and more environment friendly. For Biomedical applications of Q-dots most of the reported studies deal with the use of Q-dots in cancer biology and imaging though areas such as cardiac diseases have been largely ignored, which remains as one of the major concerns in modern world. In order to establish the therapeutic potential of Q-dots in cardiac complications it is important to understand their effect on the underlying endothelial cells, which are the primary cells in blood vessels. The women scientist Dr Diksha Painauli and colleagues synthesized thioacid capped CdSe Q-dots and modified their surface by ZnS coating by direct synthesis in aqueous medium and evaluate the cytotoxicity on HUVEC and hemocompatibility with potential intention of using them for biological applications as a drug carrier specific to cardiac disorders. These cytocompatible Q-dots were further conjugated with specific antibody and drug, streptokinase, as a targeted drug delivery system to target the fibrin clot. The results of this study are expected to help in the development of quantum dot based drug delivery system for the treatment of cardiovascular diseases with targeted drug in future (Published in *J Biomedical Nanotechnology* 2013, vol 9, 257-266).

Oral delivery of insulin

A much awaited novel nanosized drug carrier that is capable of delivering insulin through oral route is devised by the research the team led by Dr CP Sharma, Head (BMT Wing). The carrier was developed by modifying starch-derived molecule with a non-toxic polymer. This nanosized drug vehicle can deliver the insulin molecule to target tissues, retaining the conformation of insulin molecule.

Starch, a natural biodegradable polymer, is widely used in the food and plastic industries. It is a water soluble hydrophilic polymer which can be hydrophobically modified to repel water, making it an excellent drug carrier and coating polymer for sustained release of drugs.

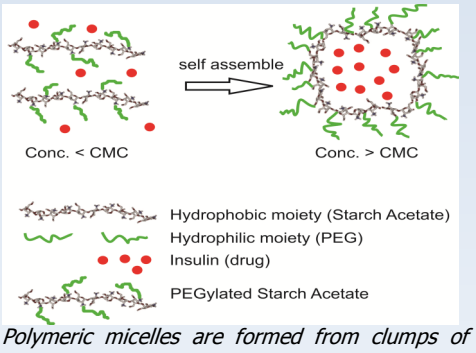
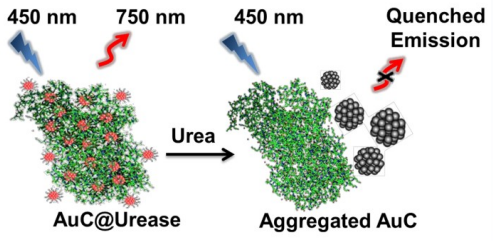


Fig: Polymeric micelles are formed from clumps of polymer chains (PEGylated starch acetate) with both hydrophobic (starch acetate) and hydrophilic ends (PEG).

Briefly authors synthesized starch acetate, allowing starch to react with acetic anhydride in the presence of sodium hydroxide catalyst. The starch acetate was modified, using polyethylene glycol, a non-toxic polymer. Then adding the modified starch acetate to insulin solution led to the formation of self-aggregated insulin-loaded nanoparticles. Authors carried out toxicity, drug release and drug uptake studies, using the insulin-loaded nanoparticles in rat intestinal mucosa, mouse fibroblast cells and simulated gastric (pH 1.2) and intestinal (pH 6.8) fluids. The rat intestinal mucosa showed significant uptake of insulin-loaded nanoparticles in vitro. A 20% release of insulin was observed in pH 1.2 during a period of 2 h while 60% release was observed at pH 6.8 in 8 h. The drug-loaded nanoparticles were non-toxic in studies with mouse fibroblast cells. These nanoparticles can be used as an oral delivery formulation for insulin that might provide a prolonged glucose-lowering effect in diabetic patients (Published in Carbohydr. Polymer 2013, 95, 1-8). This work was recently reported in Nature India.

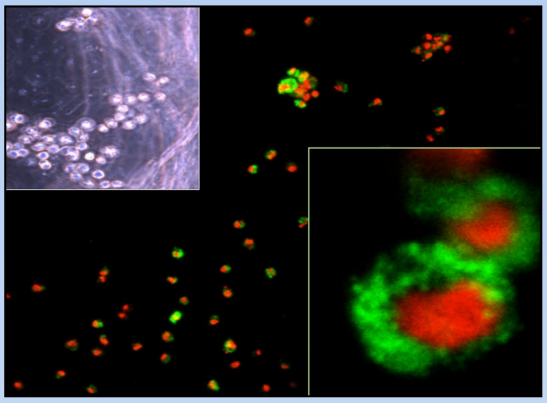
Bionanosensor for the detection of urea in blood

Urea, a byproduct of protein metabolism that is formed in the liver, circulates in the blood and is excreted through the kidney in urine. In severe nephritis or other disorders leading to renal failure, the concentration of blood urea increases. Therefore, urea is an important marker for evaluating uremic toxin levels and kidney functioning. Urea detection is also important in the estimation of nonprotein nitrogen in food products as it is reported that urea is utilized as an indicator of protein feeding efficiency. We have developed a nanosensor based on a NIR emitting (λ_{em} = 750 nm) gold cluster and urease enzyme for the selective detection of urea in whole blood. The detection is based on an enzyme specific conversion of urea to ammonium ions which facilitates a pH-induced aggregation of AuC, leading to the fluorescence quenching. This method does not interfere with urease inactive analytes (creatinine, urea, uric acid etc.) or the autofluorescence of blood as confirmed by comparable urea levels obtained when the current method and standard clinical methods are used, within an error limit of ±3%. The main advantage of the developed biosensor is that it works directly on the blood whereas currently adopted clinical methods require serum separation for the detection of urea, as many of them work on colorimetric assay which is often hindered by the color of blood. The generality of the sensor was also demonstrated for the detection of urea in adulterated milk. This can find application in the detection of urea in adulterated milk, as urea adulteration of milk to increase the SNF (Solid Not Fat) value is very common in developing countries. This work is patented recently (1567/CHE/12), and is published in Small (DOI: 10.1002/ smll.201300213).



Science Images from our research
In quest of Artistic Titles.....

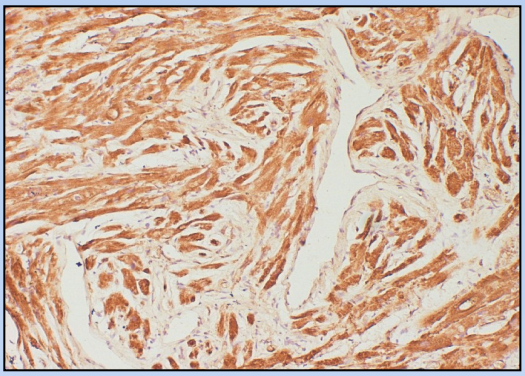
A



Cells with compromised cell wall in presence of toxic components.

Contributed by Dr. Babitha S (DTERT)

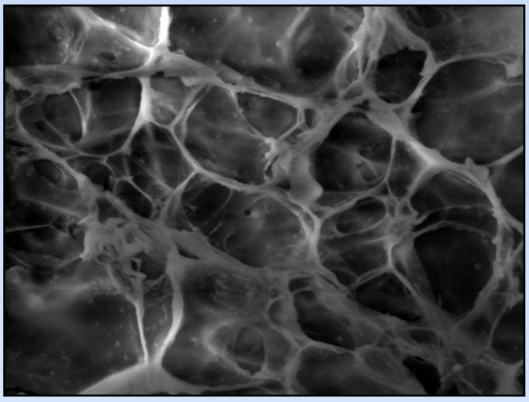
B



Immunohistochemical staining of nitrated tyrosine in human right atrial appendage.

Contributed by Dr Srinivas G (Biochemistry)

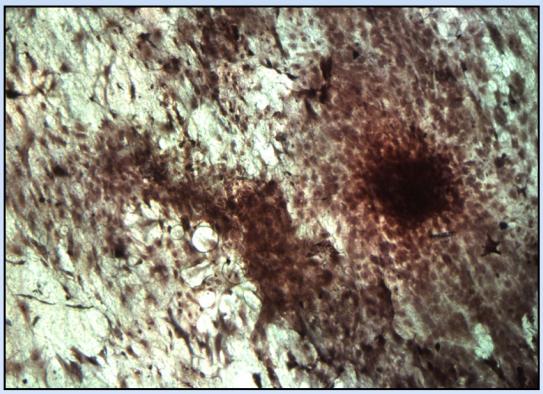
C



Scanning Electron Microscopic image of a polymer (hydrogel)

Contributed by Finosh GT (POL)

D



Live cells arranged in a peculiar pattern on signal embraced electrospun membranes

Contributed by Dr. NeethuMohan (DTERT)

Entries are invited for a suitable artistic title for these scientific pictures. The winner entries for each picture will be announced in next issue.

"People of excellence go the extra mile to do what's right."

Joel Osteen

Memory Lanes...

Self realisation in a budding spring !

D.S. Nagesh

It was during the spring of 1995, I landed up in Cleveland availing one year BOYSCAST fellowship from Govt. of India. In the mild warm sunrays peeping though the dampness, the first thing I noticed around was the bulbs (tulips, daffodils etc) everywhere, in varied colours, sizes and shapes - the first indicator of the spring and the long waited summer. Being my first trip outside India, I was amazed by the clear sky, cleanliness and the distinct public discipline in Cleveland (which is symbolic with developed nations).

Cleveland is small city in the state of Ohio, north in US, by the shore of Lake Erie - one among the Great Lakes, and on the banks of Cuyahoga river which divides the city. This river was notorious for its pollution and frequent fire mainly from the floating oil. A major fire in 1969, forced a massive cleaning up of the river, and now it is considered as one among the cleanest rivers in the world. This event also triggered the need for environmental protection act of US.

Cleveland Clinic Foundation (CCF), the largest employer of Cleveland, had its beginning in 1921 by the physicals Bunts, Crile, Lower along with Philips. A white square sitting on another four squares - its logo indicates the founders as well its objectives - in-patient care, out-patient care, research and teaching. CCF had a catastrophic fire in 1929, taking the life of 123 people including the life of founder Dr. Philips. It is believed that the heat of incandescent light on nitrocellulose X-ray film was the source of that fire. In fact, this fire mishap significantly changed the fire fighting systems and even initiated regulations on the storage and use of X-ray films in US.

Artificial Organs development at CCF had its beginning with Dr. Koff in 1957 with artificial heart programme. Dr. Nose was also part of CCF. I joined with the NIH funded Total Artificial Heart (TAH) programme with Mr. Ray Kiraly. Dr. Golding too had another programme on continuous flow Left Ventricular Assist Device (LVAD). From the first day onwards, I could find lot a similarity between our Institute and CCF - basic amalgamation of research, patient care and teaching, the multidisciplinary team, targeted programmes of medical device development, everything under a single umbrella. I could witness LVAD implantations and heart transplants done by Dr. McCarthy and team, who also used to lead the implantation of TAH in calf. The TAH programme was in its full swing then - the assembly of the device, testing, evaluation in animal- everything was going on regularly. After each evaluation, there were detailed discussions, corrective actions and follow up on implementation. Though they were with a highly advanced device, the work culture and approach was very much alike and these resemblances made me very homely there.

It was then; I was able to understand and became aware on the real greatness of our Institute, though I have spent nearly ten years here by then. I could eventually realise the vision and efforts required to build such an Institution at a global perspective. CCF even in US stands apart from rest of the medical Institutions due to its inherent uniqueness. My wonder was how a similar organisation became a reality in India, especially in the state of Kerala. In US-where a river flame or a hospital fire can change legislations and where decisions are taken fast are implemented effectively-we can understand these things can become reality. But how come here?

In that excitement, I wrote a letter to none other than our founder Director, Dr MS Valiathan, who was then the Vice Chancellor of Manipal Academy of Higher Education. I was in great doubt how he would receive it. To my great surprise, within few days I got a call from CCF Governor's office (Governor was Dr. Floyd Loop, a world renowned cardiac surgeon who was at our Institute during its early days, helping in setting up the CABG procedures) about a fax from India for me and I was overwhelmed to find a two page typed letter from Dr.Valiathan, in his letterhead, appreciating my findings, narrating glimpses of the efforts he had to put in, and how he could influence those who were in power as well as attract and retain the best talents at SCTIMST, right at its beginning. It was a write up from the heart.

That is greatness! Greatness even in small things-the seriousness given to a communication by a youngster under excitement! That is the greatness of game changers who think globally and act regionally. And as he taught us and demonstrated us, ***ultimately even the small things are equally important to make big things. happen.....***

(Mr DS Nagesh is Scientist G & Scientist-in-Charge of the Intellectual Property Rights Cell, BMT wing).

New Initiatives: Medico-Techno club

Medico-Techno (M-T) club was initiated by Dr Prabha D. Nair (Scientist G and SIC, DTERT) and Dr Shrinivas G (Prof Anaesthesia) to enlighten us with the latest technological developments in the medical field and promote better interaction with the clinicians and the researchers of our institute. The meeting by the M-T club are organized alternatively at Hospital Wing and at BMT Wing once every 3 months. The first meeting was conducted on July 16, 2011 at Hospital Wing with Dr. GS Bhuvaneshwar, (previous Head, BMT wing) giving an overview on the activities of the Biomedical Technology wing.

No	Title of Talk	Name of Speakers	Speaker's Institution
1	Journey toward development of vascular graft	Mr. C V Muraleedharan, Er. G, BMT wing Dr M Unnikrishnan, Sen Prof, CVTS, Hospital	SCTIMST
2	Design, development & the Clinical Trial of Hydroxyapatite Dense -Porous Bi-layer Burr-hole Buttons	Dr Easwer, Assoc Prof, Neurosurgery, Hospital Dr HK Varma, Scientist F, BMT Wing	SCTIMST
3	Development of Fibrin Glue; Utility & conceptualization of indigenous develop. of intracranial electrodes for epilepsy surgery	Dr Lissy Krishnan, Sc G, BMT Wing Dr Ramshekar Menon, Neurology, Hospital Dr N Khambete, Instrumentation, BMT Wing	SCTIMST
4	Medical Devices Use and Safety	Prof Alan Murray	UK
5	Development of decellularised bovine pericardial tissue for cardiac & neurosurgery applications	Dr PR Umashankar, Sc E, IVT, BMT wing Dr K Krishnakumar, Associate Prof, Neurosurgery, Hospital	SCTIMST
6	Nanomedicine based on RNA interference for tissue engineering & treatment of human disease	Prof Jorgen Kjems, Aarhus University iNano	Denmark
7	Development of Bioreactors for cartilage tissue engineering	Dr Dang Lee, Aarhus University	Denmark
8	How the use of TADs changed the orthodontic spectrum	Prof Birte Melsen, Prof and Head of Orthodontics, Aarhus University	Denmark
9	Use of dental pulp stem cells in tissue regeneration	Prof David Kraft, Aarhus University	Denmark

New Facilities

Ceramic Coatings Facility

The Ceramic Coatings Facility was recently set up in the BMT Wing Campus, SCTIMST, for providing Titanium Nitride (TiN) and Diamond like Carbon (DLC) coating service for the Bio-medical Industry. The activities of this facility include development, optimization and validation of the ceramic coatings for various biomedical applications.

A view of the process chamber for Titanium Nitride (TiN) coating

Diamond-like Carbon Coating system made by Isytech, France

Ceramic coatings are widely used in industry to protect metallic tools and components from wear and corrosion. TiN and DLC are the most advanced and highly robust ceramic coating materials. These are found ideal for coating implantable metallic biomedical devices owing to their excellent biocompatibility, high mechanical strength and ability to resist in vivo corrosion. The coatings increase the life of the implant by isolating it from highly corrosive body environment and also make it safer for the patient by eliminating the chances for tissue reactions towards corrosion products. TiN and DLC are highly sought for coating cardiovascular devices (like heart valves and coronary stents) because they offer surface with lowest chance for forming blood clots (i.e. least thrombogenicity). DLC is found superior, but its technology is highly advanced. The coating thickness would be 1 to 4 micrometers.

Dr Manoj Komath, the In-charge, is proud about the facility that it is the only center of its kind in India that offers TiN and DLC coatings, using the state-of-the art equipments. Titanium Nitride coating is made in a Dual Magnetron Sputtering system designed and developed in India by Hind High Vacuum, Bangalore. This is a Physical Vapour Deposition technique in which titanium is sputtered using direct-current gas discharge and reacted with nitrogen in a low-pressure chamber. Diamond -like Carbon coating is made in a Plasma Enhanced Chemical Vapour Deposition system designed and developed in France by Isytech, Lannion. In this technique, carbonaceous vapours are subjected to radiofrequency power at low pressures to form a discharge, from which carbon atoms get deposited.

"In this facility, we conduct batch coating operations", explained the In-charge. "That means, a set of components will be loaded together in the coating system so that the process is economically viable". The cleaning and surface processing of the components prior to coating also will be taken up, if needed. The final coating step could be completed in a day. TiN coatings are at present validated for coating heart valve cages and coronary stents. DLC coatings are intended for heart valve discs to make it non-thrombogenic (to prevent clotting) and orthopedic implants to avoid in vivo corrosion. Currently, ceramic coatings are optimized for the devices developed at the BMT Wing, soon and the facility will be opening for the Biomedical Device Industry. The team has done competent work on coatings technology which enabled the filing of two Indian patents on DLC coatings.

Visit by Ms Anna Soubry, MP, Health Minister, UK and British Delegation on 15.01.2013

New Faces

Chitra High Value Fellows & Inspire Faculties

Jithin Krishnan, Dr Neethu Mohan, Dr Sunita Prem Victor, Dr Gayathri V, Dr Bindu P Nair (Front row), Dr Kaladhar Kamalasanan, Sarath S Nair, Gopu CL, Dr. Shivaram selvam (2nd row).

Welcome to DST INSPIRE Faculty Awardees and CHVF Fellows!

Dr Shivaram Selvam and Dr Bindu Nair have joined as DST INSPIRE Faculties, an Award scheme launched by Department of Science and Technology, India to provide 5 years contractual research award to young achievers for independent research and emerge as a leader in future science & technology. Dr Neethu Mohan, Dr Sunita Prem Victor, Dr Gayathri V, Jithin Krishnan, Sarath S Nair, Dr. Kaladhar Kamalasanan and Gopu CL are the Chitra High Value Fellows. The Institute launched "Chitra High Value Fellowship" in 2012; a scheme to identify highly qualified and well proven Scientists & Engineers committed towards Product Development, Research & Teaching. The fellowship is offered for a period of 3 years and candidates with consistent high performance have the opportunity to continue employment as regular Academic Staff of the SCTIMST.

Chitra promotes Hindi...

The Official Language Implementation Committee (OLIC) of the Institute actively participates in promotion of National language Hindi among the SCTIMSTians and Kerala state. From time to time Hindi learning Workshops are organized and conducted. As a result, correspondence in Hindi by the employees has increased in recent years. For its efforts, SCTIMST received Certificate of appreciation at the Town Official Language Implementation Committee (TOLIC) held at Peroorkada in March 2013.

भारत सरकार
नगर राजभाषा कार्यान्वयन समिति, तिरुवनंतपुरम

उत्कृष्टता प्रमाण-पत्र

वर्ष 2011-12 के दौरान राजभाषा हिन्दी के प्रगामी प्रयोग संबंधी कार्य निष्पादन में छठा स्थान प्राप्त करने के उपलक्ष्य में श्री चित्रा तिरुनाल आयुर्विज्ञान एवं प्रौद्योगिकी संस्थान को प्रमाण-पत्र प्रदान किया जाता है।

तिरुवनंतपुरम
तारीख: 25.3.13

(मोहन चोपरा)
सहायक निदेशक (रा.भा.) एवं सदस्य सचिव, न.रा.का.स., तिरुवनंतपुरम

(उमा कुमार)
मुख्य पोस्टमास्टर जनरल (केरल सर्किल एवं अध्यक्ष, न.रा.का.स., तिरुवनंतपुरम

Town Official Language Implementation Committee(TOLIC) AWARD Function

"Life is an opportunity, benefit from it.
Life is beauty, admire it.
Life is a dream, realize it.
Life is a challenge, meet it.
Life is a duty, complete it.
Life is a game, play it.
Life is a promise, fulfill it.
Life is sorrow, overcome it.
Life is a song, sing it.
Life is a struggle, accept it.
Life is a tragedy, confront it.
Life is an adventure, dare it.
Life is luck, make it.
Life is too precious, do not destroy it.
Life is life, fight for it."

Mother Teresa

Chitra's Stars: Awards/ Honours

ICMR M.N Sen Oration Award

Dr. C. Kesavadas, Professor, Department of Imaging Sciences & Interventional Radiology, was awarded "ICMR M.N Sen Oration Award - 2010" by ICMR. This prize is given to a Scientist for the sustained research work carried out in the field of Practice of Medicine. The award consists of a Citation & Cash award of RS 20,000/-

ICMR Kshanika Oration Award

Dr. Annie John, Scientist-F, Biomedical Technology Wing, was awarded "ICMR Kshanika Oration Award - 2010" by ICMR. This prize is given to a women scientist for her meritorious work carried out in Biomedical Research. The award consists of a Citation & Cash award of RS 20,000/-

Bharat Shiksha Ratan Award

Dr Molly Antony, Scientist 'F', Department of Microbiology, won the "**Bharat Shiksha Ratan Award**". She received this award from Dr Bhishm Narain Singh (Former Governor of Asssam & Tamil Nadu) on 29th April 2013 at Constitution Club of India, New Delhi. The Award has been given by Global Society for Health & Educational Growth.

Nightingales

Mrs. Thanuja is one of the best critical care nurses in SCTIMST. After joining the Institute, she successfully completed certificate course in Nursing Administration from Center for Adult Continuing Education and Extension, University of Kerala. She has demonstrated courage and willingness to rescue an young girl who was wandering through street of Pattom on December 16, 2012 at 10 pm. Mrs. Gurudeep Kour Venu, a volunteer working with NGO named "Expressions India Society" expressed great appreciation on her action to Director of the Institute. Dr. K Radhakrishnan, Director, SCTIMST placed in record heart full appreciation by giving her Certificate of Appreciation. She was awarded with a Memento by the nurses of SCTIMST on the occasion of Nurses Day celebration on May 11, 2013.

Ms. Sudarsa K is an exceptionally competent Nurse with 33 years of experience in Neurology and NeuroSurgery. She has presented 5 scientific papers in various National and State level Conferences. She has various Carrier achievement Awards to her credit including: National Florence Nightingale Awards from President of India (2012), Best Nurses Award from Trained Nurses Association of India, Kerala State Branch (2010), Best Nurses Award from Nursing Service Division, SCTIMST (2008). She is a role model in clinical competence and supervision.

Congratulations! Congratulations! Congratulations! Congratulations! Congratulations! Congratulations!

Dr Bindu P Nair for Young Scientist's Award, KSCSTE Div of Tissue Engineering & Regeneration Tech

Dr Sidharth Viswanathan for Best Poster Award in 2nd INDOVASC Symposium Bangalore

Dr Vidhu Bhatnak for Best Paper presentation at 14th NCNAC, Varanasi

Ms Nandini RJ for Best Paper Oral presentation, Dept of Biochemistry Kerala

Ms Susan Mani for Best Poster Award XXV KSC, Kerala

Fayaz RK for Best Paper Neurobionics Workshop at JIPMER Pondicherry

Ms Beena G Mohan Best Paper Award, XXV KSC, Kerala

Dr Amita R for online CME Quiz 3rd prize, Geno Path 2013

Dr Sapna Erat Sreedharan for 2nd Best Platform Presentation, ISDA, Delhi

Dr Divya KP for Best Oral Presentation at ISACON, Ludhiana

Francis B Fernandez, for Best Paper Award at XXV KSC, Kerala

Congratulations! Congratulations! Congratulations! Congratulations!

Service Awards

Technological Excellence

Mr. Willi Paul is Scientific Officer at the Division of Biosurface Technology, BMT Wing, SCTIMST. His areas of interest are inorganic nanoparticles in drug delivery and nanocomposite wound healing devices from chitin/chitosan. He has 71 publications in his credit including 10 book chapters with a Scopus Citations of 1008 and an h -index of 14 (Google scholar Citations = 1488, h-index 17). Six patents are sealed including one US patent and four applications are pending. He has attended several conferences, and presented oral and poster presentations including four invited presentations. He has won two best poster presentation awards and one best oral presentation awards in these conferences. He has been awarded with Fellow Biomaterials and Artificial Organs (FBAO) by Society for Biomaterials and Artificial Organs (SBAOI) in 2011 for his significant contributions to biomaterials science and contributions to the development of the Society (SBAOI). He was actively involved in the event management of several conferences arranged by the Lab/ Institute/ Society and the Course Programmes arranged by Industry Institute Partnership Cell at SCTIMST.

Mr. S. Vijayan joined SCTIMST (then Sree Chitra Tirunal Medical Centre, SCTMC) in 1979, when the BMT Wing has been in the formative stage in the Satelmond Palace Campus. Vijayan started his work in the research group led by Mr. Venkatesan and the first assigned job was to develop a PVC bag system for a Soft-shell Oxygenators and Cardiotomy Reservoir. Later, he was involved in various crucial projects of SCTIMST for realising devices like Hard shell oxygenator, Mediastinal drainage system, Heart Valve, Concentric needle electrode etc. In 1997, Vijayan joined Bioceramic Lab as a scientific assistant and initiated the basic programmes on the optimization of bioceramic green body making and sintering for the manufacture of reproducible bioceramic materials which were later realized in the development of different products. Some of these new generation bioceramic implants are already seen market. Apart from the above developmental activities, Mr. Vijayan is also the authorized person to carry out X-ray diffraction analysis which is a part of the testing services. Mr.Vijayan's presence has always been an integral part of all the cultural and sports activities of the BMT Wing Campus and currently assumes the Secretaryship of Chitra Tech Recreation Club (CTRC)

Creative with Nature: Gardening skills

Shri Babu, a senior gardener with special skills, creativity and a sense of purpose in art of gardening. His expertise on nurturing variety of plants, knowledge of the soil types, and fruitful experimentation with nature has lead to development of beautiful eye-catching Green Paradise in the BMT wing campus. He displays a true professionalism by taking care of each plant, tiny or big, with sheer determination and patience.

Events held at SCTMST ....

Institute Day & Navathi Pranamam to HH Sree Uthradom Thirunal Marthanda Varma

Royal family of Travancore have shared a very special and deep rooted association with the Institute. In words of Dr MS Valiathan, founder Director, "*Chitra Institute is a Royal gift to the Nation*". 90th Birthday of HH Sree Uthradom Thirunal Marthanda Varma was celebrated on the Institute Day.

HH Padmanabhadasa Sree Uthradom Thirunal Marthanda Varma lightening the lamp on the Navathi Pranamam celebrations.

CONVOCATION 2013 (29TH Batch)

In the prestigious Convocation Ceremony of 29th Batch, 64 Graduates attended and received degrees on May 18, 2013. Proud Graduates were awarded degrees for Doctor of Medicine (10), Magister Chirurgiae (7), Post Doctor Fellowship (3), Post Doctoral Certificate Course (1), Doctor of Philosophy (9), Master of Philosophy (6), Master of Science in Bioengineering (2), Master of Public Health (including CMC & NIE) (25) and Master of Applied Epidemiology (1).

Convocation Address
Dr. K Radhakrishnan
Chairman, ISRO Space Commission
Secretary, Department of Space

Presidential Address
Dr. K Radhakrishnan
Director, SCTIMST

Guest Honor
Dr.Gita Sen
Center for Public Policy, IIM Bangalore.

Reply by a New Graduate

Esteemed Director of the Institute, Prof Radhakrishnan, honourable chief guest of today's ceremony Dr K Radhakrishnan, Guest of honor Prof, Gita Sen, Dean, respected teachers, distinguished guests, colleagues, ladies and gentlemen

On this memorable Saturday, I stand here to address you all on behalf of all the new graduates who have received their degrees in the august presence of our teachers, parents, spouses and friends. The joy of completion, in a way is surreal and it wipes away most of the tribulations we face during the pursuit of our ambitions.

We come here from diverse academic backgrounds, some humble and some privileged; many reach here after well chalked out plans about their future, others like me land here by a stroke of destiny. We immerse ourselves in this cauldron of knowledge and learning provided to us by the brilliant teachers of this glorious institute which needless to say, are amongst the best in their fields. We emerge wiser, competent and what is more extraordinary is that we acquire a serene and tranquil demeanor to face the challenges which lie ahead of us, bereft of the usual perils of self-doubt.

We owe a deep debt of gratitude to our institute and our beloved teachers for this and for inculcating in us values such as empathy towards our patients and respect for them which I am certain will go a long way in shaping our future.

With moist eyes we thank our family members for being there for us all the time and to say that 'we fathom the measure of sacrifices you made for us through this journey' would be a gross understatement. Dear family- take a bow!

Today, as we celebrate the culmination of our formal university education, I am reminded of a saying, an aphorism a bygone king inscribed on his ring which made him happy when sad and solemn when happy. It simply said: '**this moment shall pass**'.

It's the most appropriate message I could think to share with you all as we reflect on the highs and lows of our just concluded education and our future life. In moments of despair and gloom in the past and the distant future, it tells me that the dark clouds will pass and 'my time' is just around the corner. It also warns us that if we fail to utilize every moment we have to its fullest potential, we stand to lose that moment permanently.

Lastly it helps us stay grounded in the wake of a great success and teaches us that we cannot rest on our laurels and that keeping up with and advancing scientific knowledge, is a lifetime responsibility of our professions.

We walk from here on the well-lit path shown to us by our institute with an earnest promise in our hearts that wherever we go we will keep the flag of Sree Chitra Institute flying high.

Thank you !

(Contributed by Dr Himanshu Soni, PDF, Epilepsy)

Republic Day Celebrations

International Nurses Week Celebrations

World Environment Day celebrations
Think Eat Save

World Parkinson's Day

Workshops

English Language skill for Effective Scientific communication

One day workshop on "English Language skill for Effective Scientific communication" was organised by Research and Publication Cell on March 9, 2013 in AMC Seminar Hall in the Campus. The workshop covered topics such as, introduction to Scientific presentations Oral/ written presentation of tasks, and Multi-media Presentation by guest Faculty Dr. C. Praveen (Head of the Department of English, Govt. College of Teacher Education, Thycaud). There were 22 participants from both hospital wing and BMT wing of the institute. The participants included PhD & MPhil students, Senior Residents, project staffs and young faculty members of SCTIMST.

Applied Innovation Workshop

The Workshop on Applied Innovation conducted by Mr Slava Koznov and Mr Alexei Levene from Innovation Experience (NGO) on May 25, 2013 in BMT Wing campus provided a very interesting insight into how innovative ideas can be incorporated into design of Medical Equipment and medical devices. Participants were exposed to insights and tools garnered from the forefront of how we think about innovation, with lessons learned from Philips, and from the cutting edge of industry and anthropology in this workshop.

Upcoming events ....

The Hubert H. Humphrey Fellowship Program, which is a Fulbright program, brings accomplished young and mid-career professionals from developing countries to the United States for ten months of non-degree graduate study and related practical professional experiences.

Application Due Date: July 1, 2013

Website: http://usief.org.in/Fellowships/Hubert-H-Humphrey-Fellowship-Program.aspx

Sitaram Jindal Research Fellowship Scheme is instituted to encourage and inspire the talent and recognize excellence in innovation and research.

Website: www.sjfellowship.org

Admission to Ph.D. Programme, SCTIMST

(Only for JRF Fellowship holders of UGC/CSIR/ ICMR/DBT/INSPIRE)

Application Due Date: July 17, 2013 ; Date of Interview: July 31, 2013

Website: www.sctimst.ac.in

Farewell....

Farewell to Dr Mira Mohanty, Associate Head, BMT wing

Charity....

Flag off : New Ambulance donated by SBI

THE BRAIN INITIATIVE: In focus

Alcmaeon of Croton (500- 450 BC), an early Greek medical writer and philosopher-scientist was the first to identify the brain as the seat of (mind) understanding and to distinguish understanding from perception. He provided evidence that nerves from the sensory organs finally reached the brain, a fact, hitherto ignored. What we understood about the brain in the last 2500 years can be narrated as an astonishing journey with a variety of revelations about our own perception about brain, which is constantly evolving. With nearly 100 billion neurons and 100 trillion connections, the human brain had remained and still remains one of the greatest mysteries in science. No other study has been so challenging, given the amount of 'matter' in it. There are several neurological disorders such as Alzheimer's disease, Parkinson's disease, autism, epilepsy, schizophrenia, depression, and traumatic brain injury, exerting a tremendous toll on individuals, families, and society. Post year 2000, scientists have made a number of landmark discoveries like sequencing of the human genome, the development of new tools for mapping neuronal connections, the increasing resolution of imaging technologies, and the explosive growth of nanoscience and technology, all of which is thought to help unlock the mysteries of the brain. With this background, the US President Barack Obama has called on the scientific community to join him in pursuing **Brain Research through Advancing Innovative Neurotechnologies [BRAIN] Initiative**. This is one of the boldest steps taken in the 21st century. He has asked the best minds available for a team effort to solve the puzzle and probably wants us to know the following. '*To reach the darkest abyss in the brain, one should seek out for the most complex and sophisticated minds, put them in a room together, and have them ask each other the questions they are asking themselves*'.

The team consists of the world's best companies, research universities, foundations, and philanthropists in identifying and pursuing one of the Grand Challenges of the 21st century. Approximately $100 million in funding for research is supported by the National Institutes of Health (NIH), the Defense Advanced Research Projects Agency (DARPA), and the National Science Foundation (NSF). There are private partners like The Allen Institute for Brain Science, Howards Hughes Medical Institute, Kavli Foundation and Salk Institute for Biological Sciences as well who will share an equal amount in grant to support the initiative. The $100 million (and growing) fund is substantial amount as a start up grant, but we may need to fill in the hundreds of millions, even to reach 'a dollar per neuron', which might be the legitimate cost involved. We might soon find ourselves in the following scenario; the more we know about the brain, the more we are convinced about the need to know more!

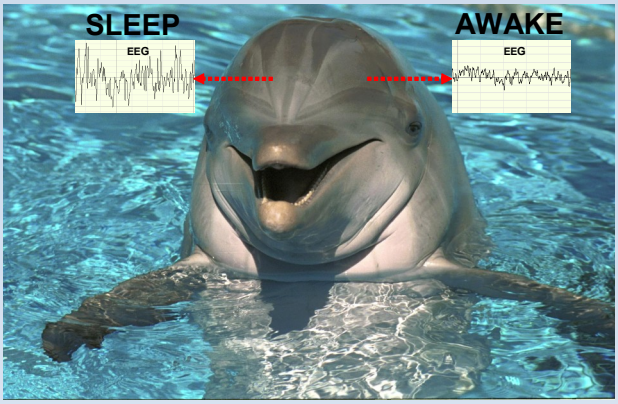
Given the ambitious scope of this pioneering endeavour, NIH has established a high level working group of the Advisory Committee to the NIH Director (ACD) to help shape this new initiative. This working group, co-chaired by Dr. Cornelia "Cori" Bargmann (The Rockefeller University) and Dr. William Newsome (Stanford University), has been asked to articulate the scientific goals of the BRAIN initiative and develop a multi-year scientific plan for achieving these goals, including timetables, milestones, and cost estimates. As part of this planning process, input will be sought broadly from the scientific community, patient advocates, and the general public. The working group is expected to produce an interim report by fall 2013 followed by the final report in June 2014.

Going back to Alcmaeon, it is been told that 'He thus takes the stance of the scientist who draws inferences from what can be perceived, and he implicitly rejects the claims of those who base their account of the world on the certainty of a divine revelation'. Yes, it is time to know the 'matter' behind the 'mind'.

(Contributed by Dr Srinivas G, Biochemistry)

Did you know ???

Sleeping with half brain: Unique mode



Can different parts of brain take turns to go to sleep? Answer is yes. As we know, sleep is characterized by recurring reversible loss of consciousness. Interestingly, some of our fellow beings can have one half of their brain sleeping, leaving the other awake. This is known as "unihemispheric sleep". This phenomenon is observed mainly in migratory birds like Common swift, Japanese quail, Mallard, Orange-fronted parakeet, and some aquatic mammals like Amazon River dolphins, Beluga whale, Porpoise, Pilot whale. In these animals, sleep and wake states are alternated between the two hemispheres, until the animal's sleep requirement is fulfilled. They keep their one eye opened during this period.

Unihemispheric sleep enables these animals to perceive threats from its environment even when one half brain is sleeping. It helps the air breathing aquatic animals to come up to surface periodically to breathe, or the migratory birds to fly continuously over long stretches of ocean. Interestingly, only one type of sleep, known as non -rapid eye movement (NREM) sleep occurs during unihemispheric sleep, where as the other type of sleep, known as rapid eye movement (REM) sleep or the paradoxical sleep, which may be of importance in learning and memory, may not occur during this sleep. These apparent 'extreme' capabilities are necessary for the survival of these animals. Of course, it should be emphasized that unihemispheric sleep has not been observed in humans.

(Contributor: Ms Arathi R, PhD student, Sleep Research Lab)

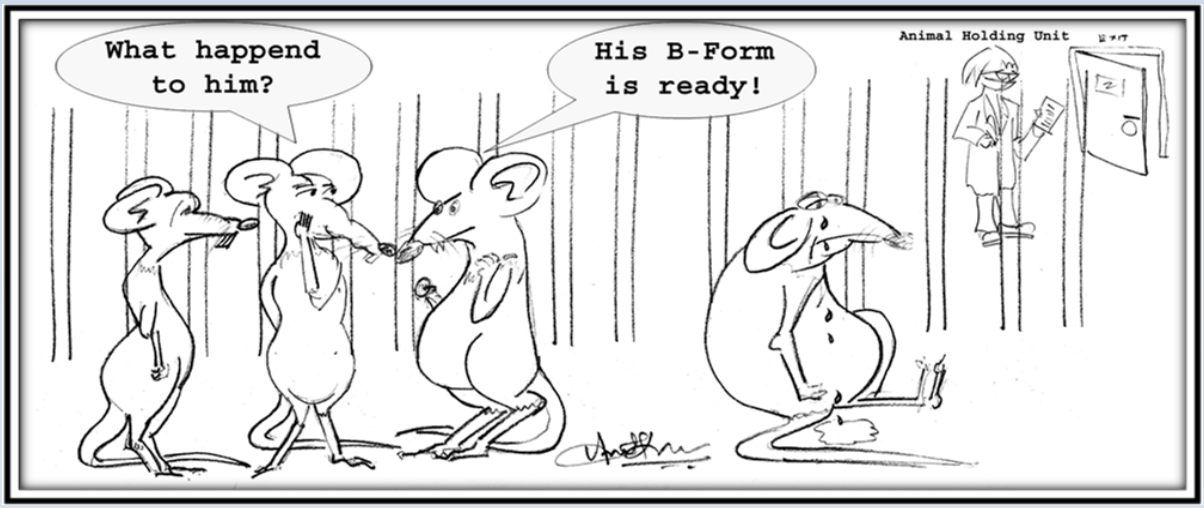
Anything other than Science…

KING FRUIT in campus

The Jackfruit (scientific name Artocarpus heterophyllus) is a species in the mulberry family. It is the largest tree-borne fruit known for having a distinct aroma. Ripe jackfruit is naturally sweet and is used to make a variety of dishes, including custards, cakes, payasam, ice creams and more. It's simple sugars like glucose and fructose can quickly replenish one's energy and bring on a physical sense of euphoria and revitalization. In Kerala, jackfruit chips are the most popular snacks. A portion of 100 g of edible raw jackfruit provides about 95 calories, and is a rich source of protein, the antioxidant vitamin C, B-complex vitamins like vitamin B-6, niacin, riboflavin, and folate. It also has small amounts of vitamin-A, flavonoid pigments such as carotene-ß, xanthin, lutein and cryptoxanthin-ß. Fresh jackfruit provides potassium, magnesium, manganese, and iron. It can be a good bulk laxative because of its dietary fiber. The nature has bestowed Chitra-BMT wing campus with many jackfruit tress all around, apart from its health effects, trees provides an ecosystem in which organisms co exist, and also providing wide shade and coolness. It's an economical source and a feast for vision. Thus, 'Jack fruit' can be definitely called as the '**KING FRUIT'** on this royal piece of land.

(Contributor: Neelima T, PhD student, BMT wing)

Fun Page....



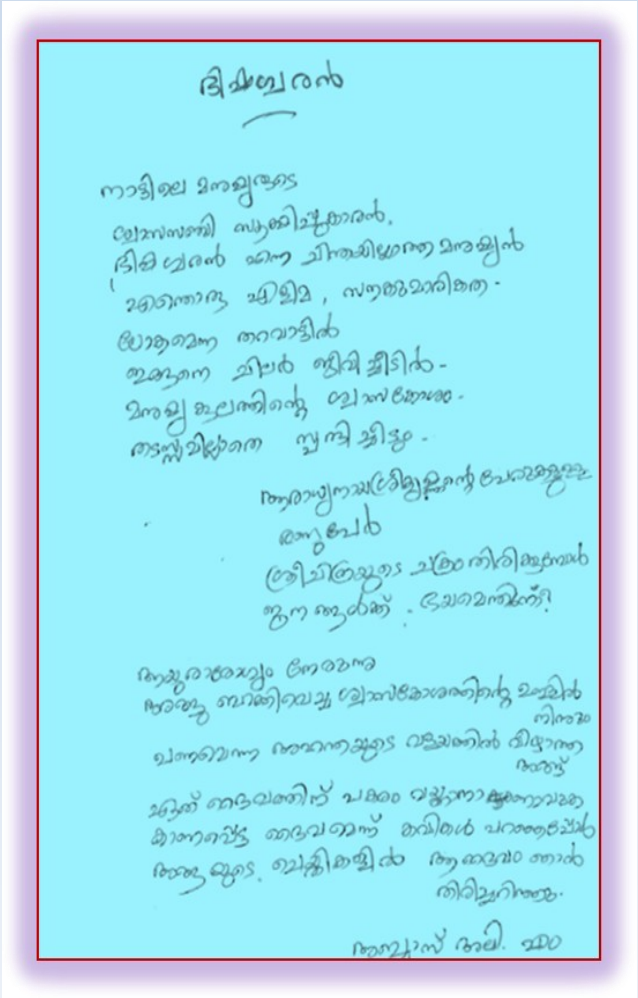
(Designed by Anil Kumar PR, Scientist C, Tissue Culture Lab, BMT wing)

Tusker caught Blessing en Mass at Kottur!

Kottur Elephant Rehabilitation Center is about 45 kms from Thiruvananthapuram. It is situated near Kappukadu in the lap of Agasthyarkoodam Hill range in the Western Ghats. The area spreads over 56 hectares and has a good forest cover making it haven for the elephants. One of the highlights of the center is the chain-free life to these mammoths. For the abandoned babies, the center becomes a natural protected cozy home whereas to the sick and injured ones, it is like a retirement home. About 15 -20 elephants are looked after by an expert team.

National Bird : Enjoying the rains !!!

Poetic Feelings of a Patient.....



(The poem describes the deep feelings of gratitude and faith by a patient towards the Doctors who treated him. The very first stanza portrays the Doctor as a humble, cordial noble soul in whose presence the breath of mankind is maintained. The patient expresses that they feel confident and brave when they are at Sree Chitra Hospital as they know this Institute is governed by Eminent with the name of Lord Krishna. Lastly, the patient's emotions towards the Doctor transform into Worship and realizing the God in Doctor.....)

RAIN..

Raindrops, don't stop
As slowly memories trickle drop by drop.
into my mind's closed window pane
Amazed I look through the mist
in blurred vision I see
A paper boat in the rain
A distant land, wet, green,
The fields, the streams,
The moss covered paths
And feel the smell of the earth
After the first rain
The song of moist cool winds
A Sweet melancholy refrain
Like Knights with lightening swords,
The dark nights thunder by
clearing up into a beautiful
black bright Orion lit sky
Waking up with a smile .Refreshed,
Wiping off the soft blurry mist
I want to let the falling raindrops
Fill my heart.. Again.

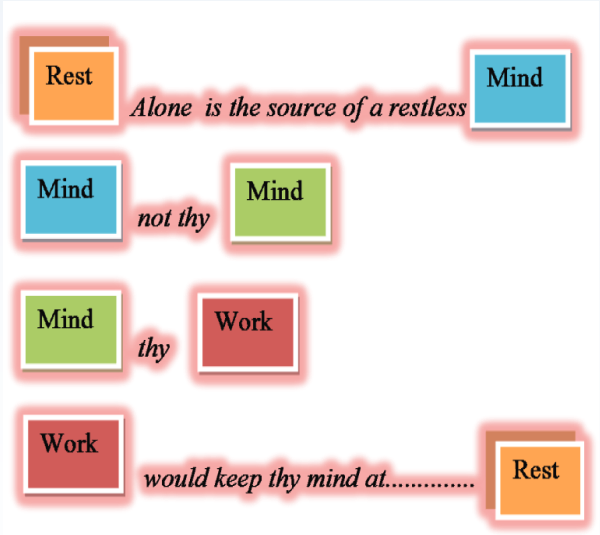
(Arjun GN, PhD student)

"I slept and dreamt that life was joy. I awoke and saw that life was service. I acted and behold, service was joy."

Rabindranath Tagore

The Rest-Mind-Work-Rest Cycle

(A poem by Technologist..)



(Created by Prashant Nair, JRF, Sleep Research Lab)

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To one and all for their valuable Contributions

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(*The articles are invited for the next issue and may kindly be sent to the above mailbox*)