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Chitra Dhwani

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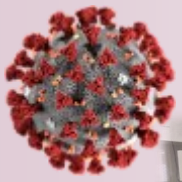
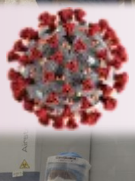
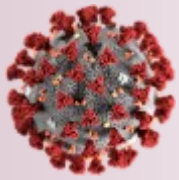
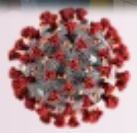
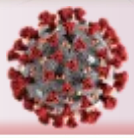
COVID-19 Special Issue











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Ultimately, the greatest lesson that COVID-19 can teach humanity is that we are all in this together" Kiran Mazumdar-Shaw

From Editor's Desk....

A Letter from the Editor

Dear All,

I am delighted and glad to reignite our Institute e-zine "**CHITRA DHWANI".** Under the humble directions of our esteemed Director, I took charge in July 2020 with the new vibrant team. This opening volume is a combined special COVID-19 mega issue 1-3, covering events from Jan to Sept 2020, during this extended pandemic. With the outbreak of COVID -19, the country faced extreme challenging situations, but at the same time it offered an golden opportunity to display our strength to deal with the extraordinary situation. Our Director played catalytic role and sparked energy in these hard times to face the challenge and to address the rising demand of indigenous products and devices as per the AatmaNirbhar mantra by our beloved PM of India.

I am sure everyone will cherish the special feature contributed by Shri Muraleedharan CV that provides the historical glimpses of remarkable journey of medical device development in SCT highlighting the glorious past and present. The joy is doubled as this is concomitant with Golden Jubilee celebration of the DST. Every Chitra member played effective role of frontline warriors in their capacity, whether they were Doctors, Nurses, Scientists, Engineers, Technical, Security or any other staff. Hats-off to the COVID-10 testing team who staff worked day and night for vigorous RT-PCR test to meet the rising demand in Kerala. The convalescent therapy was rolled in for benefit of serious patients as per ICMR guidelines. Various frugal technologies and therapeutic innovations by SCTIMSTians during COVID-19 are encouraging at a time when country was facing lockdown, extended lockdowns, unlocking of triple lockdown etc.

Every hand came forward to help whether it was contribution to PM-CARE and CM-Distress Relief fund, or donating LED sets to the school children to pursue online classes or distribution of food to needy ones. Dr Dhruba Borah reconnected to us through our Alumni Column even in this hard times. The LGBT issues were discussed through online meeting. We missed the prestigious Annual Convocation but academic activities continued with various online platforms and the new academic session resumed.

Enthusiastic participation by all the members of Chitra family is outstanding. I profusely thank everyone for their valuable and creative contributions to Chitra Dhwani. I hope you will enjoy the new issue which is as informative as before in this era of new normal of social distancing, mask and hand hygiene. We welcome suggestions from you about this endeavor, and continue to look forward to your co-operation, support and blessings to further improvise and make it a continued success. Get regular sleep and stay healthy.

Thanks
Best regards

Kamalesh K Gulia, PhD
Chief Editor, Chitra Dhwani
Scientist & Incharge
Division of Sleep Research
BMT Wing, Satelmond Palace
SCTIMST, Trivandrum
Kerala, India

Special Feature

Journey of Medical Device Development: Frugal innovations & beyond

The arrogance of success is to think that what you did yesterday will be sufficient for tomorrow." ***William Pollard***

Our Institute is now well recognized as an institution with an excellent track record in conceiving, developing and translating healthcare technologies. The technology development and translation activities of the Institute are now entering to its fifth decade of operations. Though the Biomedical Technology Wing got initiated in late 1970s, the activities of the wing got impetus after construction of the laboratory buildings in early 1980s in the Satelmond Palace campus. The subsequent progress in the technology development is discussed in four different phases aligned to the four decades of existence of the Biomedical Technology Wing.

The **first phase** spanning from 1980 to 1989 could be termed as formative years. It was during this period the laboratories were established with the teams set-up to take up device development programs. Medical device technology development required teams covering various domains of expertise starting from biomaterial science, medical device engineering, biological sciences and business management. This called for building teams in all these domains and their subdomains which posed another major constrain. With the available resources it was not possible to build comprehensive teams in all these subdomains and hence the structure of Biomedical Technology Wing took that of a set of thinly spread teams in many subdomains covering animal science, animal surgery, bioceramics, biochemistry, biomedical engineering, haematology, polymer science, toxicology, technology business management etc. Each team consisted three to four people with one or two scientists/ engineers and couple of technical personnel. The management took care to make sure that each team has a blend of knowledge and experience initially to start with. This was achieved by picking the technical personnel with sufficient experience and skills from other institutions for carrying out day to day activities independently.

The primary roles of these teams were to build the facilities and capabilities related to design, prototyping, evaluation and processing techniques. The team leads were carefully chosen and nurtured to become versatile professionals. This was an essential component of the success as substantial cross fertilization of ideas amongst various domains was extremely important in the progress of the device developmental projects.

The initial projects in device development were limited to few and aligned to three major streams which included cardiovascular, neuroprosthetic and blood management products. This selection was aligned to the clinicians available in the Institute. It was ensured that every device development team has clinical faculty members and later it was found that the teams which had strong involvement of the clinicians had an edge over the others where the involvement was suboptimal.

The device development teams went through many failures in their initial stages. But, the mindset of "Fail Early, Fail Often and Fail Forward" was very well inculcated in them and led to eventual success. By the end of first decade, few products were ready for technology transfer. By then the norms for the technology transfer and post transfer translation activities were developed and put in place by the technology business management team. The journey of the Biomedical Technology Wing from then on could be considered as second phase covering 1990 to 1999.

Biggest challenge for technology transfer and commercialization was unwillingness of the industries to invest on the technologies which are not tried and tested in the market. Most of the Indian industries at those times were reluctant to absorb indigenous technology since their experiences with indigenous technology were not very encouraging. Moreover, the industry was primarily looking for plant to plant technology transfers and was not having expertise in scaling up manufacturing process from laboratory scale to commercial production scale.

The self-confidence and the confidence in the Institute of a young civil servant turned entrepreneur was the breakthrough that helped the Institute to come out of this. The technology transfer of the blood bag, the first technology of the Institute was not very smooth. There were many scaling up issues; but the tenacity of the industrial partner and handholding of the institute with the industry could finally solve most of these issues and bring the product to the market. The blood bag technology transfer was an excellent learning opportunity for the Institute and led to innovative strategies being brought into the technology transfer process.

The concept of technology proving facility (TPF) was the outcome of the problems faced during the scale up of blood bag technology. The TPF was devised as an intermediate facility to bridge gap between the laboratory scale production and commercial production. The TPF had clean rooms and other systems for meeting the good manufacturing practice (GMP) guidelines. The concept was to have the industry carry out pilot production at the TPF under the guidance and supervision of the

Journey of Medical Device Development: Frugal innovations & beyond

development team and use these devices for clinical trials and for market seeding. This would help the industry to (a) sort out most of the scaling up issues, (b) carry out necessary clinical evaluations and get regulatory clearance, (c) seed the market with the device and get market feedback, and (d) delay the investment decisions of the commercial plant to a point when the industry is more confident about the product. This strategy helped the Institute transfer technologies of oxygenator, hydrocephalus shunt, vascular graft and artificial heart valve through the TPF, which could be considered as the forerunner of the current day technology incubators.

By the end of the **second phase**, most of the technologies developed during the first phase had completed translational activities and the brand "**Chitra Devices**" was slowly getting acceptance in the medical device market. During the same phase new programs were initiated in the biomaterials segment, especially in dental and orthopaedic biomaterials. During the first two phases, lot of expertise and facilities were developed in the area of medical device and biomaterial evaluation. The excess capacity in these segments were made accessible to Indian Medical Device industry helping the industry to get the regulatory testing carried out in India, at least partially, for which they have to approach laboratories in Europe and USA earlier. This also led to the identification of the need for international recognition for the medical device testing activities of the Institute so that the results are acceptable globally. The **third phase** of the BMT wing could be attributed to this activity and associated developments.

For achieving global acceptance for the test results generated in the Institute, the accreditation agency chosen need to be a member of the International Laboratory Accreditation Cooperation (ILAC). The National Accreditation Board for Testing and Calibration Laboratories (NABL) though was member of ILAC, did not have adequate expertise then for accrediting in the domain of medical devices. Search led to the Comité Français d'accréditation (COFRAC, France), which was willing to provide the necessary support, though language was a barrier. The entire BMT wing campus took part in the process of getting ready for the accreditation and this led to a situation in which the device development activities took a back stage. The subsequent accreditation of the laboratories of the Biomedical Technology Wing in 2003 under the scope of ISO 17025, the international standard covering the general requirements for the competence of testing and calibration laboratories, was a milestone in the progress of the wing.

Any accreditation calls for standardization and standard operating procedures for every activity. In the process of getting ready for accreditation, the basic mindset of the teams at BMT wing got hardened to that of standardization which does not go well with innovation, which require an exploratory mindset. This conflict was evident for few years after accreditation. During the same period, the BMT Wing took up an ambitious **Vision 2020 program** which aimed at gearing up the Institute's medical device development activities with a more enhanced vision of promoting the Indian Medical Device industry. Some augmentation of capacity and capability could be achieved as part of the Vision 2020 program. Many of the projects related to second and third generation devices were also initiated by the Institute with financial support from the industrial partners. The **fourth phase** of the BMT Wing's journey starts with this background.

By the end of first decade of 2000, the technologies transferred during the earlier phases were getting matured and the brand Chitra devices was getting very good acceptance. The Chitra Model as an institution in which high quality clinical service, technology development, public health intervention and human resource development; all combined into single institutional framework was getting recognition as an appropriate model for others institutions to emulate. The BMT wing was finding it difficult to cater to the market demands of testing services and the work load from testing requirements was also adversely affecting the technology development. Moreover, the structure of the wing continued as a set of thinly populated divisions which was planned in the 1980s when the operations were limited. With the success behind, the demand for technology developments from industries as well as individual entrepreneurs were increasing. Capacity and capability upgradations were imminent. This scenario called for improved strategies in the operations of the wing. The operational strategies had to be reworked and the focus on the activities of the wing had to be brought back to technology development. It was in this context, the planning for setting up of the Technology Incubator (TIMed), the Medical device Park (MedSpark) and restructuring of the BMT Wing into four departments started. The Technology incubator was to address the demands from the individual entrepreneurs and start-up companies for technology development and scaling up. The TIMed came into existence with the support of the Department of Science and Technology and the Kerala State Industrial Development Corporation. During the first five years of its existence itself, TIMed has become a most sought-after destination in the country for medical technology entrepreneurs.

Journey of Medical Device Development: Frugal innovations & beyond

The MedSpark, the medical device park, was devised to offload the bulk of the testing and evaluation activities, to offer sharable R&D facilities for MSME industries and individual entrepreneurs, to provide sharable facilities for pilot production of medical devices (an upgraded TPF), to offer enhanced technology incubation services (an upgraded TIMed) and to have a skill imparting / skill upgradation unit to cater the requirements of medical device industry. The MedSpark is planned as joint initiative of the Kerala State Industrial development Corporation and the Institute. The facility will become operational within three years at the Life Science Park campus of KSIDC.

It was at the same period the Department of Science and Technology, GoI decided to set up **Technical Research Centre (TRC)** at five Institutions under DST. The TRC for Biomedical Devices was sanctioned to the Institute. This gave us an opportunity to bring back the focus of the BMT wing towards device development activities. With in five years of its existence, the TRC could achieve this objective as is evident from the number of technology transfers that has taken place during the past few years.

If we look at the journey of the Institute in the medical device technology development during the past four decades, it can be easily observed that the technologies developed by the Institute fall in the conceptual definition of **frugal innovations**. Sometimes referred to as Jugard Innovations, the frugal innovation is a process of innovating in conditions of constraint, to produce solutions that are substantially more affordable than alternatives, and accessible to a broader range of people, at the same time meeting all relevant quality and reliability norms. The frugal innovation process is a problem-oriented, creative approach to problem solving which starts from user needs and works from the bottom up to develop contextually appropriate solutions. It tends to be frugal both in ends and means, i.e. relying on the recombination of existing knowledge and technologies from previous efforts rather than substantial, dedicated R&D investments. At the same time, frugality (and thus frugal innovation) remains a relative, rather than an absolute, concept with respect to these dimensions. Whether a certain solution can be considered frugal depends partly on available alternatives as well as its impact on the society.

There are many examples of frugal innovations in India and some of the iconic ones happens to be from the healthcare segment. The famous *Jaipur Foot*, a prosthetic leg for people with below-knee amputation, is an iconic frugal innovation. The outcome of the work by Dr Sethi along with the *Bhagwan Mahaveer Viklang Sahaya Samiti*, world's largest NGO serving the disabled is a shining example of frugal innovation which has transformed the lives of thousands of people during the past five decades. In the developed economies, a prosthetic limb would cost between US$ 150 to US$ 2000, while the *Jaipur Foot* cost less than USD $8 (₹600) to make and costs the user less than US$ 20 (₹1500). Its cross-functional design can take on even the most demanding Indian terrain and lifestyle, and be customized and manufactured within few hours time.

Though the term frugal innovation was the term coined to describe the R&D activities in the resource constrained third world, the concept is getting acceptance in the corporate as well as first world strategies also. The Tata Nano car is an excellent example for frugal innovation in the automobile segment. Renault-Nissan Alliance (France), was impressed by Indian engineers' ability to innovate cost-effectively and quickly under severe resource constraints. Renault-Nissan proactively embraced frugal engineering and became one of the world's leading producers of both electric cars as well as low -cost vehicles — two of the fastest growing and most promising market segments in the global automotive sector. The General Electric Corporation is another example of frugal innovation as their primary strategy for R&D in healthcare sector.

The products from the Institute are very cost effective. Most of the devices in the market costs from one third to half the price of their imported counter parts of the same quality and functionalities. The products are well received by the market. To cite a few examples; (a) the blood bag production based on the Institute's technology meets about 30% of the global market requirements, and (b) the TTK-Chitra heart valve is having about 35% market share in India and is being exported to several countries.

Operating within resource constrained environments, producing technologies that can compete with any leading products in the market and having considerable fraction of commercial success in the transferred technologies, the technology development activities of the Institute is a testimony to the success of the frugal innovation strategies. It is also satisfying to see that the similar strategies are being embraced by the corporates.

(Contributed by Shri CV Muraleedharan, Associate Head, BMT wing; Scientist 'G' (Senior Grade) & In-Charge, Division of Artificial Internal Organs, who is the think-tank and visionary in the field of devices development)

COVID19 Laboratory Testing in SCTIMST

Carrying forward the tradition of local empowerment and national commitment in crisis management

February 2020 brought with it the threat of a pandemic that originated in Wuhan, China. All the established Government Medical Colleges in the state geared up to meet the challenge. It was at this time that SCTIMST was approached with a request from the State Govt to take up the burden of COVID19 testing from the State. The laboratories in SCTIMST were individually too small in number of personnel to start this venture. Hence under the leadership of the Head of the Biochemistry Department, Dr Srinivas G who, with the help of Dr Jyothi EK, Scientist C of Microbiology, Dr Madhusoodanann UK and Dr Cibin TR of Biochemistry, quickly set up the infrastructure for the COVID 19 testing facility in the Molecular diagnostic section of the Department of Microbiology. Many of the essential items required for the COVID testing laboratory were arranged by the latter on war footing. The technical staff of microbiology and biochemistry along with the PhD students of Biochemistry quickly set up the lab environment and the work flow and readied the lab for function in quick time.

An approval from NIV, Pune was needed for the laboratory with respect to its infrastructure and trained manpower. This was obtained on March 21, 2020 and we started receiving samples. The swabs came in batches throughout the day, hence all the technical and non-technical staff had to be deployed in shifts extending up to 10 pm in the night. As the testing requirements were projected to increase, our Director Dr Asha Kishore decided to use the full potential of SCTIMST to meet the needs of the Nation. She asked Dr A Maya Nandkumar of Division of Microbial Technology whether a testing facility could be set at BMT wing campus. As HOD of Department of Applied Biology, Dr Maya met with the faculty and together they agreed and volunteered to share in the work. A COVID testing facility was set up with all Divisions of Dept of Applied Biology pitching in with equipments like PCR machine, centrifuge, plastic ware etc. Then they had a series of training sessions on donning, doffing as preparatory for the actual testing which was followed by setting up protocols on the basis of our experience in running ISO 17025 accredited testing laboratories. The Government of Kerala also provided test kits and consumables required for sustained testing.

The Nucleic acid Extraction Area

The multidisciplinary team at Hospital Wing, SCTIMST, headed by Dr Kavita Raja and Dr Srinivas G

COVID19 Laboratory Testing in SCTIMST

At the peak of the pandemic, upto 200 samples arrived on a single day with timelines for reporting. It is a matter of pride that there were no ambiguous results and all quality control standards were fulfilled in every test run.

Mentorship status to SCTIMST

Following the successful running of the RT PCR tests in most Govt Medical Colleges all over India, ICMR decided to expand the number of laboratories doing the test. The RT-PCR for COVID was not allowed to be done in any laboratory without approval from ICMR. This policy was a great success because though it limited the number of tests done but it ensured highest quality standards with ICMR approved kits and protocols.

To ensure that all these were implemented, ICMR now selected central Govt institutions in all the states as mentors. SCTIMST was thus selected to be a mentor institute for expanding the capacity in the state.

Initially thirty institutions, mainly Medical Colleges in the Govt and Private sector and a few Hospitals with good state of art labs were included in the list given to us. Dr Kavita Raja, Dr Srinivas G , Dr Dinoop KP and Dr Jyothi EK were part of the Core team for mentorship. Their was assessed by asking irrelevant information through emails and phone. Out of the Govt Medical Colleges, four were equipped by the state Govt to start testing. The HODs were contacted and the procedure for getting approval was informed to them. Their Evaluation was done by the core team at SCTIMST and approval was granted on the recommendation by ICMR. They joined the state labs and started testing on their own.

At present, other than 6 Private Medical Colleges, all the Govt and private Medical colleges in the state, coming to more than 50 in number, are approved centres for testing, empowered by the mentor team at SCTIMST. In addition, IISER, Trivandrum, Regional Public Health Labs, labs attached to the naval bases and large private labs were also empowered to increase their capacity and start molecular diagnostic labs.

Mentoring has been a very satisfying experience, combining learning and teaching and connecting. Now the SCTIMST team is very well known to the Microbiology labs all over Kerala and they look to SCT to solve their problems in managing the results and mode of reporting. Microbiology departments in the remote corners of Kerala, like Palakkad and TD Medical College, Alappuzha and Govt Medical College, Parippally, Kollam were elevated to the status of molecular diagnostics. The initial days of the pandemic control were so successful only due to the untiring efforts of the State Govt officials and the support extended by the SCTIMST team and Director to the state govt. COVID has shown the world how essential it is that infrastructure and facilities are equitably distributed and how humans rise up to the occasion when most needed.

The team at BMT Wing, headed by Dr Maya Nandakumar

Convalescent plasma therapy for serious COVID-19 patients

What is Convalescent plasma therapy?

Convalescent plasma is plasma collected from patients who have recovered from a particular infection. The rationale behind this therapy is that the antibodies present in convalescent plasma against the particular infection will provide passive immunity to severely ill patients who are otherwise unable to mount a sufficient immune response by their own. This is a form of adaptive immunotherapy which helps to boost the immune system of the sick and help them fight the infection by shortening the duration and severity of illness.

These antibodies are called neutralizing antibodies. This form of passive antibody administration is a means of providing immediate immunity to severely ill COVID-19 patients. The passive antibody therapy becomes effective only when a sufficient amount of antibody is administered to neutralize the antigen or infectious agent. Hence, it is important to initiate plasma therapy early in the disease onset, when the antigen load is low. Depending on the antibody amount and composition, the protection given by the transfused antibody can last from weeks to months.

History of passive immunotherapy

Prior to antimicrobial era, serum therapies were successfully used to treat many infectious diseases such as anthrax, plague, scarlet fever, measles, tularemia, diphtheria, dysentery, meningococcal meningitis, rabies, pneumococcal pneumonia etc. Emil von Behring first demonstrated its effective use in diphtheria.

The convalescent plasma has been used for SARS-1 (2003), H1N1 (2009-2010), Middle East respiratory syndrome (MERS) (2012), West African Ebola epidemic (2013), and for H5N1 and H7N9 avian flu outbreak more recently. All these trials have shown success in terms of reduced viral load, serum cytokine responses, and mortality following convalescent plasma therapy.

Apart from this, passive administration of antibody is routinely used in clinical practice to prevent disease, for example hepatitis B immune globulin for patients exposed to hepatitis B and human rabies immune globulin, in patients exposed to large dose of rabies virus.

Convalescent plasma and COVID-19

Since SARS, MERS, and COVID-19, share similarity in their biological and clinical characteristics, convalescent plasma therapy might be a promising treatment option for severe COVID-19 patients. The idea to use convalescent plasma for treatment of COVID-19 infected patients was first suggested by Arturo Casadevall (MD, PhD) from Johns Hopkins University; and Liise-annePirofski (MD) from the Albert Einstein College of Medicine.

Collection & storage of Convalescent plasma

Convalescent plasma is collected from the recovered patients, observing all aseptic precautions and stored at optimum temperature in the licensed blood banks (centres) similar to fresh frozen plasma.

Central Drugs Standard Control Organization (CDSCO) together with Indian Council of Medical Research (ICMR) has put forward the following eligibility criteria for Convalescent plasma donor:

1. **18 years of age**
2. **Males or nulliparous female donors of weight more than 55 kg**
3. **Prior diagnosis of the COVID-19 infection documented by RT-PCR with symptomatic disease with at least fever and cough**
4. **Complete resolution of symptoms at least 28 days prior to donation or Complete resolution of symptoms at least 14 days prior to donation and two negative real time PCR test results for COVID-19 from nasopharyngeal swab, collected 24 hours apart**

These criteria are in addition to the blood donor eligibility criteria for whole blood donation as given in the Drugs & Cosmetics Act 1940 and therein.

If the recovered COVID-19 patient fulfils all the eligibility criteria, as determined by the Blood Centre Medical officer, he/she will be accepted for convalescent plasma donation. The plasma will be collected by Apheresis procedure, under complete medical supervision. Not more than 500 ml of plasma will be collected in one sitting. If the procedure goes well and donor agrees for a repeat procedure, it can be scheduled at two weeks interval.

The plasma collected will be subjected to all mandatory testing as required by the national guidelines and stored at optimum temperature in licensed blood banks/ centres. Upon request from physician, the plasma will be issued for transfusion to COVID-19 patients, who fulfil the eligibility criteria as laid out in the clinical trial (PLACID) guidelines of ICMR. The patients will be followed up for resolution of signs and symptoms of infection, improvement of lung function, resolution of radiological lesions and length of hospital stay.

Concept of plasma Bank

The concept of banking plasma is not new. All licensed Blood Banks have the facility to separate and store the plasma separated out from whole blood. This is called fresh frozen plasma. The main advantage of having Plasma Bank is that, it will have tested group specific tested convalescent plasma readily available for use in patients with severe COVID-19 infection.

A risk-benefit assessment should be done in each case before initiating plasma therapy.

Convalescent therapy……

Status of convalescent plasma therapy in India:

Since no effective treatment has been discovered against COVID-19 infection till date, Indian government from time to time based on available evidence of benefit is recommending the various treatment options including antiviral drugs such as Remdesvir, Immunomodulatory drug Hydroxy chloroquine and Dexamethasone etc. National and International Trials are on-going for use of convalescent plasma from recovered COVID-19 patients for treatment of severe COVID-19 infections under emergency investigational new drug use. Indian trial is called PLACID trial and is being coordinated by ICMR.

"The department of Transfusion Medicine of SCTIMST is a State of Art Modern Blood Centre with facilities for collecting, preparing and storage of all blood components, including plasma in the most advanced equipment and storage cabinets. Collaborating with BMT wing of SCTIMST, plasma is being used to develop technology for Plasma Derived Medicinal Products (PDMP) which will have immense therapeutic value in healthcare delivery. This technology may be modified later on to generate Neutralizing Antibodies to COVID-19 from convalescent plasma."

(This special article is contributed by Dr Amita R and Prof Debasish Gupta (Head) of the Department of Transfusion Medicine, SCTIMST)

Silent Hypoxia in COVID-19

Hypoxia in COVID-19 – definitely 'SILENT' but not a 'HAPPY' one

Let's Unmask it

A medical dictionary defines Hypoxia either as 'oxygen deficiency in body tissues', or a 'decreased oxygen content in inspired air'. The normal human body manifests this hypoxia by rapid breathing or shortness of breath. However, patients affected by COVID-19 typically do not manifest any such clinical features and tend to remain 'silent' in the initial stages of the disease. This has led to the widespread misunderstanding of this phenomenon, by being dubbed, especially by mainstream media, as 'happy hypoxia!' This unusual response, initially baffling to the medical community worldwide, is considered a result of the altered response of various body receptors that detect altered oxygen levels or a technical limitation of pulse oximeters. This phenomenon also helps in the early detection of severe COVID-19 infection. Monitoring of an individual suspected of COVID-19 infection or a high-risk contact involves, apart from clinical symptoms, periodic monitoring of oxygenation by a pulse oximeter.

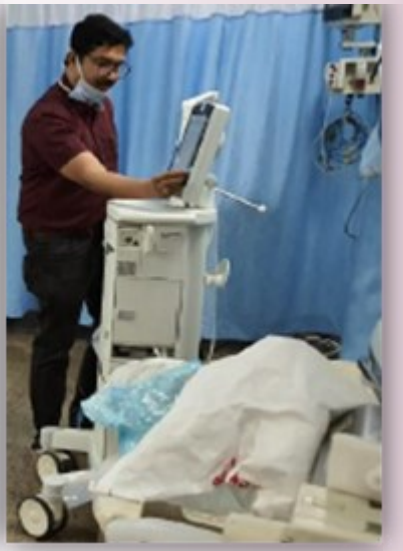
(Contributed by Dr Devarakonda Bhargava Venkata and Dr Thomas Koshy, Division of Cardiac Anaesthesiology, SCTIMST)

Pulse oximeter is used to measure blood oxygen level at home. A normal reading is a Sp02 level/ oxygen saturation level which should range between 95 and 100 percent.

Disinfection of Campus

Ventilator Training Program for Faculty & Nurses

The coronavirus disease 2019 (COVID-19) pandemic necessitated the use of mechanical ventilators for the serious patients. Anesthesiologists and intensive care experts with specific skills, knowledge, and experience helped in management of hospitalized mechanical ventilation. In SCTIMST, Prof Baiju S Dharan and team including Prof Prasanta Kumar Dash, Prof Thomas Koshy, Prof Suneel PR and Prof Unnikrishnan P organized training program on ventilators for Faculty members and nurses



COVID-19 related Training Programs for Clinicians & Nurses

Training Program for Clinicians and Nursing Staff on Clinical Management of COVID-19

Training Programs for Clinicians and Nursing Staff on Clinical Management of COVID-19 were conducted through webinar series in SCTIMST. Dr Syam K and Dr Ramshekhar N Menon from Neurology Department successfully coordinated these webinars from 3 August to 18 August 2020.

S No	Date	Topic of Webinar	Expert Faculty
1	03.08.2020	Epidemiology of COVID-19 – Current Scenario in India and Kerala	Dr Rakhal Gaitonde Professor, AMCHSS
2	04.08.2020	Logistics and Infrastructure modifications made in SCTIMST for facing the COVID-19 Pandemic	Dr Sanjeev V Thomas Professor (Sr Grade), Neurology and Medical Superintendent, SCTIMST
3	06.08.2020	Identification, Triaging and Clinical Management of COVID-19; Antiviral and other disease specific therapies and indications	Dr Aravind R Head, Department of Infectious Diseases, Govt Medical College, Thiruvananthapuram
4	07.08.2020	Oxygen Therapy and a management of respiratory failure in COVID-19	Dr Nilakshi Sabnis Infectious Diseases Specialist & Intensivist, KEM Hospital, Mumbai
5	10.08.2020	Intensive Care Management and Management of Pulmonary Complications in COVID-19; the Kerala Scenario	Dr Anil Sathyadas Intensivist, Government Medical College, Thiruvananthapuram
6	11.08.2020	Fluid therapy, Management of Sepsis, Septic Shock and Hyperglycemia in COVID-19	Dr Smrati Bajpai ID specialist and Intensivist, KEM Hospital,
7	12.08.2020	COVID-19 – Extrapulmonary manifestations and complications	Dr Shruti Tandan Intensivist, Jaslok Hospital, Mumbai
8	13.08.2020	Infection Control Practices in COVID-19; Prevention of Infection in Health Care Workers	Dr Aravind R Head, Department of Infectious Diseases, Govt Medical College, Thiruvananthapuram
9	14.08.2020	Resuscitation in COVID-19 patients-current guidelines and practices	Dr Sanjeevani Zadkar Anaesthesiologist and Intensivist, KEM Hospital, Mumbai
10	17.08.2020	COVID-19 in Paediatric Population-General and Intensive Care Management	Dr Sheeja Pediatric Intensivist , SAT Hospital, Government Medical College, Thiruvananthapuram
11	18.08.2020	Nursing Care Considerations in COVID-19	Dr Aravind R Head, Department of Infectious Diseases, Govt Medical College, Thiruvananthapuram

The recorded webinar can be viewed on link:

https://intranet.sctimst.ac.in/guidelines/VideosWebinarTraining.php

Technology Development: In Vitro Diagnostic Devices

CHITRA Magna: a magnetic nanoparticle based RNA extraction kit for PCR and LAMP tests for COVID-19

SARS-COV-2, the causative virus of COVID-19 pandemic is an RNA virus. RNA is a long single stranded polymeric substance present in all living cells including RNA viruses like SARS-CoV-2and carries the genetic information of the organism necessary for life. One of the critical steps in detecting this virus is by confirming the presence of the RNA of the virus in the sample taken from the throat or nose. The sample collected is transported under specified conditions in a viral transport medium to the testing laboratory. In the lab, the RNA of SARS-CoV-2 is extracted, converted into DNA and amplified using the PCR technique or LAMP technique. The presence of detectable levels of a specific RNA segment is the confirmation of COVID-19 infection.

Chitra Magna, an innovative RNA extraction kit has been developed by the team led by Principal Investigator Dr Anoop Kumar T in Sree Chitra as an innovative technology for isolating RNA from swabs. This protocol uses magnetic nanoparticle to capture and concentrate the RNA from the patient sample. This is a significant advantage of because even if some viral RNA disintegrates during storage and transportation of the patient samples, all of it is captured by the magnetic bead-based extraction technology. The magnetic nanoparticle beads bind to the viral RNA and when exposed to a magnetic field gives a highly purified and concentrated level of RNA. As the yield of RT-PCR or LAMP test is dependent on getting adequate quantity of viral RNA, this innovation enhances the chances of identifying positive cases. The Institute has filed for patent for this technology which is simpler than in imported kits. This technology has been independently validated at National Institute of Virology for Covid19 RNA isolation and found suitable for RT-PCR. Central Drugs Standard Control Organization (CDSCO) has given approval for commercialization of the kit for Covid19 RNA isolation.

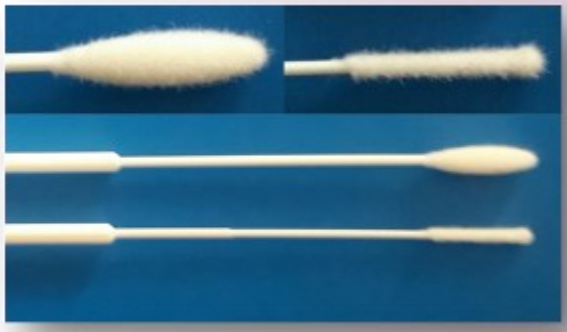
Chitra Magna can be used to extract high purity RNA from patient samples not only for LAMP testing but also for RT-PCR test; this is a big boost to the Covid19 testing because there is a shortage of RNA isolation kits in the country. The first step of isolating high quality and high concentration of RNA without degradation is critical to the outcome of the PCR or LAMP test. Barring a few Indian manufactures, the majority of RNA isolation kits are imported, and its non-availability often becomes a severe bottleneck for RT-PCR testing in large numbers across the country.

The technology of Chitra Magna has been transferred to the Agappe Diagnostics Ltd, Ernakulam and TATA Sons. Agappe Diagnostics has commercially launched the product May 2020 in the name "Agappe Chitra Magna".

(Team: Dr Anoop Kumar T, Division of Molecular Medicine, Department of Applied Biology, BMT Wing, SCTIMST)

Technology Development: In Vitro Diagnostic Devices

CHITRA EMBED Nylon Flocked Swabs



For COVID-19 testing, nasal and throat specimens are collected with specially designed swabs. Proper and adequate specimen collection and its transport in a suitable liquid medium are critical for ensuring good quality and quantity of viral sample collection. Centre for disease control and prevention (CDC) USA, recommends the use synthetic fibre swabs with plastic shafts, preferably flocked swabs when available. Owing to the shortage of such swabs during this pandemic, the development of swabs was initiated during last week of March 2020. The project was taken up as a co-development with M/s Mallelil Polymers Pvt. Ltd, Cochin. The team from the Institute led by Dr Lynda V Thomas took responsibilities of designing, design verification, device validation etc while that of the industrial partner included packaging development, production, regulatory clearance and commercialization.

The swab consists of a nylon fiber flocked-tip with flexible plastic handles. The nylon fibers are flocked onto the swab tips using a special electrostatic flocking machine. Flocking is a method to apply very short fibers called flock to a substrate and are arranged vertically in a brush like pattern over the swab tip applied with a medical grade adhesive. They are available as sterile, ready-to-use devices with both the nasal and oropharyngeal variants. The Industrial partners obtained the manufacturing license soon after the technology transfer and are now successfully developing more than 10,000 pieces per shift in their facility. The swabs are being sold to diagnostic labs both in Kerala and other states.

(*Team (from Left: Ms Jijo, Mr Rahul, Dr Neethu and Dr Lynda Thomas*))

Technology Development: In Vitro Diagnostic Devices

Nasopharyngeal and Oropharyngeal Swab with VTM kit

Nasopharyngeal and Oropharyngeal swab intended for collection of nasal and oral sample was developed and commercialized under the trade name Enmesh. The device consists of a stiff handle (made from of polymer such as polypropelene). and polyurethane (PU) foam at one end (Fig. 1). The nylon/PU brush with soft micro-bristles is non-cytotoxic (Fig. 2) allows efficient collection and release of cellular and samples (Fig. 3). The device can be individually packed and sterilized using ETO.

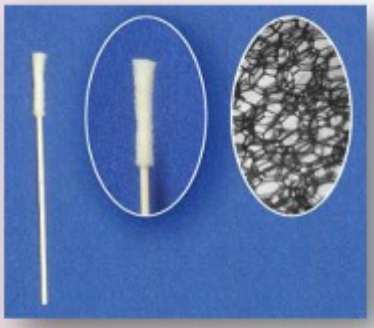


Fig. 1 The oropharyngeal swab (prototype) is polymer foam bristles with plastic handle

Fig. 2 The polymer brush is non-cytotoxic to fibroblast cells after 24 h direct contact

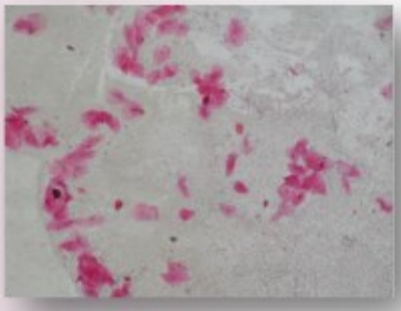


Fig. 3 The device effectively collects and release cells from buccal swab

(Team members: Dr Shiny Velayudhan, Dr Anil Kumar PR, Dr Maya Nandkumar A, Dr Anugya Bhatt, Dr Manoj Komath)

Chitra Rapid Ab test kits

In response to the pandemic novel coronavirus disease 2019 (n-COV-19), SCTIMST had initiated a project for developing in-vitro diagnostic tests for detecting immunity to the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). While medical diagnostic companies are racing to develop tests and governments are looking to purchase them in huge amounts for disease screening in outbreak areas, SCTIMST has developed a rapid test kit for COVID-specific IgG/IgM antibodies that is simple to use and can be performed even at the patient bed side. A small drop of whole blood or serum/plasma from the patient is sufficient to perform the tests, and visual results can be obtained within 15 to 20 min. This qualitative test provides information on whether a suspected person has developed antibodies. The kit, along with its novel diluent system that enhances the kit sensitivity, is very stable at room temperature. During the initial infection phase, IgM is the predominant antibody produced, whereas IgG is produced at the later infection stage. A positive IgM result indicates recent infection whereas a positive IgG indicates past COVID-19 infection. The technology for making this rapid kit was developed and clinically validated at COVID hospitals in Kerala for preliminary third-party testing. A Memorandum of Understanding (MoU) was signed between SCTIMST and M/s. Origin Diagnostic and Research Centre, Kerala, for commercialization. The technology is currently revising as suggested by ICMR.

(*Team members include Dr Manoj G and Ms Vani Maya from the Division of Artificial Internal Organs, Dr Anugya Bhatt and Dr Renjith P Nair from the Thrombosis Research Unit, and Dr Dinoop KP and Dr Jyothi EK from the Department of Microbiology, SCTIMST Hospital Wing*)

Technology Development : Devices for Isolation/ Barrier

Chitra Examination & Swab collection booth

In the history of mankind, first time such a large scale of virus infection is seen in world with millions of deaths. The outbreak of COVID-19 virus in short time had instilled fear in people, society and even health professionals. Out of all, the urgent need was to guard the health professionals, who are people's life-saver, from virus. The team from SCTIMST undertook the challenging task to provide a solution to minimize the chance of infection to the health professionals by providing isolation barrier from a potential source of Covid-19. The team developed telephone like booth for examining the patient and Dual-chamber swab collection booth for sample collection without direct contact with patients. The Examination booth is equipped with lamp, table fan, rack, and UV light. The UV light disinfects the chamber after each patient leaves. There is a pair of gloves & stethoscope port in booth which allows patient's physical examination. The dual-chamber swab collection booth has two chambers, the patient's chamber which is maintained at a negative pressure and has two compartments: bottom compartment for patient and top compartment for exhaust air disinfection. Top compartment is equipped with a high efficiency particulate air filter (HEPA), set of UV-C lamps and a conventional blower. Exhaust air from the bottom compartment enters the top compartment and gets flushed out via the HEPA filter, which traps fine viral matter. The UV lamps disinfect the trapped as well as suspended viral load. The development of Examination and Swab collection booth with working prototype was completed in record time of 7 days.

The Chitra booths technology was transferred to multiple industry partners (M/s HLL Lifecare Limited, Thiruvananthapuram, M/s HMG (India), Mumbai, M/s JADRO Steel LLP, Panchla, Howrah, Kolkatta, M/s Sivapriya Exim Pvt Ltd, Annanagar , Chennai, M/s TVS Supply Chain Solution Limited, Indiranagar, Bengaluru, M/s Kanjikode Industries Forum, Kerala, M/s. Kerala State Drugs and Pharmaceuticals Limited through expression of interest. The M/s HLL Lifecare Limited hads upplied 58 numbers of Chitra booths to various govt. hospital & M/s Kerala State Drugs and Pharmaceuticals Limited is working on 23 numbers booths. Research work associated to Chitra booths was published in the Journal "Transactions of the Indian National Academy of Engineering".

(Team: Mr Muraleedharan CV (Scientist G), Mr Ramesh Babu V (Engineer G), Mr DS Nagesh (Scientist G), Er Saurabh S Nair, Er Arvind Kumar Prajapati, Dr Sivakumar KGV, Team of Artificial Internal Organ & Division Of Extra Corporeal Devices)

Technology Development : Devices for Isolation/ Barrier

Chitra Isolation Pod

Isolation pod device is an enclosure for carrying the COVID-19/ infectious patients from one place to another. The inside of the device is at a negative pressure, and air is sucked out through a filter. It also has ports with gloves to take care of the patients. This will provide complete safety to the people carrying the patient. The Isolation pod consists of

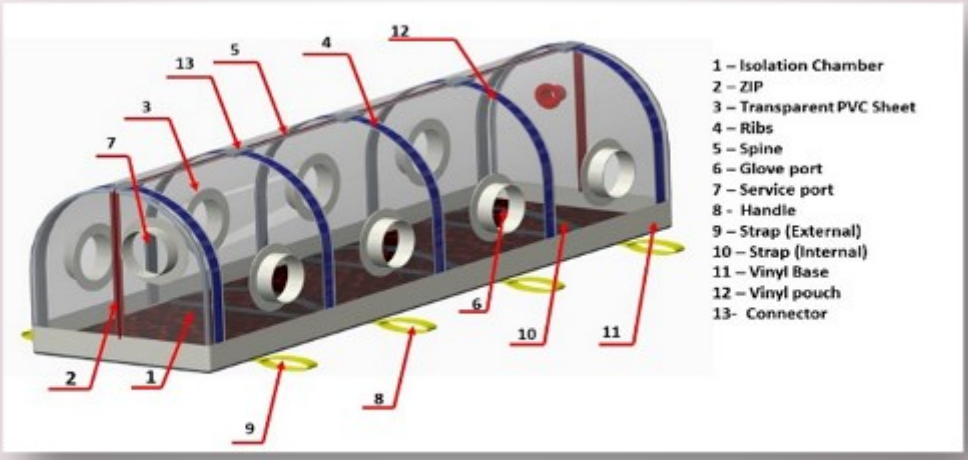
- **Isolation Module – Consists of a Tent cover for isolating the patients from surroundings. Transparent for easy visibility and for monitoring purposes etc.**
- **Vacuum pump/Blower – Located at the feet end of module to maintaining a vacuum inside the module.**
- **Bacterial viral filter - To filter the exhaled gases of the patient.**
- **Bed – A light weight bed is provided in the isolation module to shift the patients, for easy patient transfer in ambulances.**
- **Ports – To allow oxygen, IV, and other line access to the patient and additional port for nursing.**

It can eliminate the transmission of pathogens and prevent the spread of infections, protect the environment from contamination and reduce the infection rate

Applications:

1. **Hospital, clinics, emergency centre, infectious disease hospitals where the people are crowded.**
2. **Entry and exit ports of airports, hospitals including centralized disease treatment centres.**
3. **Patients ambulatory transport from home to hospital or to different test centres or hospitals.**

This technology is transferred to HMT Kalamassery and Kerala State Industrial Development Corporation (KSIDC).



(Team: Mr Sarath G, Scientist D, Mr Vinod Kumar V, Engineer F, Mr Sarath S Nair, Engineer E, Mr Nagesh DS, Scientist G, Department of Medical Device Engineering; Dr S Manikandan, Professor, Department of Anaesthesia)

Technology Development : Devices for Isolation/ Barrier

Dual Chamber Design for Swab Collection Booth

The dual-chamber swab collection booth is the new upgraded design of the Chitra Swab Collection Booth that added safety and convenience to the process of collecting swabs from suspected case of infectious disease such as COVID-19. Dual chamber provides more protection to the healthcare personnel and cater better isolation for the suspected persons. The modifications were needed as the peril of the COVID19 pandemic is continuing. The industry partner M/s HLL Lifecare Limited has already fabricated and installed 4 units of Chitra Dual Chamber Design at Trivandrum, Cochin, Calicut and Kannur Airports.

The dual-chamber swab collection booth design encloses the health worker and the person who is sampled, separated by a transparent glass barrier on which a pair of long-sleeved gloves is mounted. This provides a better line-of-defence for the health worker with minimal personal protective equipment and an isolated place for the person being tested.

The seating arrangements are provided for both of them and a wireless portable interphone is installed for ease of communication.All consumables necessary for swab collection are provided in collection chamber. The Chitra Dual-Chamber Booth can be kept in a separate room in the hospital or laboratory where swab collection takes place exclusively for COVID-19 testing.

The key feature of this device is that the patient's chamber is maintained at a negative pressure which is further divided into the bottom compartment for patient and the top compartment for exhaust air disinfection. A high efficiency particulate air filter (HEPA), set of UV-C lamps and a conventional blower are provided for effective disinfection.

Exhaust air from the bottom compartment enters the top compartment and gets flushed out via the HEPA filter, which traps fine viral matter. The UV-C lamps disinfect the trapped as well as suspended viral load. The patient chamber is disinfected using an appropriate chemical disinfectant after each swab collection. This would ensure that a symptomatic or suspected case does not infect next person who is being screened.

The developed prototype was tested for safety and efficacy in accordance with the guidelines of the Centers for Disease Control and Prevention (CDC), Atlanta, USA. The device received the registration for commercialization from the Central Drugs Control Standard Organization (CDSCO), Ministry of Health, Government of India, as a non-notified medical device.

The Chitra Swab Collection Booth technology (single chamber) has been transferred to different industry partners, M/s HLL Lifecare Limited, Thiruvananthapuram, M/s HMG (India), Mumbai, M/s JADRO Steel LLP, Panchla, Howrah, Kolkatta, M/s Sivapriya Exim Pvt Ltd, Annanagar, Chennai, M/s. TVS Supply Chain Solution Limited, Indiranagar, Bengaluru, M/s Kanjikode Industries Forum, Kerala, M/s Kerala State Drugs and Pharmaceuticals Limited, through expression of interest.

HLL Lifecare Limited has supplied 29 booths (single chamber) to various govt hospital & M/s Kerala State Drugs & Pharmaceuticals Limited is working on 23 orders received from District Medical Office, Alappuzha (a project of District Panchayath, Alappuzha). The bill of materials for Chitra dual chamber booth is estimated at about ₹ 115K and can be purchased from formerly mentioned industry partners. Research work associated to Chitra Swab Collection is also accepted for publication by Journal of "Transactions of the Indian National Academy of Engineering".

(Team: Dr Asha Kishore, Mr Muraleedharan CV, Mr Ramesh Babu V, Dr Sivakumar KGV, Er Saurabh S Nair, Er Arvind Kumar Prajapati, Team of Artificial Internal Organ & Division of Extra Corporeal Devices

Technology Development : Devices for Therapeutic Support

The Emergency Breathing Assistance System (EBAS)

In 2020, the world experienced an unprecedented situation where life of millions of people are taken away or put to hold by a miniscule virus. Each day, lakhs of people contracted the illness that affected lungs in a major way causing mortality. The wrath of this deadly virus was evident even in our country. The best minds of the world had started working on healthcare preparedness, alternative mechanisms for treatment of end stage patients where sophisticated life support equipment such as ventilators were inadequate and for an effective vaccine development. The Indian health care system was unprepared for the onslaught of a pandemic of such magnitude. The harsh reality of having less number of ventilators to support the growing number of infected patients was indeed a jolt to the Indian healthcare system. More than 50000 ventilators were required to be readied by the time the tally hits its peak which warranted for fast track development with available off the shelf components.

However, there was a need for strategic deployment of these equipment in such a way that the highly sophisticated apparatus like the ICU ventilators providing full-fledged clinical support were kept reserved for the critically ill patients while those with moderate symptoms were supported with other breathing assist devices which are less expensive and easily available. The need of the hour was to redefine innovation and research to enable technology to reach the maximum number of people in the minimum possible time. Development of an emergency breathing assistance system with minimal number of components for its reliable operation was conceived by a team comprising of Mr Sarath S Nair, Mr Vinod Kumar V and Mr Nagesh DS, Mrs Sreedevi V and the research staff from the Department of Medical Device Engineering, Prof Thomas Koshy and Prof Manikantan from the Department of Anesthesia of SCTIMST under the leadership of Dr Asha Kishore and Dr Harikrishna Varma. Very soon in April 2020, the highly enthusiastic team of Wipro 3D spearheaded by Mr Ajay Parikh took the knowhow and design of the Emergency Breathing Assist System (EBAS) for commercialization. A functional prototype of the EBAS was sent to Wipro for scaling up and industrial fabrication. With the valuable guidance by Mr Muraleedharan CV (Associate Head) and with the industrial hand holding by Mr Balram S (Head of Technology Business Division), the product is now market ready under the brand name **Air Bridge**. The use analysis and specification development was carried out after interactions with more than 25 clinicians across the country.

As the scale up of the device progressed in Wipro at Bangalore, testing and reliability analysis were performed in biomedical technology wing to verify its safety and effectiveness.

The EBAS was designed to work as a bridge ventilator for a few hours to few days in patients with moderate to severe breathing difficulty before conventional mechanical ventilation could be provided. The device, has all the major ventilation parameters such as positive pressure volume-controlled ventilation, tidal volume adjustment and provision to provide different respiration rates and Inhalation to Exhalation Ratio for emergency management of breathing difficulty. The machine achieves these ventilation parameters by using time tested method of cyclical, inflation and deflation of a conventional Bag Valve Mask (BVM) system. The device was tested in laboratory conditions for more than three months and by third party international agencies to establish its safety, reliability and effectiveness as per International standards and guidelines. The device is portable, has low running costs to operate and easy to train.

The development of EBAS has showed the capability of SCTIMST to rise up to the challenge and deliver the best possible for the country. It is envisaged that this EBAS will soon become a part of artillery for medical emergency response in low resource setting hospitals and empower the healthcare infrastructure in India and abroad.

(Team: Mr Sarath S Nair, Mr Vinod KV and Mr Nagesh DS, Mrs Sreedevi V, the research staff from the Department of Medical Device Engineering; Prof Thomas Koshy and Prof Manikantan, Dept of Anesthesia, SCTIMST)

Technology Development : Devices for Therapeutic Support

Four Zone deployable MediCAB for COVID19 management

The outbreak of COVID-19 across India, has put immense pressure on the National Health Infrastructure to treat the ever increasing number of positive cases. Traditional construction methods will be capable of constructing 50-100 bedded facility from scratch with the state of art facilities within weeks to months. The situation demands unconventional scaling up of health infrastructure. Given the urgent need, there is a pressing demand for modular or deployable emergency response field units like field wards, ICU, tents etc. Collectively these factors prompt us to work on a four zone strategy based deployable field hospital for COVID-19 management. Also a network of such modular micro hospitals across the country can potentially become the backbone of rural health infrastructure in India post COVID-19.

SCTIMST came up with the deployable four zone strategy and design requirements of emergency hospital field units for COVID-19 management. The four zone layout by SCTIMST helps to separate the suspected, positive and critical patients. The deployable hospital is customizable and can be transported and deployed during emergency and disaster management. The four zones are (1) Health workers zone (2) Suspected Zone (3) Ward for Positive patients (4) ICU. The design requirements for the negative pressure deployable units were derived from international health facility guidelines (IHFG) and Guidelines for setting up ward and isolation facility by Health Ministry, Govt. of India.


SCTIMST-Modulus four zone

Modulus, a start up in IIT Madras research park, signed MoU with SCTIMST, for co-development of four zone field hospital structures to combat covid19. Followed by that, Modulus successfully fabricated portable and foldable deployable field units, Medicab, based on four zone strategy.

Rapidly deployable cabins which can be

1. **Assembled in few hours by 4 people!**
2. **The model is a collapsible cabin which when folded the size reduces by 4x to 5x times making it cost-effective to transport.**
3. **A hospital of 1600 sq ft can be folded and transported in just one trailer.**

M/s Modulus Housing Pvt Ltd, who commercialized the SCTIMST-Modulus medicab, reported that the four zone medicab raised CSR funds worth approximately INR 2.35 Crores while commercialization during third quarter, Q3 of 2020.

(*Team: Subhash NN & Muraleedharan CV (SCTIMST), Shreeram (M/s Modulus Housing Pvt Ltd).*

COVID-19 special: Devices for Disinfection

Bin19 and UVspot

Chitra UV-C based multipurpose disinfection device is intended for UV-C disinfection of micro-organisms in (1) used face-mask prior to disposal, and (2) UV-C stable metallic objects. The devices developed by SCTIMST has two commercial variants-Bin19 and UV spot.

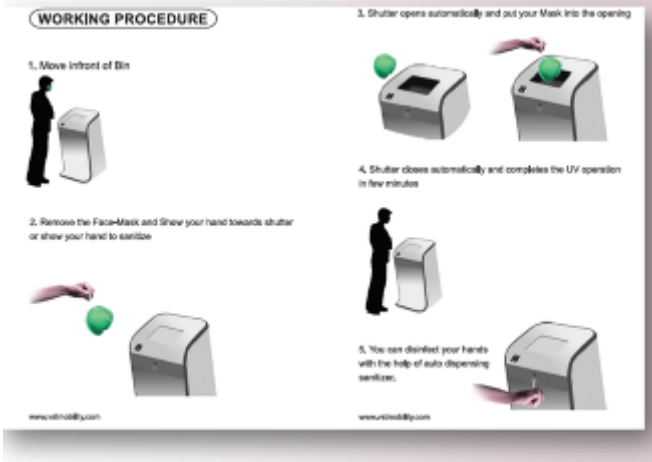
Millions of Indians have been using facemasks since the outbreak of COVID19. Facemask along with other protective measures, can limit the spread of respiratory diseases including COVID19. However, single use face masks are hazardous waste and must be discarded immediately upon removal. Instead of throwing used masks into the disposal bin, disinfecting the masks is essential to break the chain of infection spread.

The variant Bin19, technology know how by SCTIMST and commercialized by M/s VST Mobility solutions Pvt Ltd has the following features:

1. **When the user waves hand in front of the bin, it's shutter automatically opens.**
2. **After putting the used face mask, one at a time, the shutter closes automatically. Followed by that the disinfection process begins. After the disinfection the mask will be automatically transferred from the disinfection space, to a waste bin below. Both the disinfection space and waste bin is enclosed by a metallic enclosure.**
3. **The user can disinfect hands, with the help of an integrated auto dispensing sanitizer.**
4. **Once the waste bin is full of facemasks, ready for disposal, the IOT enabled Bin19 send message to the maintenance team for waste removal.**

The variant UVspot, technology know how by SCTIMST and commercialized by M/s VST Mobility solutions Pvt Ltd is intended for the UV-C disinfection of UV stable objects of daily use.

Timeline from ideation to commercialization readiness for both devices were 8 weeks, which consists of: (1) One week from ideation to proof-of –concept (POC) stage, (2) Safety and efficacy validation as per ICMR guidelines of novel COVID-19 solutions at SCTIMST in next 2 weeks, (3) Technology transfer to industry partners through expression of interest, (4) 2–3 weeks for Central Drugs Standard Control Organization (CDSCO) registration after necessary certifications for Quality Management Systems for the industry partner, (5) Parallel, in a fast track mode, procurement and production scale up took another 2 weeks due to lockdown. M/s VST Mobility solutions Pvt Ltd reported a business of INR 13.24 Lakhs worth Bin19 and UVspot delivered during third quarter, Q3 of 2020.



(*Team: Subhash NN, Principal Investigator; Muraleedharan CV, Co-Principal Investigator*)

COVID-19 special: Devices for Disinfection

Chitra Acrylosorb Respiratory Fluid Solidification System

Disposal of respiratory secretions of patients suffering from highly contagious diseases such as COVID 19, tuberculosis, influenza etc poses high risk of infections for healthcare workers. The researchers at SCTIMST have come up with a method for safe handling and disposal of respiratory secretions in hospitals for ICU patients or those with copious respiratory secretions treated in the wards. The AcryloSorb canister bags can absorb 500 mL of respiratory secretions and solidify it immediately. In addition to that the whole system will be decontaminated within no time because of the presence of disinfectant. The team realized this technology consists of biomaterial scientists and clinicians; Dr Manju S, Dr Manoj Komath, Dr Ajay Prasad Hrishi, Dr Asha Kishore. The know-how of the AcryloSorb suction canister liner bags is transferred to Romsons Scientific and Surgical Pvt. Ltd for manufacture and immediate marketing. Romsons Scientific & Surgical Pvt. Ltd located at Uttar Pradesh is a global player in medical devices with more than 200 products in market. The approximate cost will be of Rs 100/- for each canister liner bag. The field trial of the in-house designed suction canister liner bags were conducted in SCTIMST.

(Team: Dr Manju S, Dr Manoj Komath, Dr Ajay Prasad Hrishi, Dr Asha Kishore)

Chitra Disinfection Gateway

Chitra Disinfection Gateway was designed for decontamination of people, one at a time. This portable system is equipped with a system for generating Hydrogen peroxide mist and UV based decontamination facility. Hydrogen Peroxide fumes decontaminates body, hands and clothes of a person. The UV system decontaminates the chamber. The whole system is electronically controlled.

Unlike the systems which was put into use and restricted by Govt, the Chitra system is fully tested and validated electronically and biologically via microbiological and toxicological studies.The technology is transferred to 7 more than 5 companies including HLL-Govt of India, HMT-Govt of India, KSDP-Govt of Kerala etc

(Team: Mr Jithinkrishnan, Rethnagireeshwar, Rakesh, Biju B, Dept Med Device Engineering, BMT wing, SCTIMST)

COVID-19 related Papers Published from SCTIMST

S No	Authors	Title	Journal
1	Sylaja PN, Srivastava MVP, Shah S *et al.*	The SARS-CoV-2/COVID-19 pandemic and challenges in stroke care in India	Annals of the New York Academy of Sciences. May 2020
2	Thomas A, Samuel TV, Malviya A *et al.*	Guidance for Health Care Providers on Management of Cardiovascular Complications in Patients Suspected or Confirmed with COVID 19 Virus Infection.	The Journal of the Association of Physicians of India 2020; 68: 46-49
3	Kapoor A, Pandurangi U, Arora V *et al.*	Cardiovascular risks of hydroxychloroquine in treatment and prophylaxis of COVID-19 patients: A scientific statement from the Indian Heart Rhythm Society.	Indian Pacing and Electrophysiology Journal 2020; 20: 117-120
4	Kapoor A, Pandurangi U, Arora V et al.	Reply to letters vide manuscript "Cardiovascular.....Society"	Indian Pacing and Electrophysiology Journal 2020; July
5	Bhatia R, Srivastava MVP, Khurana D *et al.*	Consensus Statement On Immune Modulation in Multiple Sclerosis and Related Disorders During the COVID-19 Pandemic: Expert Group on Behalf of the Indian Academy of Neurology.	Annals of Indian Academy of Neurology 2020; 23 (Suppl 1): S5-S14
6	Bhatia R, Sylaja PN, Srivastava MVP *et al.*	Consensus Statement - Suggested Recommendations for Acute Stroke Management during the COVID-19 Pandemic: Expert Group on Behalf of the Indian Stroke Association.	Annals of Indian Academy of Neurology 2020; 23 (Suppl 1): S15-S23
7	Harikrishnan S, Mohanan PP, Chopra VK *et al.*	Cardiological society of India position statement on COVID-19 and heart failure	Indian Heart Journal 2020; 72: 75-81
8	Gupta P, Muthukumar N, Rajshekhar V *et al.*	Neurosurgery and Neurology Practices during the Novel COVID-19 Pandemic: A Consensus Statement from India.	Neurology India 2020; 68: 246-254
9	Ojha V, Mani A, Kumar S	Chest CT for Screening of COVID-19: Is it Feasible in Developing Countries?	The Journal of the Ass. of Physicians of India 2020; 68 : 61
10	Gulia KK, Kumar VM	Importance of Sleep for Health and Wellbeing Amidst COVID-19 Pandemic.	Sleep and Vigilance 2020; 4:49-50
11	Gulia KK, Kumar VM	Reverse quarantine in Kerala: managing the 2019 novel coronavirus in a state with a relatively large elderly population	Psychogeriatrics 2020; 20(5): 794-795
12	Pandi-Perumal SR, Gulia KK, Gupta D *et al.*	Dealing with a pandemic: the Kerala Model of containment strategy for COVID -19	Pathogens and Global Health 2020; 114(5): 232-233
13	Varma RP	Alcohol withdrawal management during the Covid-19 lockdown in Kerala.	Indian J Medical Ethics 2020; 2: 105-6
14	Singh G, Srinivas G, Jyothi EK *et al.*	Containing the first outbreak of COVID-19 in a healthcare setting in India: The Sree Chitra experience.	Indian J Public Health 2020; 64 (Supl): S240-S242
15	Prasad V, Sri BS, Gaitonde R	Bridging a false dichotomy in the COVID-19 response: a public health approach to the 'lockdown' debate.	BMJ Global Health 2020; 5

Herd Immunity in light of COVID-19

COVID 19 and Herd immunity

Herd immunity (or population immunity) is a form of indirect protection from an infectious disease which infects a sufficient percentage of a population and when the majority of the population become immune to that particular disease we call it as **Herd immunity.**

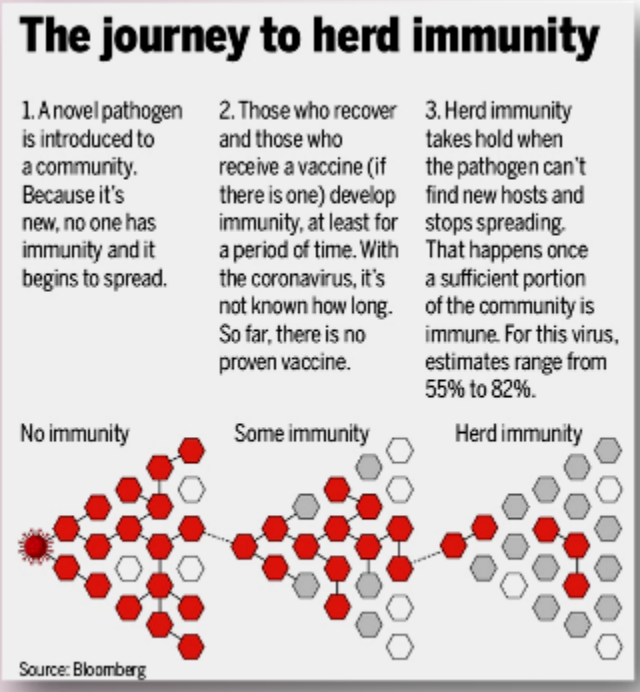
How individuals become Immune?

- **Vaccination**
- **Secondary infection**

Some individuals cannot become immune because of medical conditions, such as an immunodeficiency or immunosuppression, for them we can say immunity becomes a priority.

History

The term was originally coined in 1923 and in case of measles it was observed in the year 1930.



Reflection of COVID 19 on Herd immunity

COVID-19, has demonstrated the devastating impact of a novel, infectious pathogen on a susceptible population. From the day of infection via SARS-COV-2 (Severe Acute Respiratory Syndrome) scientists have estimated a reproductive number of virus (R0) and this works to measure the herd immunity portion in the recent context. Assuming an R0 estimate of 3 for SARS-CoV-2, the herd immunity threshold is approximately 67%. This means that the incidence of infection will start to decline once the proportion of individuals with acquired immunity to SARS-CoV-2 in the population exceeds 0.67. Another most important measure to evaluate the societal cost of achieving global SARS-CoV-2 herd immunity is the overall infection fatality rate (IFR). This Fatality rate is defined by the proportion of deaths caused by a certain disease among all infected individuals. But records can't keep this data because people are right now showing asymptomatic features and there are also unreported cases existing. As we say this above two factors play a role in measuring herd immunity then the point should also be noted that this may vary from Socio cultural perspective and also may depend on the density of population in relation to the geographic area they are in. We can only say the super spreading occurs in cases like COVID 19 due to the absence of developed drug or any vaccine. Past history from SARS COV-1 (2003) and MERS (Middle East respiratory syndrome - 2012) can tell us about the super spreading events. However, generation of Antibodies against the disease is not uncommon after the first infection. Ina study of 175 COVID 19 patients it was found that 165 individuals had generated antibodies against the virus. This shows the common process of antibody response. Thus, we can hope to have completely developed herd immunity from secondary infection.

The percentage of people who need to have antibodies in order to achieve herd immunity against a particular disease varies with each disease. For example, herd immunity against measles requires about 95% of a population to be vaccinated. The remaining 5% will be protected by the fact that measles will not spread among those who are vaccinated. For polio, the threshold is about 80%(Source: WHO) so we can't the exact population number after getting infected will develop herd immunity. What we can recommend is to maintain that stigma of being Socially distanced from the herd it self until we get an available safe and effective vaccine.

(Contributed by Dr Ankita Kar, BHMS, MPH (2nd year), SCTIMST)

COVID-19 special: In House Low Cost Sanitizer Dispensers

Promoting good hand hygiene was one of the most basic yet powerful tools in this COVID -19 Pandemic. Public and private health facilities should make functional hand hygiene stations readily accessible.

Foot operated sanitizer:-stand allows for minimum contact with other surfaces and body parts. Also, the stand offers a strong and sufficient bottle holding space. To use this stand, you just need to press the pedal at the bottom with your foot and the bottle will dispense sanitizer.

Automatic sanitizing Dispenser:-allows no contact with other surfaces and body parts. To use this equipment, you just place hand beneath the IR sensor and it will sense and dispense the sanitizer. These are ideal for crowded areas, such as hospitals, offices, airports, railway stations, etc. This helps reduce the spread of germs and may even help maintain personal hygiene.

The main advantages are:

- **Variable height adjustment to accommodate any bottle size.**
- **Foot pedal operated for hassle-free operation and easy handling.**
- **Avoids contamination of surfaces & terminates the spread of virus.**
- **Less weight and cost**
- **Easy Installation and Maintenance**

Foot Operated Sanitizer Dispensers

Automatic Sanitizing Dispenser

(*Team members Mr Subhash Kumar MS , Mr Sree Hari, Mr Aneesh S, Mr Vivek PU from the Division of Artificial Internal Organs, BMT wing whole heartedly made several of these sanitizer dispensers for internal usage)*

"In the face of adversity, we have a choice. We can be bitter, or we can be better. Those words are my North Star." Caryn Sullivan

COVID-19 related: Societal Outreach and Contributions..

Employees and Pensioners of the Institute contributed an amount of INR 9,17,960/- (Indian Rupees Nine Lakhs Seventeen Thousand Nine Hundred Sixty only) towards the Prime Minister's Citizen Assistance and Relief in Emergency Situations Fund (PM-CARES), and an amount of INR 8,41,260/- (Indian Rupees Eight Lakhs Forty-One Thousand Two Hundred Sixty only) to the Kerala Chief Minister's Distress Relief Fund (CMDRF) to tackle the ongoing COVID-19 pandemic situation. This amount was remitted digitally by the Institute to the PM-CARES and CMDRF on 29th May 2020.

Pensioners Forum contributed a sum INR 50,000 towards CMDRF on 29 April 2020 during COVID-19 pandemic

Employees Humanitarian Efforts

Visual Display Unit Donation Drive: Faculty Forum of the BMT wing

The pandemic situation brought several changes in society. In the current scenario of distance/virtual classrooms, visual aids were essential for students in our community to keep up with their peers. Taking cognizance of the unequal access in society, Faculty Forum BMT Wing took a collective decision to make amends within our abilities. Total of TV units (12) were donated to beneficiaries in Chadiyara Lane (2), Mudavanmugal LP School (3), Chinnamma Memorial Girls Higher Secondary School, Poojappura (4), St. Joseph U P School, Perayam (1), Cotton Hill Higher Secondary School, Trivandrum (2).

NURSING SERVICE DIVISION: An Overview of the Activities 2020

Nursing Service Division is always encouraging the all round development of the staff under Nursing Division. They are motivating the staff as well as conducting many activities to enrich knowledge, skill and attitude of the nurses.

Nursing division organized Congenital heart awareness week from **7th to 14th February 2020** and state level conference on comprehensive nursing management of stroke in March 2020. Nursing division contributed in '**Open House 2020**' held in BMT wing were demonstration of basic life support and personal protective equipments and displayed video on CATH Lab awareness by our staff.

Ms Shani, Senior Nursing Officer was awarded with international early career investigation award by world stroke organization and European stroke organization.

Hand hygiene day was celebrated on **5th May** with evaluation of hand hygiene. Conducted hand hygiene awareness campaign to patients, relatives and displayed posters of hand hygiene.

With the emergence of COVOD 19 pandemic globally, our institution also affected. Nursing division took its full effort to empower the staffs with knowledge, skills and prepared the warriors to fight against COVID 19. Newer ideas contributed by the Nursing staff in supporting the entire COVID prevention activities of the institute. Conducted awareness programme, supplied mask to the patients and relatives, encouraged hand hygiene and social distancing.

Our infection control Nurse took great initiative in COVID precaution activities along with HIC team and Nursing division.

Many of the staff attended COVID related webinars conducted by various institutions. Took initiative to conduct webinar by **Ms Nirmala MO, Ms Suja Raj and Mr Vijaykrishnan** on care of patient on ventilator with COVID 19.

The habit of celebrating educational activities by conducting various conferences were transformed to e-learning and gradually developed a habit of attending webinars and earning e-certificates among staff. Learning at the finger tip was encouraged and supported by TNAI. A training module on Coalition for response to COVID 19 "**Essential Up Skilling for Nurses on COVID 19 Pandemic Management**" accredited by the TNAI was conducted. Around 185 staffs successfully completed the module and we have received the certificates of appreciation for the contribution. Certificate of appreciation was awarded to SCTIMST as "**COVID WARRIOR HOSPITAL**" in fight against COVID 19 by GENERATION. Updating of COVID preventive measures were imparted to all category of staffs and periodical revision of protocol in relation to state COVID protocol to be continued.

Mrs Sumakumari, Mrs Preethamol and Ms Jisna Nursing officers participated as panelist in Heart Failure Certification Program conducted by Heart Failure Association of India and Trained Nurses Association of India.

(Contributed by Smt Nirmala M.O. MSc (N), Nursing Superintendent, SCTIMST, Trivandrum)

New Facility

Molecular Genetics & immunology Unit

Dr VK Saraswat, Hon'ble President, SCTIMST, inaugurated the Molecular Genetics and Neuroimmunology Unit (Ground floor, Block 2, Hospital wing) on 26th February, 2020, at 10 AM. President inaugurated the event via Skype, followed by lighting the lamp and plaque unveiling by the Director on behalf of the Hon President.

In vivo evaluation Facility: Inauguration by the President

In Vivo Evaluation Facility under Division of In Vivo Models and Testing, Department of Applied Biology, Biomedical Technology Wing was inaugurated by The Honorable President, SCTIMST, Dr VK Saraswat on 12th March 2020 at 12.30 hrs through Video Conferencing. The Director, SCTIMST, Prof Asha Kishore on behalf of the Honorable President unveiled the plaque, lit the ceremonial lamp and opened the facility for functioning in the presence of The Head, BMT Wing, Dr HK Varma, Senior Deputy Director, Shri Girijavallabhan VK, Chief Engineer, CPWD, Shri Sandeep Mehta and staff members of SCTIMST.

Genesis of *In vivo* Evaluation Facility

SCTIMST is in the forefront of medical device development using indigenous technology following the inception of its 'Biomedical Technology Wing' in 1976 at Satelmond Palace campus, Poojappura. Animal evaluation of medical devices is an integral part of medical device development which is required to establish functional safety prior to its clinical use in human patients. Division of 'Vivarium and later Division of 'In vivo models and Testing' was established to accomplish this important task. Numerous high risk medical devices such as mechanical heart valve, oxygenator, vascular graft, hydrocephalus shunt, bone substitutes, dental materials etc. have undergone animal studies in this facility to prove its safety and performance before it reached patients.

In vivo evaluation Facility continue….

At present, there is a resurgence of medical device development activities at SCTIMST under Technical Research centre (TRC), a programme funded by Department of Science and Technology (DST), Government of India. SCTIMST has recently launched nearly 40 research projects for the development of indigenous biomedical devices and bio materials under TRC as part of the efforts by DST to fast-track work on indigenous medical devices development. In this program, with dedicated teams, it is aimed to develop technologies ready to be transferred to industry partners. Development of these medical devices requires animal studies to establish preclinical safety/performance.

Apart from this, SCTIMST is helping the domestic medical device industry in the development of indigenous medical devices by way of undertaking preclinical animal evaluation for them since 2000. More than 15 GLP documentation compliant studies were performed for Indian medical device companies such as M/s Sahajanand Medical Technologies, Pvt Ltd, Surat, M/s Nanotherapeutics Pvt. Ltd, Surat, M/s Sun Pharma, Mumbai, M/s Perfint Healthcare, Chennai, M/s MIV Therapeutics, Surat, M/s Vasmed Health Sciences Pvt. Ltd., Bangalore, M/s Angiometrix, Bangalore etc. As SCTIMST is a major centre in India for doing such studies, there will be persistent demand for preclinical animal testing from Indian medical device manufactures.

Establishment of this new 'In vivo Evaluation facility' will augment the exiting efforts for the indigenous development of medical devices in our country through supporting in-house development of medical devices as well as by providing additional capacity to Indian medical device industry and academia for their medical device development efforts.

Animal Models in the Facility

The *In vivo* Evaluation Facility is a state of art facility for housing large experimental animals. The facility has the capacity to house 40 adult pigs and 70 adult sheep in compliance with the recommendations and requirements of the CPCSEA.

The facility can house experimental animals such as pigs and sheep and has enclosures for housing experimental animals, space for minor procedures, acute pre and post-operative management of experimental animals and space for feed storage.

All the animal enclosures have automatic stainless steel drinkers for animals and sheep facility is installed with durable and impact resistant polypropylene slatted floor. The building is designed taking due consideration for safe housing of animals, its management and movement, species segregation and paddocks for grazing and exercise of sheep.

The entire facility is pest and rodent proof and also has an efficient system for managing the animal waste and affluent treatment facility with least impact on the environment.

The facility will be a step forward towards a GLP certified animal testing facility for Medical Devices in the country.

(This report is contributed by Dr UmaShankar PR (Head of the Division of In vivo Models & Testing) and Dr Sachin J Shenoy of the Department of Applied Biology, BMT Wing)

Excellence is not a destination; it is a continuous journey, that never ends" Brian Tracy

Inauguration of SC/ST Cell

Director - Prof Asha Kishore inaugurated the functioning of SC/ST Cell in SCTIMST and delivered inaugural message. Felicitations were delivered by Head BMT wing - Dr Harikrishna Varma, Associate Head, Sri CV Muraleedharan and Smt Leena Joseph (Liaison Officer for SC/ST/PWD). Dept Heads, representatives of Academic and Non-Academic staff members were participated in the function by observing COVID protocol. Sri Rajesh RP (Member, SC/ST cell) delivered vote of thanks.

1st Indigenous Blood Flow Meter & External Pneumatic Device

In open heart surgeries, the heart is temporarily bypassed and machines take over the pumping function of the heart and oxygenation function of lungs, thus maintaining normal circulation of blood and oxygen supply to the body. The outcome of surgery is better and recovery is faster using advanced pumping technologies such as centrifugal pumps in which precise measurement of blood flow rates is critical. India is currently fully dependent on import for these blood flow meters. The cost of a unit is Rs 25 to 30 Lakhs. Due to high cost, the advanced pumping technology and flow meters are used only in few super specialty hospitals in India.

The team of Sree Chitra developed the technology for a simple, advanced and cost-effective blood flow meter. The technical knowhow of the device is transferred to M/s. En Products Pvt Ltd for commercial production. The company, based in Kochi, Kerala, manufactures special purpose machines and electronic products and is also specialized in process automation and robotics. "This indigenous technology of blood flow meter will considerably reduce the cost of the device to a few thousands from 25 lakhs and make it available to public hospitals for safer and less expensive cardiac surgeries.

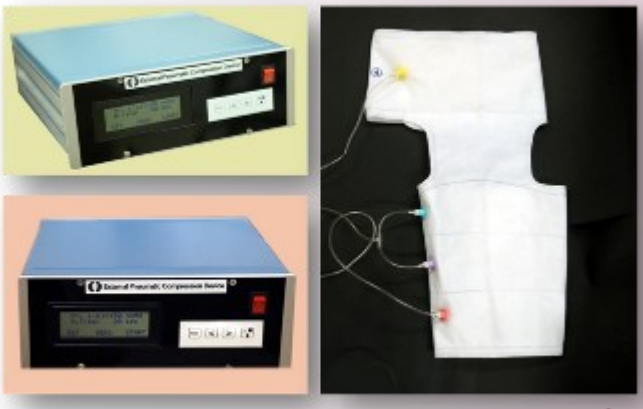
This palm- size device measures the flow rate of blood using a novel magnetic method and a signal conditioning technique. The device has a mechanism to produce a magnetic field, an electronic measurement system and a disposable biocompatible tube fitted with electrodes which are kept over the magnetic field. When blood passes through the tube, under the influence of this magnetic field, a voltage is generated across the electrodes which is proportional to the rate of blood flow . The device has novel methods for generation of the magnetic field and the detection of the voltage. These attributes give the device better accuracy of measurements. The device is portable, smaller than the imported device and can also be operated with battery as a measure to enhance patient safety. The novel concept reduces the cost of production of the device considerably to few thousands of rupees. In addition to its application in bypass surgery, this device can be used for measuring flow of conductive fluids for various industrial applications.

The device has undergone laboratory tests and preclinical animal evaluations. It has all the essential features to perform the functions and is compliant with national/international standards and guidelines. It is manufactured using components sourced from established supply chains within the country. The Institute has applied for patent and published two papers based on this technology.

The device was developed by the engineering team comprising of Mr Sarath S Nair, Mr Vinod Kumar V, Ms Sreedevi V and Mr Nagesh DS of the Department of Medical Devices Engineering in Biomedical Technology Wing of the Institute. The preclinical evaluations are conducted by a clinical team comprising of Dr Vivek V Pillai and Dr Bineesh K R of the Department of Cardiovascular and Thoracic Surgery and Dr PR Umasanker and Dr Sachin J Shenoy of Division of In Vivo Models and Testing Divisions.

Technology Transfer of External Pneumatic Compression Device for Prevention of Deep Vein Thrombosis

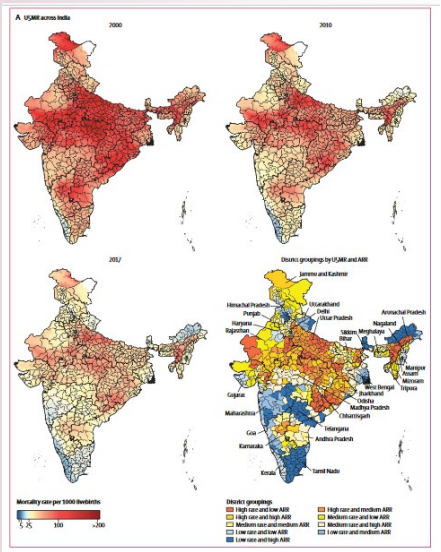
Deep Vein Thrombosis (DVT) is the formation of blood clots in deeply located veins, usually in the legs. Normally blood in the veins of the legs is returned to the heart by the contraction of muscles of the legs during walking. DVT is caused by prolonged immobility and bed ridden state, post operative immobilization, paralysis of legs, stroke, pregnancy, dehydration, use of certain drugs, travel by long flights without moving etc. The SCT engineering team included Mr Jithin Krishnan, Mr Biju Benjamin and Mr Koruthu P Varughese has developed a device for the prevention of DVT. The license for the manufacture and sale of the device was transferred to M/s. Enproducts Pvt Ltd, located in Kochi, Kerala.



Subnational mapping of under-5 and neonatal mortality trends in India: the Global Burden of Disease Study 2000-17

In a Global Burden of Disease Study 2000-17 initiative (State-Level Disease Burden Initiative on Child Mortality), this elegant study published in LANCET provides a detailed analysis of subnational trends of child mortality State-Level Disease Burden Initiative on Child Mortality. It was discussed in a meeting of the India National Health Policy (NHP) and Sustainable Development Goal (SDG) targets for child mortality. Dr Thankappan and several members were part of the team from SCTIMST.

In this study, the under-5 mortality rate (U5MR) and neonatal mortality rate (NMR) were assessed from 2000 to 2017 in 5 × 5 km grids across India, and for the districts and states of India, using all accessible data from various sources including surveys with subnational geographical information. The 31 states and groups of union territories were categorised into three groups using their Socio-demographic Index (SDI) level, calculated as part of the Global Burden of Diseases, Injuries, and Risk Factors Study on the basis of per-capita income, mean education, and total fertility rate in women younger than 25 years. Inequality between districts within the states was assessed using the coefficient of variation. We projected U5MR and NMR for the states and districts up to 2025 and 2030 on the basis of the trends from 2000 to 2017 and compared these projections with the NHP 2025 and SDG 2030 targets for U5MR (25 deaths and 23 deaths per 1000 live births,



respectively) and NMR (16 deaths and 12 deaths per 1000 live births, respectively). The causes of child death and the contribution of risk factors to child deaths were assessed at the state level.

U5MR in India decreased from 83·1 in 2000 to 42·4 per 1000 livebirths in 2017, and NMR from 38·0 to 23·5 per 1000 livebirths. U5MR varied 5·7 times between the states of India and 10·5 times between the 723 districts of India in 2017, whereas NMR varied 4·5 times and 8·0 times, respectively. In the low SDI states, 275 (88%) districts had a U5MR of 40 or more per 1000 livebirths and 291 (93%) districts had an NMR of 20 or more per 1000 livebirths in 2017. The annual rate of change from 2010 to 2017 varied among the districts from a 9·02% reduction to no significant change for U5MR and from an 8·05% reduction to no significant change for NMR. Inequality between districts within the states increased from 2000 to 2017 in 23 of the 31 states for U5MR and in 24 states for NMR, with the largest increases in Odisha and Assam among the low SDI states. If the trends observed up to 2017 were to continue, India would meet the SDG 2030 U5MR target but not the SDG 2030 NMR target or either of the NHP 2025 targets. To reach the SDG 2030 targets individually, 246 (34%) districts for U5MR and 430 (59%) districts for NMR would need a higher rate of improvement than they had up to 2017. For all major causes of under-5 death in India, the death rate decreased between 2000 and 2017, with the highest decline for infectious diseases, intermediate decline for neonatal disorders, and the smallest decline for congenital birth defects, although the magnitude of decline varied widely between the states. Child and maternal malnutrition was the predominant risk factor, to which 68·2% of under-5 deaths and 83·0% of neonatal deaths in India could be attributed in 2017; 10·8% of under-5 deaths could be attributed to unsafe water and sanitation and 8·8% to air pollution.

India has made gains in child survival, but there are substantial variations between the states in the magnitude and rate of decline in mortality, and even higher variations between the districts of India. Inequality between districts within states has increased for the majority of the states. The district-level trends presented here can provide crucial guidance for targeted efforts needed in India to reduce child mortality to meet the Indian and global child survival targets. District-level mortality trends along with state-level trends in causes of under-5 and neonatal death and the risk factors in this article provide a comprehensive reference for further planning of child mortality reduction in India.

(Dandona R, Kumar G, Nathaniel HJ et al. Subnational mapping of under-5 and neonatal mortality trends in India: the Global Burden of Disease Study 2000-17. India State-Level Disease Burden Initiative Child Mortality Collaborators: LANCET 2020; 395: 1640-1658)

Research Highlights ....

'Luminescent Gold Nanorod' for targeted Imaging and therapy!

Gold nanorod (GNR) is a rod-shaped nano structure with longer and shorter diameters in the longitudinal and transverse directions, respectively. They are optically very active due to the presence of surface plasmons and absorb light in the visible and also in the red or near infrared region of electromagnetic spectrum. Due to this strong absorption in the red or NIR region, GNRs are known for its temperature generating property which could be used for photothermal therapy (PTT) for cancer, with suitable targeting agents. However, they do not have fluorescence emission property. Moreover, they quench the fluorescence of any molecule in its proximity. So, using it for imaging applications is difficult. In this study, a team led by Dr Jayasree conjugated a fluorescent protoporphyrin molecule to GNR, which is an FDA approved fluorescent photosensitizer (PS) for photodynamic therapy (PDT). They managed to retain the fluorescence property of the complex by a mechanism of energy transfer from GNR to PS, which was confirmed theoretically. Thus finally, the GNR-PS system had dual therapeutic (PTT & PDT) as well as fluorescence imaging property. This was illustrated in cancer cells and cancer induced animals. Using principal component analysis of fluorescence spectral studies, PDT was found more effective than PTT, in vivo. This work appeared as the cover page (frontispiece) of the journal.

(RV Nair, LV Nair, DM Govindachar, H Santhakumar, S Nazeer, Rekha CR, SJ Shenoy, G Periyasamy, RS Jayasree. Luminescent Gold Nanorod to enhance the NIR emission of Photosensitizer for Targeted Cancer Imaging and Dual therapy: Experimental and Theoretical Approach, Chem Eur J 2020;26:2826-36)

Delineating the venom toxin arsenal of Malabar pit viper.

MALABAR PIT VIPER **Photo credit @ Dileepkumar**

This study was conducted by Dr Dileepkumar Raveendran of Indriyam Biologics Pvt. Ltd., SCTIMST-TIMed in collaboration with School of Biotechnology, Amrita Vishwa Vidyapeetham, Kollam. The venom protein components of Malabar pit viper (Trimeresurus malabaricus) were identified by combining SDS-PAGE and ion-exchange chromatography pre-fractionation techniques with LC-MS/MS incorporating Novor and PEAKS-assisted de novo sequencing strategies. Total 97 proteins that belong to 16 protein families such as L-amino acid oxidase, metalloprotease, serine protease, phospholipase A2, 5'-nucleotidase, C-type lectins/ snaclecs and disintegrins were recognized from the venom of a single exemplar species. Of the 97 proteins, eighteen were identified through de novo approaches. Immunological cross-reactivity assessed through ELISA and western blot indicate that the Indian antivenoms binds less effectively to Malabar pit viper venom components compared to that of Russell's viper venom. The in vitro cell viability assays suggested that compared to the normal cells, Malabar pit viper venom induces concentration dependent cell death in various cancer cells. Moreover, crude venom resulted in chromatin condensation and apoptotic bodies implying the induction of apoptosis. Taken together, the present study enabled in dissecting the venom proteome of Trimeresurus malabaricus and revealed the immuno-cross-reactivity profiles of commercially available Indian polyvalent antivenoms that, in turn, are expected to provide valuable insights on the need in improving antivenom preparations against its bite.

(Muralidharan V, Korumadathil SS, Raveendran D et al. Delineating the venom toxin arsenal of Malabar pit viper (Trimeresurus malabaricus) from the Western Ghats of India and evaluating its immunological cross-reactivity and in vitro cytotoxicity. International J Bio Macromolecules 2020; 148: 1029-1045).

Republic Day at Hospital Campus: 26 January 2020

Independence Day at Hospital Campus: 15 August 2020

Pre COVID-19 Celebrations

Republic Day at BMT Wing Campus: 26 January 2020

The function for distribution of Service Awards to the SCTIMST employees on completion of completion of 10, 20 and 30 years could not be conducted on 15 August 2020 considering the COVID-19 protocol.

"Teamwork is the ability to work together toward a common vision. The ability to direct individual accomplishments toward organizational objectives. It is the fuel that allows common people to attain uncommon results." Andrew Carnegie

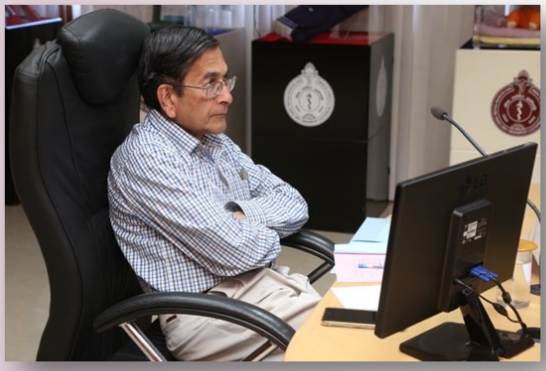
Independence Day at BMT Wing Campus: 15 August 2020

International Epilepsy Day, 12 February 2020

Workshop: Severity Classification Harm-Benefit Analysis

One-Day Workshop on Severity Classification and Harm Benefit Analysis in Animal Experimentation was organized by SCTIMST 18th Feb 2020, at Achutha Menon Centre. It was sponsored by the Laboratory Animal Scientists Association, India. Dr Klas Abelson, Associate Professor, Dept of Experimental Medicine, Faculty of Health and Medicine, University of Copenhagen, Denmark lead the sessions. The aim was to enlighten the scientists, research students, technicians and veterinarians in animal experimentation about the importance of severity classification and harm benefit analysis in bringing in welfare and refinement in animal experimentation during the planning, applying for ethical permissions and evaluating applications and during the actual conduct of experiments. The course was attended by about 50 participants who were Scientists, Veterinarians, CPCSEA nominees, MSc, MVSc and PhD Students from organizations across the South Indian states viz Hyderabad, Bangalore, Tumkur, Padappai, Chennai, Kumaracoil, Nagercoil, Trichur, Wayanad, Kozhikode, Kottayam and Trivandrum.

Research Council Meeting, 24 & 25 Feb 2020



National Science Day 2020: Women in Science

National Science Day 2020 was celebrated on 28 Feb at BMT Wing, SCTIMST. Students and faculty members from the NSS College for Women, Neeramankara, Thiruvananthapuram attended the program. **Dr Ruby John Anto, Scientist, RGCB** was the Chief Guest and delivered the Science day message. This was followed by a science quiz, science magic and the lab visit by the students.

Continue....

National Science Day 2020: Women in Science

Dr Kamalesh K Gulia, Scientist, Division of Sleep Research, BMT Wing, SCTIMST delivered talk on "**Women in Science, nurturing their dreams**" in Govt. Arts College on occasion of National Science Day Celebration (*Theme: Women in Science*) organized by Kerala Academy of Sciences on 28th Feb 2020.

Clinical Microbiology: Diagnostic Approaches

COMPREHENSIVE NURSING MANAGEMENT OF STROKE

State level Conference on COMPREHENSIVE NURSING MANAGEMENT OF STROKE was organized by Comprehensive Stroke Care Program & Nursing Service Division, SCTIMST in association with Non Communicable Diseases Division, Directorate of Health Services, Govt of Kerala on 1st March 2020

SCTIMST OPEN Day 2020, 6th March 2020









World Sleep Day 2020: Better Sleep, Better Life, Better Planet

Nurses Day Celebrations, 6th to 12th May 2020

The nurses association executive committee conducted various activities conducted as part of nurses week celebrations in association with Nursing Department held at Sree Chitra Institute of Medical Sciences and Technology.

The following are the glimpses of the various activities being held in this regard on 6th to 12th May 2020.

1. **Blood donation camp.**
2. **Face shield distribution to health workers of SCTIMST.**
3. **Health education to patients and relatives regarding hand hygiene, use of mask & COVID-19 prevention.**
4. **Food, water and mask distribution to patients and bystanders at SCTIMST, RCC & MCH.**

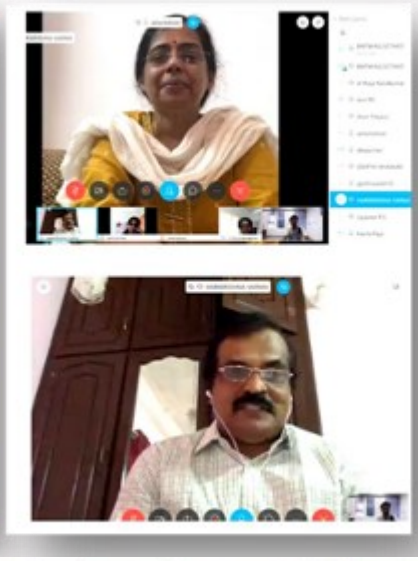
World Environment Day: Time for Nature, 5 June 2020

Inaugural Event Organized by Sree Chitra Employees Co-operative Society

World Environment Day (WED) is celebrated on 5 June every year for encouraging awareness and action for the protection of the environment. It was first held in 1974, with a flagship campaign for raising awareness on environmental issues emerging from marine pollution, human overpopulation, and global warming, to sustainable consumption and wildlife crime. World Environment Day is popular global platform for public outreach, with participation from over 143 countries annually. Each year, WED has provided a new theme that major corporations, NGOs, communities, governments and all celebrities worldwide adopt to advocate environmental causes. This year's theme was **Time for Nature**.

International Day of Yoga, 21 June 2020

Theme: Yoga at Home and Yoga with Family



SCTIMST entrusted two committees, one in the Hospital wing and another in the BMT wing, for coordinating the activities of the observance of International Day of Yoga 2020. Given the COVID-19 situation, the committees conducted virtual (online) sessions for promoting the Common Yoga Protocol, among the staff and students of the institute. The family members of the employees also participated in the proceedings. Ten sessions of Interactive Online Yoga Training based on the Common Yoga Protocol were organized starting from June 14, 2020, onwards. Dr Arun Thejaus KP, an established Yoga trainer led these sessions along with Mr Saji KS, our Computer Programmer, who is also a certified Yoga Trainer. The virtual meetings were handled by Mr Sajithlal MK and Mr Saji KS (Computer Division).

VOLUNTARY BLOOD DONATION: Challenges in COVID-19 PANDEMIC

This COVID-19 pandemic has resulted in development of severe panic and fear among the people for their safety and survival. Many countries have enforced lockdown to all activities leading to the postponement or cancellation of many sporting, religious, political, and cultural events. Nationwide all schools, colleges and universities have been closed. Misinformation about the virus has been circulated through social media and the mass media. The World Health Organization declared the outbreak of COVID-19 as a Public Health Emergency of International Concern on 30th January, 2020, and a COVID-19pandemic on 11th March, 2020 (1).

These factors have seriously affected one significant area of healthcare delivery – availability of adequate quantities of safe and quality blood in the Blood Centres across the country. More than 80% of the nation blood supply comes from voluntary non-remunerated blood donors (VNRD), who through their altruistic act keeps the shelves of the Blood Centre filled up with blood units throughout the year. Ever since the lockdown has been announced in the country from 25th March 2020 onwards, all movements of citizens have come to a standstill. All the educational institutions, industries, social organizations, IT sectors are closed down across the country. Outdoor blood donation camps are mainly organized by these sectors. Suddenly without any prior arrangements, blood donation came to a grinding halt. The situation became worse with no blood donation camps being organized, no people were willing to visit blood center for donation and many healthcare workers were put into quarantine. With a large number of populations being affected with COVID-19 and many of their family members and close contacts going for either institutional or home quarantine, the population of eligible blood donors is also shrinking. This is a matter of big concern for National blood supply.

Availability of blood and blood products remain one of the bottlenecks in getting back to normalcy in clinical work of the hospitals, especially for people needing regular blood transfusion on account of blood disorders such as Thalassemia, Sickle Cell Anemia, Hemophilia, etc. Obstetric patients, Cancer patients and others in dire need, such as victims of accidents, need blood products on a daily basis during the pandemic period.

Blood Center operates normally round the clock regardless of the pandemic. It is crucial that healthy people continue to donate blood so that needy patients can have access to the blood products they need. Many hospitals have stopped undertaking elective surgical cases which accounts for maximum blood utilization. These has resulted in outdating of several units of blood and blood components like platelets which has a short storage life. Blood Centers have no other option beside collecting blood from replacement donors, which may compromise on the quality of blood during this pandemic period. But they are very few in numbers which cannot meet the daily requirement.

Testing of blood donors for COVID-19 is not mandatory as per national guidelines. Till today no cases of blood-borne COVID-19 infections have been reported. But it is essential that Blood Donors must be completely well, without any symptoms.

Unfortunately, Blood Centers have been forced to cancel blood donation events during the pandemic because of a lack of suitable premises, closure of organizations, unwillingness of people to venture out for blood donation and of course the impending lockdown.

During the pandemic, people will not be able to donate blood if they are symptomatic, because blood center will not allow donors with symptoms of a cold into the donation area.

One of the situations that is highly debatable is whether the blood donor should wear face masks and protective gloves before entering the donation site and throughout the donation process. It is advisable that face masks and protective gloves must be removed when entering the donation centre. Removal of face mask helps to identify the blood donor during the blood donation and also help the donor to drink as recommended before and after the donation. The more often a person touch the mask, the greater is the chance that mask itself can spread potential viruses.

Protective gloves must also be removed when donor arrive at the donation centre. Washing or sanitizing hands when donor arrive, before drinking coffee, and when donor leave is an effective way to prevent the potential risk of infection via the hands.

In such a grievous situation prevailing throughout the nation, the best alternative is the use of Blood mobiles which can go to the doorstep of willing regular voluntary blood donors house to collect blood from them. Blood Centers should process all collected units into blood components so that proper clinical use of blood can be ensured.

Care about the safety of blood donors during this pandemic situation is very important to gain confidence from the blood donors.

Voluntary Blood Donations: Challenges

Blood Donation camps as well as in-house blood donation needs to change some practices at blood donation sites.

- **Only blood donors are allowed to enter the donation area.**
- **No children or accompanying person should be allowed to enter the donation site during this pandemic.**
- **Blood donors should be checked upon arrival to confirm that they do not have any fever like symptoms.**
- **If donors have any symptoms of fever, cough, cold, they will not be able to donate blood.**
- **Donor must wear face masks (compulsory) and protective gloves (optional) when they arrive at the donation site.**
- **Each donor is directed to wash or disinfect their hands upon arrival with sanitizer.**
- **Strict restrictions will be enforced to limit the number of people attending the blood donation premise at same time.**
- **A distance of at least one metre should be kept from other donors attending the donation area.**
- **Level of cleaning at blood donation premise has to be increased.**
- **Blood Center staff should stay at home if they have any fever like symptoms.**
- **It is essential that only healthy people continue to donate blood.**

National Blood Transfusion Council, Ministry of Health and Family Welfare has issued guidelines on 25th March 2020 to Blood Transfusion services to collect blood in view of COVID-19 pandemic (2).

Though the Blood Transfusion Services in India is facing a big challenge in this COVID-19 pandemic, but with the active support from Government machineries, Organizers of voluntary blood donation camps, registered regular voluntary blood donors and above all the blood centers are taking all initiatives to ensure safe blood supply to the needy patients in this time of crisis.

References:

1. Scaling up COVID-19 Outbreak Readiness and Response in Camps and Camp Based Settings. World Health Organization. March 2020
2. Guidance Document-National Blood Transfusion Council. Ministry of Health and Family Welfare, June 2020

(*This article is contributed by Dr Debasish Gupta, Professor & Head, Department. of Transfusion Medicine, SCTIMST, Trivandrum*)

"Technology now allows people to connect anytime, anywhere, to anyone in the world, from almost any device. This is dramatically changing the way people work, facilitating 24/7 collaboration with colleagues who are dispersed across time zones, countries, and continents" Michael Dell

National Voluntary Blood Donation Day

Department of Transfusion Medicine, SCTIMST celebrated the National Voluntary Blood Donation Day 2020, on October 1st 2020. The celebration was restricted to memento distribution to felicitate our regular blood donors, who supported us during the COVID crisis. The function was conducted following all the directives and COVID protocols of the Infection control team of SCTIMST and Health Department. The donors left the venue after receiving the mementos, so that there were not more than five donors at any given time. In total, 40 voluntary donors and 6 blood donation camp organizers were felicitated at the function.

Chitra's Stars: Awards/ Honours

Service Awards on completion of 10, 20 and 30 years in SCTIMST

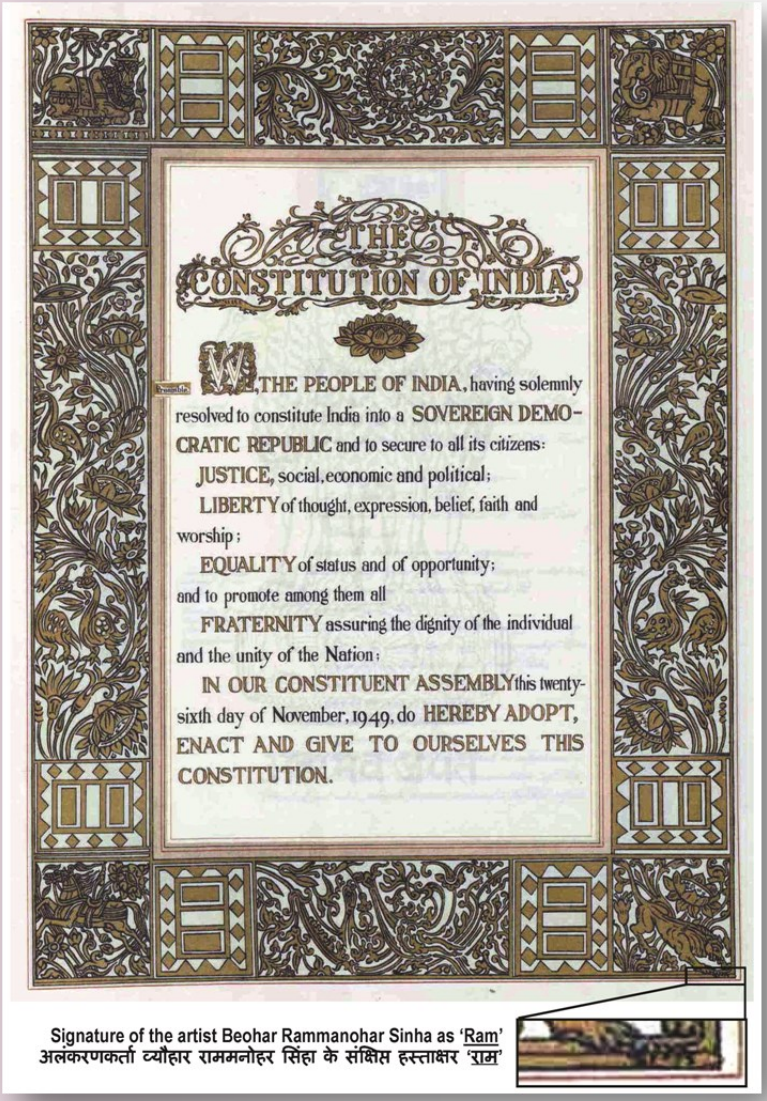
Service Awards on completion of 10, 20 and 30 years in SCTIMST

Chitra's Stars: Awards/ Honours

Service Awards on completion of 10, 20 and 30 years in SCTIMST

Chitra's Stars: Awards/ Honours

Preamble to the Constitution of India



THE CONSTITUTION OF INDIA

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a SOVEREIGN DEMOCRATIC REPUBLIC and to secure to all its citizens:

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity;

and to promote among them all

FRATERNITY assuring the dignity of the individual and the unity of the Nation;

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949, do HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.

Signature of the artist Beohar Rammanohar Sinha as 'Ram'
अलंकरणकर्ता व्यौहार राममनोहर सिंहा के संक्षिप्त हस्ताक्षर 'राम'

Preamble: Illuminated, Decorated & Calligraphed

The original preamble manuscript was illuminated and decorated by Beohar Rammanohar Sinha, calligraphed by Prem Behari Narain Raizada.

Beohar Rammanohar Sinha's short-signature in Devanagari-script as Ram on the Preamble-page (lower-right corner within the outermost border-design), and as Rammanohar on different pages of the Constitution bear unambiguous testimony to this fact. He was the most loved disciple of Nandalal Bose. In the wake of completing the Constitution, leftover art-material was carefully preserved and passed on to his son Beohar Dr Anupam Sinha.

This work is in the public domain in India as its term of copyright has expired.

(Compiled by Ms Gayathry G, PhD student, Division of Bioceramics, BMT Wing, SCTIMST)

Events...

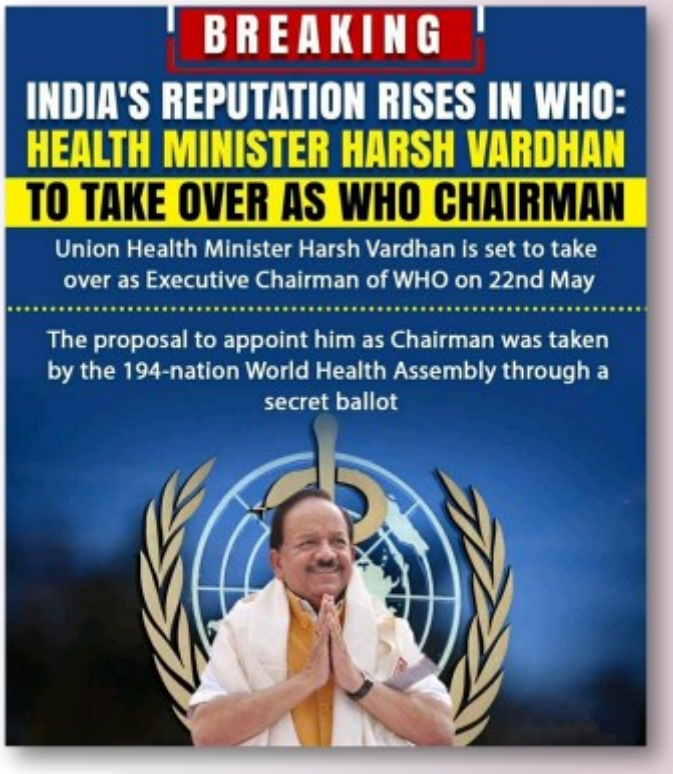
Annual Convocation-2020

Due to COVID-19 pandemic, Convocation – 2020 (36th batch) was not conducted. However, graduands were awarded degrees through post at the last week of May and early June 2020. There were 143 graduates and the details are given below.

S No	Course	Count
1.	Doctor of Medicine (DM)	24
2.	Magister Chirurgiae (MCh)	6
3.	Post-Doctoral Fellowship (PDF)	9
4.	Post-Doctoral Certificate Course (PDCC)	6
5.	MD	1
6.	Doctor of Philosophy (PhD)	17
7.	Master of Philosophy (MPhil)	8
8.	Master of Public Health (MPH)	72
Total		143

Quiz 6.1 Identify the building below. Provide historical value of it.

Proud Moments..



Quiz 6.2 Identify the object in the picture below. Provide two important use of it.

Winners will be announced in the next issue. Answers to these quizzes may be sent to enewsletter@sctimst.ac.in

Chitra's Stars: Quiz Masters

Neuro Quiz

Ms Saji Gopinath, Staff Nurse - B, Neuro OT has won Second Prize (UG Category) in Neuro Quiz at the 40th Annual Meeting of Society of Indian Neuroscience Nurses (SINN) along with the 68th Annual Meeting of The Neurological Society of India (NSI) (SINNCON 2019) held at Renaissance Mumbai Convention Centre Hotel from 5th - 6th December 2019.

Neuro Quiz

Mr Rathish Rajan, Staff Nurse - A, Neurology ICU has won Second Prize (P.G. Category) in Neuro Quiz at the 40th Annual Meeting of Society of Indian Neuroscience Nurses (SINN) along with the 68th Annual Meeting of The Neurological Society of India (NSI) (SINNCON 2019) held at Renaissance Mumbai Convention Centre Hotel from 5th – 6th December 2019.

PG Quiz: Neuroanesthesia

Dr Neeraja Ajayan, DM Neuroanaesthesia has won the First Prize for PG Quiz during the 21st Annual Conference of the Indian Society of Neuroanesthesia & Critical care, ISNACC 2020 held from 31st January - 2nd February 2020, at Chennai.

PG Quiz: Neuroanesthesia

Dr Nagmoti Shilpa Vikasrao, DM Neuroanaesthesia has won the First Prize for PG Quiz during the 21st Annual Conference of the Indian Society of Neuroanesthesia & Critical care, ISNACC 2020 held from 31st January to 2nd February 2020, at Chennai.

PG Quiz: Neuroanesthesia

Dr Keta Thakkar, DM Neuroanaesthesia has won the Third Prize for PG Quiz during the 21st Annual Conference of the Indian Society of Neuroanesthesia and Critical care, ISNACC 2020 held from 31st January 2020 - 2nd February 2020, at Chennai.


Certificate

ISNACC 2020

21st Annual Conference of the
Indian Society of Neuroanaesthesiology and Critical Care

This is to certify that

KETA THAKKAR

has been awarded 3rd Prize in Quiz competition during the Conference held at Mamallapuram, Chennai from 31st January to 02nd February, 2020

Dr. Prasanna Bidkar
Organising Chairman

Dr. V. Ponniah
Organising Secretary

Chitra's Stars: Poster Awards/ Quiz Masters

Best Poster Award

Ms Ajimi Mol A, Final year student, Diploma in Advanced Medical Imaging Technology (DAMIT) Dept of IS & IR, SCTIMST, has been awarded Second Prize for the topic "Flow diverter for Intracranial Aneurysms" in the National Level E-Poster Competition organized by K S Hegde Medical Academy, Nitte, Mangalore in association with ISRT held on 24.06.2020.


NITTE (Deemed to be University) | K S HEGDE MEDICAL ACADEMY

NATIONAL E-POSTER COMPETITION

CERTIFICATE

This is to certify that **Ms. Ajimi Mol A** has been awarded **Second Prize** for the topic "Flow diverter for intracranial aneurysms" in the **National Level E-Poster Competition** organized by **K. S Hegde Medical Academy, Nitte** (Deemed to be University), Mangalore, Karnataka in association with **Indian Society of Radiographers and Technologists (ISRT)** Mangalore Academic Club held on 24-06-2020.

SHASHI KUMAR SHETTY, Organizing Secretary, KSHEMA | DR. U. RAGHURAJ, Organizing Chairman, KSHEMA | TASLEEM SHAIKH, Regional Coordinator, ISRT | SURESHA T, Vice Chairman ICRT, ISRT | COMMANDER K J DANIEL, Public Relations, ISRT

Best Poster Award

Dr Remya NS, Scientist C, Toxicology Division, Biomedical Technology Wing, SCTIMST has won the Poster Award (third prize) for the poster entitled 'Osseointegration enhanced by surface modification of titanium implants: An in vivo study' (Remya NS, Vandana Unnikrishnan, Mohanan PV) at the International Conference on Breakthrough in Toxicology and Human health and 39th Annual Conference of Society of Toxicology, India held at Jiwaji University, Gwalior during 27-29 December, 2019

Dr RN Roy Best Paper Award 2017

The article titled, *"Spatiotemporal Clustering of Dengue Cases in Thiruvananthapuram District, Kerala"* published by **Ms Joanna Sara Valson** (PhD Scholar, AMCHSS) in the Indian Journal of Public Health (http://10.0.16.7/ijph.IJPH_26_16) has been selected for the prestigious Dr RN Roy Best Paper Award 2017. This was based on her MPH dissertation supervised by Dr Biju Soman. The Award will be handed over to her on 29th of February 2020 during the national conference (IPHACON 2020) at the All India Institute of Medical Sciences (AIIMS) New Delhi.

'IACTACON Mega Quiz' Masters

The SCT IMST team consisting of **Dr Vasanth K** & Dr **Murukendiran GJ**, DM Senior Residents, Cardiothoracic & Vascular Anaesthesia, SCTIMST, have won the 'IACTACON MEGA QUIZ' at 23rd National Conference of the Indian Association of Cardiovascular & Thoracic Anaesthesiologists (IACTACON) held at Goa from 07 to 09 Feb 2020. The award included a certificate along with a cash prize of Rs 25,000.

ECHOCARDIOGRAPHY Quiz Masters

The SCTIMST team consisting of **Dr Devarakonda V Bhargava** & **Dr Mamatha Munaf**, DM Senior Residents, Cardiothoracic & Vascular Anaesthesia, SCTIMST, have won the 'ECHOCARDIOGRAPHY QUIZ' at 23rd National Conference of the Indian Association of Cardiovascular & Thoracic Anaesthesiologists (IACTACON) held at Goa from 07 to 09 Feb 2020. The award included a certificate, cash prize of Rs 12000 and author signed copy of the renowned textbook titled 'Clinical Manual & Review of Transesophageal Echocardiography' (3rd Edition)

Chitra's Stars: Orations/ Awards/ Honours

Prof Baldev Singh Oration Award 2019

Dr Kamalesh K Gulia, Scientist F & Incharge, Division of Sleep Research, Department of Applied Biology, Biomedical Technology wing, SCTIMST, Trivandrum received Prof Baldev Singh Oration Award for the year 2019, from the Association of Physiologists and Pharmacologists of India, on 28th November 2019, in recognition of her substantial contribution to Neuroscience, during the Annual Conference of the Association held at Gauhati Medical College, Guwahati, Assam.

(Dr Kamalesh K Gulia receiving the Prof Baldev Singh Oration Award from the Chief Guest, Shri Pijush Hazarika, Min of State, Health & Family Welfare & Urban Development, Govt of Assam, in presence of Prof Dipika Deka, Vice Chancellor of Srimanta Sankardeva Univ of Health Sciences, Assam).

Fulbright Nehru Doctoral Res Fellowship

Ms Ashtami Jayakumar, PhD Scholar, Toxicology Division, BMT wing, SCTIMST has awarded the prestigious Fulbright-Nehru Doctoral Research Fellowship (FNDR fellowship 2020) by the United States-India Educational Foundation, Fulbright Commission in India, New Delhi. The programme is envisaged for a period of 6 months at University of Houston, USA under the mentorship of Prof Dr Chandra Mohan. All expenses (to and fro air tickets, living allowances and contingency grants) related with the FNDR fellowship will be taken care by the USIEF.

Fulbright-Nehru Doctoral Research Fellowships are granted to academically exceptional candidates for advanced research and professional development through bilateral partnerships managed by commissions for India and United States. The programme aims to improve intercultural relations, cultural diplomacy and intercultural competence between the people of the US and India through the exchange of persons, knowledge and skills.

Dr TV Anilkumar, FRCPath (England)

The Royal College of Pathologists (England) awarded Fellowship to **Dr TV Anilkumar**, Division of Experimental Pathology, based on the merit of his publications in Toxicologic Pathology. He is the first veterinarian practicing pathology in India, to get this honour.

Dr TV Anilkumar initiated the Division of Experimental Pathology in the Biomedical Technology Wing. His research interest is on the use of porcine cholecyst-derived extracellular matrix for regenerative medicine applications and invented a non-detergent and non-enzymatic method for preparing tissue engineering scaffolds. When used for graft-assisted healing, the scaffold induced faster wound healing with minimal scarring. The technology has been transferred to M/s Alicorn Medicals, a start-up biopharmaceutical firm in TIMED. A wound healing matrix, identified as 'Cholederm', is now manufactured (test purposes) as a 'Class D' Medical Device under a license of the Central Drugs Standards Controls Organization (Govt of India).

Oral Presentation Award

Dr Naresh Kasoju, Scientist-C, Division of Tissue Culture, Department of Applied Biology, BMT Wing received Oral Presentation Award at Indo -US International Conference on Bioengineering & Regenerative Medicine (ICBR 2020) organized by School of Biochemical Engineering, Indian Institute of Technology (BHU), Varanasi, India in collaboration with Florida International University, Florida, USA during 27-29 Feb 2020.

Chitra's Stars: Awards/ Best Paper

SERB-OVDF (Govt of India) Award

Ms Athira SS, PhD Scholar, Toxicology Division, Biomedical Technology Wing, SCTIMST is awarded the Govt. of India's prestigious SERB-OVDF (Science and Engineering Research Board, Overseas Visiting Doctoral Fellowship) Program at Purdue University, USA, under the mentorship of Prof. Freeman Jennifer, for a period of one year. All expenses (to and fro air tickets, living allowances and contingency grants) related with the SERB-OVDF will be taken care by the SERB, Dept of Sciences and Technology, Govt of India.

The main objectives of the SERB-OVDF programme is to build national capacity in frontier areas of Science and Engineering, which are of interest to India by providing research training to PhD students admitted in the Indian institutions in overseas universities of repute and to create opportunities to build long-term R&D linkages and collaborations with accomplished scientists and technologists from around the world. Also to tap the expertise gained by these young scientists to strengthen the national programme in their domain knowledge.

Health Policy Analysis Fellowship

The Alliance for Health Policy and Systems Research (the Alliance), an international partnership hosted by the World Health Organization (WHO) awarded their prestigious health policy analyses fellowship to **Dr Ranjana Ravindranath.** Dr Ranjana is a PhD (Public Health) student under the supervision of Dr Jeemon Panniyammakal (Assistant Professor, Epidemiology, AMCHSS, SCTIMST). It is a PhD mentoring fellowship award, which aims to develop capacity for health policy analysis and create a network of Low and Middle-Income Countries (LMIC) health policy Analysts. The award includes mentorship directly from health policy think tanks at WHO, bursary support for PhD research, and full financial support for participation in International policy workshops.

Best Paper Award

Dr Neeraja Ajayan, DM Neuroanaesthesia has been awarded the prestigious "VK Grover Best Paper Award" during the 21st Annual Conference of the Indian Society of Neuroanesthesia and Critical care, ISNACC 2020 held from 31st January 2020 to 2nd February 2020, at Chennai.

Best Paper Award

Ms Vineetha Vijaykumar, Nursing Officer-A, NSICU has won the Best Paper Award during the National conference on "Exploring new frontiers and advances in Cardiology and Neurology for Nursing professionals" held on 14th and15th February, 2020, at Aster MIMS Hospital, Calicut.

National Conference
on
Exploring new frontiers and advances in Cardiology and Neurology for Nursing professionals

Certificate

BEST PAPER

This is to certify that Mr/ Ms ....VINEETHA....VIJAYAKUMAR.....has received Best Paper award during the National conference on "**Exploring new frontiers and advances in cardiology and neurology for nursing professionals**" held on 14th and 15th February, 2020 organized by MIMS College of Nursing at Aster MIMS Hospital Auditorium, Govindapuram, Calicut.

Organizing Secretary
Dr Sheeja C V
Professor &Vice Principal,
MIMS College of Nursing

Organizing Co-Chairperson
Dr Sreejitha CH
Professor,
MIMS College of Nursing

Organizing Chairperson
Dr Assuma Beevi T M
Director, MIMS Academy,
Principal, MIMS College of Nursing

An
Aster DM
Healthcare Venture..

MIMS

Aster MIMS
We'll Treat You Well

KNMC approved 10 credit hours
Order No: C/70466/19/NC-CNE

Venue : Aster MIMS Hospital Auditorium, Calicut
Date : 14th & 15th of Feb 2020

Buddhist teachers remind us that each of us is a student and everyone else in the world is our teacher, and that those who cause us the most difficulty can be our best teachers, towards whom we would be wise to feel gratitude.

The XIV Dalai Lama

Chitra's Stars: Videoflix

Early Career Investigator Award

Ms Shani S D, Senior Nursing Officer (Ward) - A and PhD Scholar(Part time) has received the International Early Career Investigator Award for the abstract titled "Facilitators and barriers to medication adherence among stroke survivors in India" by the American Heart/ Stroke Association.

Video Flix Competition IACTACON 2020

Dr Vasanth K, 3nd year DM Senior Resident, Cardiothoracic & Vascular Anaesthesia, SCTIMST, has been awarded 'First Prize' for the best presentation in Video flix competition held during the 23rd National conference of Indian Association of Cardiovascular and Thoracic Anaesthesiologists (IACTA) on 7th to 9th Feb 2020 at Goa. The presentation was titled 'Left Ventricle Thrombus diagnosed by Intraoperative Trans Oesophageal Echocardiography in a case of ALCAPA'. The award included certificate and a cash prize of Rs 5000.

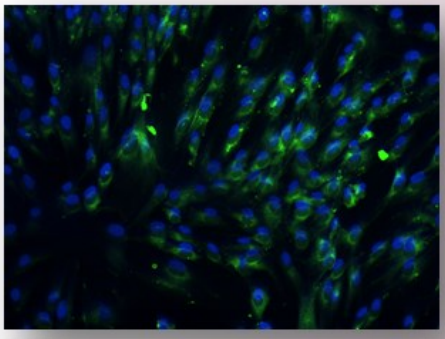
Quiz 6.3 & Title for pics

Quiz 6.3 Give full name of the special dress worn by the person in the following image. Send two important precautions to use it.

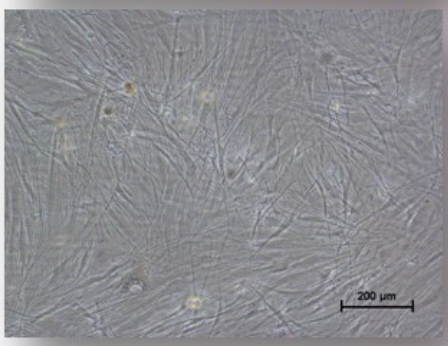
Quiz 6.4 Science Images from our research: In Quest of Artistic title

(Picture curtesy: Dr Eva Das, Division of Tissue Culture, BMT wing)

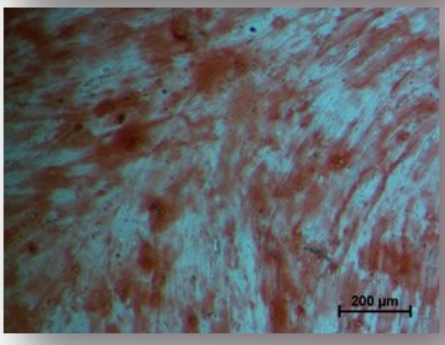
1



2



3



Artistic titles to these scientific pics may be sent before 30 Nov 2020 to enewsletter@sctimst.ac.in
Winners will be announced in the next issue.

Nobel Prizes

Nobel in Physiology/ Medicine 2020

Harvey J. Alter — **USA, 85 yr**
Michael Houghton — **UK, 71 yr**
Charles M. Rice — **USA 68 yr**

This year's Nobel in Physiology/Medicine is awarded to Prof Harvey J Alter, Prof Michael Houghton and Prof Charles M Rice for their seminal **work on Hepatitis C virus**. Prof Alter identified that an unknown virus was responsible for chronic hepatitis. Prof Houghton isolated the viral genome following a unique method. Subsequently, Prof Rice established with evidence that the Hepatitis C virus was indeed the sole causative agent for chronic hepatitis**.**

Nobel in Chemistry 2020

Emmanuelle Charpentier — **France, 51 yr**
Jennifer A. Doudna — **USA, 56 yr**

This year's Nobel in Chemistry is awarded to Prof Emmanuelle Charpentier and Prof Jennifer A Doudna for their outstanding **work on genome editing using molecular scissors based on CRISPR/Cas9** (clustered regularly interspaced short palindromic repeats/CRISPR associated protein 9). Since their discovery, more than 20,000 publications came up on this topic across the globe and thereby expanded the horizons of genetic engineering.

Nobel in Physics 2020

Roger Penrose — **UK, 89 yr**
Reinhard Genzel — **Germany, 68 yr**
Andrea Ghez — **USA 65 yr**

Awarded to Prof Roger Penrose "for the discovery that **black hole formation is a robust prediction of the general theory of relativity**", and Prof Reinhard Genzel & Prof Andrea Ghez "for the discovery of a **supermassive compact object at the centre of our galaxy**".

Nobel in Peace 2020

Awarded to **World Food Programme (United Nations)** - the world's largest humanitarian organization providing assistance to millions of people across the globe and saving the victims of acute food insecurity and hunger.

The Award includes a Diploma, Medal and eight million Swedish Kronor (INR 6.75 crores) per full Nobel Prize, which is shared among winners according to decision of Academy.

(Compiled by Dr Naresh Kasoju, Scientist-C, Div of Tissue Culture, Dept of Applied Biology, BMT Wing; Source: www.nobelprize.org, Photo credits: Niklas Elmehed (Nobel Media), Source: Web of Science.)

Alumni portal: Journey from Kerala to the North-East

One fine day, one of my senior colleagues from Gauhati Medical College, a WHO employee told me about MPH in SCTIMST. At that time, I was working as a regular doctor in Assam State Government Health Service since 2004 after I left Army after completion of short service commission for six years in 2003. Of course I was not enjoying my job in state government as I found it to be a system driven monopoly/ monotous environment. Moreover, there was resource constraint in government facilities which I had to face on daily basis. I had a zeal to serve with a broader perspective and so I decided to appear for the MPH entrance examination at SCTIMST. After my selection, I bid adieu to my family members and friends and went to Kerala. I remember that our joining date was on 1st January 2009. So, I reached there on 31st December early morning by bus from Chennai as I missed the Guruvayur express because of delay of my train at Chennai. I still remember that I got the opportunity to watch several Tamil movies from Chennai to Thiruvananthapuram. At least I remember Vadivelu because he was there in most of movies. On 31st night, I along with Vishwanat Ayar, a resident from Pallakad who was my batch mate from Assam went to Kavalam beach.

On 1st January, we were welcomed by the Director, SCTIMST and all other staff of AMCHSS. Our HOD was Dr KR Thankapan. We did not get hostel accommodation in the Sree Chitra premises due to paucity of rooms. So, we have been placed in Poojappura BMT wing hostel. We use to go by institute bus. I accepted everything very positively. Our classes started in full swing. We visited various places for our course work. Also we use to explore Kerala during weekend and holidays. I been to many places like Kanyakumari, Kumarakom, Kollam to Alleppy boat jetty, Varkala beach, Shangumugham beach, Kovalam beach, Back waters, Neyyar lion safari, Kottayam etc. I took part in annual athletics events and won few models in Athletics. The tea making style by the road side vendor was unique in Kerala. We all use to have lot of tea with various local snacks and delicacies. I like south Indian dish and Kerala dish is unique which I always enjoyed. The climate is similar to Assam, humid and lot of rains (except no winter). The coastal beauty of Kerala is unique which draws people from worldwide.

With all representatives from 8 North East states

The unique system of MPH curriculum helped us to imbibe what we wanted to be. The teaching staff, Mala Maa'm, Sundari Maa'm, Raman Kutty Sir, Sankara Sarma Sir, Thankapan Sir and all others were our guiding force and mentors. We are here today because of their focused untiring efforts. I take the opportunity to thank each one of them for their contribution to develop us as a public health expert.

After my successful MPH course on 31st Dec, 2010, I joined as a Regional Coordinator (Care Support and Treatment) for eight NE States at Guwahati under National AIDS Control Organization in January 2011. I served there till 2019. I took the programme to the desired level in the backward districts of North Eastern States which I always feel proud. I feel satisfied when the community in need get their service up to the last mile. I feel great when a HIV positive mother delivers a HIV negative baby. All these cumulative successes were possible because of my learning gained during MPH which I implemented both at the system and the community level. In June, 2019, I changed my job and joined in Piramal Foundation to work for Aspirational districts in Assam under NITI Aayog. It has been a year and the ADT district indicators are really improving. I am hopeful that soon the tag of low performing district will go away from Assam.

Travel to Meghalaya with GFATM team

Home delivery pocket study in Char areas at Dhubri, Assam along international border with Bangladesh

I am thankful to all Sreechitrian and my sincere gratitude to KK Gulia, Editor, Chitra Dhawni for giving me this opportunity to jot down few lines. SCTIMST shines because of reflection of glory.

(Dr (Maj) Dhruba J Borah, Popularly known as DJ, is State Transformation Manager, Aspirational District Transformation Program - NITI Aayog, Piramal Swasthya)

Life Beyond Suicide and Depression during COVID-19 Era

The concept of sound mind in a sound body is quite widespread and popular from the time of Ancient Greeks. The new and wide spreading COVID-19 pandemic is highly stressful and again brings forward the significance of this statement. Helping the public to equip themselves with the psychological and physical management of Corona is an emergency. The rate of suicide, due to depression, secondary to pandemic as well as environmental factors due to pandemic, is increasing and making the situation adverse.

The environmental factors circling around lockdown, potential job losses, financial burden, uncertainty about the future, fears of running out of food and necessities, bearing excessive family burden, difficulty in balancing between excessive household and professional responsibilities, restriction to movement and lack of opportunity for entertainment, and poor quality social life, lack of opportunity in social interaction, fear of stigmatization, substance abuse due to boredom and a sense of loss of control .

The worries of adults can be transmitted to children and make them anxious and fearful.

The long hours working in potentially dangerous situations and keeping oneself away from family is another cause of stress and depression to many.

Checking of the following four core symptoms will help you to rate and identify your level of depression.

1. I have sound sleep regularly
   Always 0 Rarely 1 Not at all 2

2. I can enjoy food as I have enjoyed earlier
   Always 0 Rarely 1 Not at all 2

3. I won't be easily dull or depressed during crisis
   Always 0 Rarely 1 Not at all 2

4. I become more helpless, hopeless, tired, sometimes with active suicidal ideation, than ever before
   Always 0 Rarely 1 Not at all 2

If your score is 0-4 you are not depressed. If your score is 6 or above you need an immediate medical help of a Psychiatrist.

It is not easy for us to check for warning signs of depression, rather it is easy to improve your adjustment skills and make the situation favorable to you.

People, who are depressed rely more on their environment for psychosocial support. The lack of support will lead to emptiness and suicide to combat intolerable stress. A person's tolerance to stress is in built but it can be boosted through strengthening measures.

Assigning new tasks, mild to severe level, is a way to strengthen the tolerance level.

We should learn better coping strategies and everyone should be given equal opportunity to learn and improve skills even at home. They can interact with their environment through video calls, can initiate small play groups of their own, where they can share their novel ideas, and lay stones for novice innovations. Cultivate or rediscover old interests and hobbies.

The most accepted way to combat depression is to make an activity scheduling with wishes and dreams based on one's own priority. You can share and discuss it with your friends of equal interest to find out more active and practical way to implement them. Increased activity level for task completion will help you combat depression.

If someone tells you "I am depressed", what will you do?

Immediately hug them. Let them lean on your shoulder. Let them cry, Let them do whatever they want, Let them ROAR or YELL. Never restrict. Let emotional ventilation happens. Be patient enough to tolerate them. At this stage, NEVER – ask, brood, advice, blame, stigmatize, overlook for a diagnosis-. Let them behave as they like. The second is extension of support. Touch their shoulder. Hold their hands. Make them comfortable.

Make them free and let them tell you what they want. This is a lengthy process and may take hours. You may get irritated, agitated, and finally tired. But stand with them and give them assurance.

After this process, the patient may become more free and in penta-up. Never forget to ask them about their suicidal ideation. If it is active, inform the relatives and consider it as a medical emergency.

Once they get out of this stage, there may be emotional vacuum. Help them to fill this vacuum with hope, optimism, and help them to build up their confidence. Include their peers, family and provide them maximum support. They may develop transference towards you; understand it and be safe always

Pandemic will come and go. But we will remain beyond it, beyond suicide and depression, otherwise who will beat the next pandemic??Who will explain to the next generation about the present pandemic??

This is the time not for depression; ***"Rise and Shine, Tomorrow will be yours"***

(Sushama Ramachandran is Psychologist in Department of Neurology, SCTIMST)

"Success seems to be connected with action. Successful people keep moving. They make mistakes, but they don't quit." Conrad Hilton

Burning Questions! Gaps in Medical curriculum regarding LGBT+

"Love is Love", Article 377: Reflections and the way forward with it..

"Why is it that, as a culture, we are more comfortable seeing two men holding guns than holding hands?" **Ernest J Gaines**

First-year of medical school, eager students learning one of the foremost things is that diseases have a binary affliction. They present only in males and females. Anatomy taught those very students that there is a female and male body and syndromes or conditions such as Klinefelter or Turners are a deviation from the norm (anything apart from the male or female body is abnormal). Psychiatry teaches that being in a gay, lesbian, or any other gender relationship other than a heterosexual one is not normal. The word abnormal is not out rightly used but implicated.

Therefore, each year the system churns out non-inclusive medicos who have no idea about anatomy, physiology and biology in a broader terminology of the LGBT+. This makes the present and future doctors unintentionally incompetent and insensitive to the LGBT+ community. One cannot solely blame the doctors. Major blame lies with then non-inclusiveness of the medical curriculum.

With this mindset, we started the MPH course. Frankly, it didn't bother us at the start until we came across a line, "Sex is a non-modifiable factor" with the explanation for it being that sex can be only binary. Mind you, this is after the Navtej Singh Johar vs Union of India verdict of 2018 which decriminalized Article 377. The public health professional stirred in each one of us and reared its head to ask the pertinent question "why don't we talk about this section of the public? Why are they left out? Why do we have more papers on only male and female populations? Don't the same diseases affect the LGBT+ community?" these questions started our journey towards knowing where the fault lies.

The journey was not easy. We are talking about a vulnerable community that is marginalized, socially tortured, isolated, and forced into closets all because a façade of "social values and prestige" need to be maintained. Since we could not reach individuals directly, we asked our professors at AMCHSS for help. Thus, we were invited by Queerala, a community-based organization for LGBT+ individuals located in Kerala, for a meeting in Kochi. The meeting helped us in understanding the need for a public health discussion on LGBT issues. The meeting also introduced us to Dr L Ramakrishnan, Dr Sameera Jahagirdar, and Vihaan Peethambar. We invited these speakers for a webinar session conducted on the 20th of June, 2020. The discussion centered around the topic of the experience of the LGBT community and the non-inclusiveness of the medical curriculum: What can public health professionals do?

Dr L Ramakrishnan explained how sexual identity, sexual orientation, and Gender expression differ from the normative definition of Sex and Gender. Sexual Identity essentially is what one identifies themselves as. Sexual orientation is about who one wants to be with. Gender expression is how one likes to express themselves to the world. The session pointed out the gaps in the medical Textbooks of Gynecology and Psychiatry and how conservative the latest editions of Medical textbooks are. Contrary to the modern take on morality, he enlisted various historical depictions showing that in 'our culture', which is usually used as an excuse to subject the LGBT+ community to discriminatory treatment, has actually been quite inclusive. He concluded by saying the situation is reversible and there are ways in which public health and medical curriculum can covert these gaps.

Dr Samira Jahagirdar showed the success of the medical inclusiveness model by the critical care team at Mahatma Gandhi Medical College and Research Institute, Puducherry talking about the Gender Affirming procedure. A trans-woman herself, she narrated the journey of her Gender Affirmative surgery and the enormous support she got from her colleagues in her dept. This story reinforced the concept that medical institutes can be made inclusive with sheer grit, determination and a desire to change the rigid norms.

Mr Vihaan Peethambar spoke from a community perspective of struggles that they face while approaching the medical system. His journey as a trans- man was not only thought-provoking but a shame to the medical fraternity that could not provide care and sensitivity required. He talked about very normal procedures of name change and how the doctors treated him insensitively. The curiosity of knowing the genitalia of a trans-person, or any person for that matter, when there was no examination needed is unjustifiable. Being highly educated and coming from an affluent background he contemplated how a person without privilege would survive in such an environment. Apart from the social stigma, the insensitiveness of the medical professionals takes a toll on their mental health which is reflected in the high rates of suicide in the community. One thing that stuck with us at the end of his talk was that "***Does one need a change in the curriculum to treat someone as a human being***?"

Our Reflections and the way forward: Medical curriculum is not inclusive. The way forward with it is to have a complete revamp of the definition of gender taught.

(This article is contributed by Dr Purva Raj and Dr Shipra Lal Ratnakar, MPH 2019 Batch, AMCHSS)

Magic Fountain

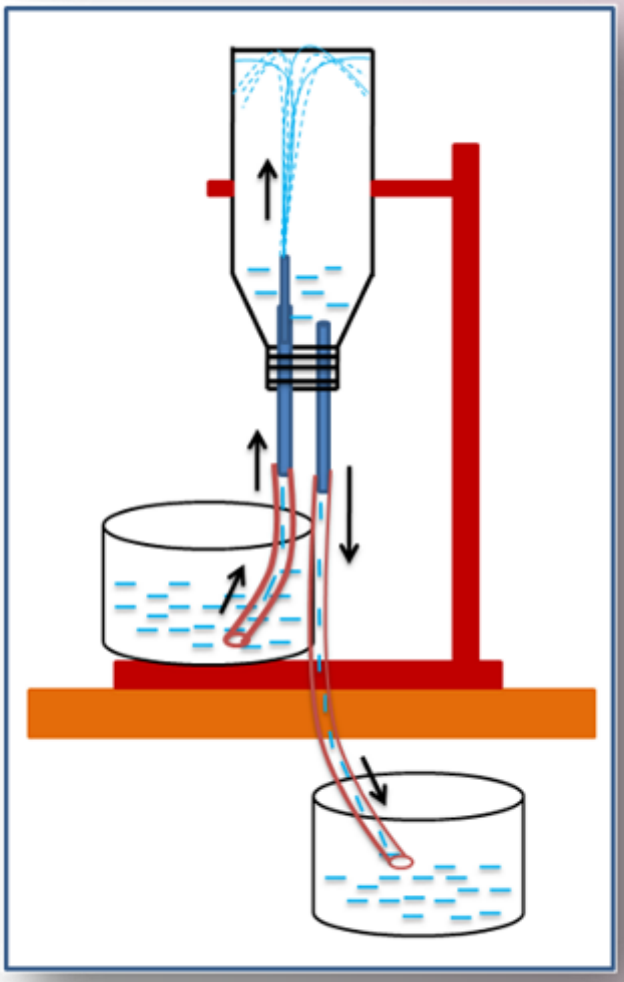
This Magic fountain is made using common household waste materials. For example, empty plastic bottles of carbonated beverages, empty ball point pen refill and plastic or drip tubes.

Steps:

1. **Drill two holes on the cap of the plastic bottle.**
2. **Take two empty pen refills. One should have the metallic nib attached at one end. Using a hacksaw cut the top part of the metal nib so that a small orifice is made. This acts as the jet. Insert the refill tubes through each of the drilled holes as shown in the figure.**
3. **Attach a 20 cm drip tube at the rear end of the refill with the jet. Attach half a meter long drip tube at the end of the second refill.**
4. **All joints and sealing should be air tight.**
5. **Fill 2 cm of water in the bottle, and close the cap. While pressing the finger at the open end of the long drip tube, inverse the bottle and place it in the stand.**
6. **Immerse the open end of the drip tube, attached to the jet, into a water reservoir. Release the finger from the open end of the long drip tube.**
7. **Now, water shall flow out from the long drip tube, while water from the reservoir would rise up and emerge with high velocity through the jet as a water fountain. The fountain continues to work perpetually as long as water is fed in to the reservoir.**

Governing principles of the water fountain:

The magical fountain woks on Bernoulli's principle and the Venturi effect. When an incompressible fluid passes through a constricted section, its velocity increases and pressure drops.



In step 5, when the bottle is inverted, water reaches the bottle neck. At this instance, the pressure inside the bottle is in equilibrium with that of the outside. When water starts to flow out of the bottle in step 7, pressure is reduced inside the bottle. This pressure drop forces the liquid from the reservoir to rise and flow through the jet. As the fluid flow through the constricted orifice of the jet, pressure drops further, and the velocity increases rapidly resulting in a beautiful water jet fountain.

(This article is contributed by Dr. Gijo Raj, Division of Polymeric Medical Devices, SCTIMST)

"The more you learn, the more you want to learn."
Lailah Gifty Akita, Think Great: Be Great!

Organic Future

Most of the time, what will attract your eyes and heart during visits to government guest houses and quarters, is a colourful garden with immaculate varieties of flowering plants. But the picture is entirely different in the BMT wing staff quarters of SCTIMST. Here, you will be greeted by an array of green vegetables showcasing their organic splendour. The organic garden around the staff quarters houses a wide variety of green vegetables, including coriander, mint, chilly, brinjal, beans, tomato, curry leaves, spinaches, okra (lady's finger), etc. In addition to the green vegetables, you can see fruit-bearing plants also in the quarters' premises. This heart-soothing greenery is the result of the combined efforts of Mr Prathyush and Mr Joseph Sebastian, for nearly a decade. They spend most of their off-work hours in the garden for nursing the young saplings and providing necessary care to avoid the attack of pests. It's happy to see that they're transferring the farming temper to the next generation also, by involving their children and other junior colleagues for the gardening. Gathering inspiration from this success story, new entrants like Dr Renjith and Mr Mathews (father in law of Mrs Jasmine, PMD) are also coming down to the land to try their hands. Today, let's have a glimpse of this organic garden in BMT wing quarters and hear from them about their experiences.

Mr Joseph Sebastian (aka Achayan) joined the BMT wing as a technical assistant in the pathology lab. He initiated the farming activities after setting up his home in the BMT quarters. His backpack is full of gardening experiences starting from childhood days in Kottayam. Pass time cultivation activities become a passionate affair after the entry of Mr Prathyush, a technical assistant in PFF, to the team. Mr Prathyush, hailing from Kannur, also has similar background and interest. Later, they together shed their sweats for making an impressive vegetable garden in the quarters' premises. They're very systematic and very strict in avoiding chemical fertilizers.

"Cow dung, vermicompost, neem cake, etc. are commonly used in this garden as manure. Watering of plants is a must in this hot weather. We customarily water them twice a day to avoid wilting," Mr Joseph informed. "Pest control is a difficult task to handle, so we should monitor the plants every day. Earlier, we had some bad experiences of losing the whole bunch of plants due to pest attack." Prathyush remarked. It gives us immense happiness on seeing the sprouting of plants from their seeds. They love to be in the garden more than in their own home, that's what their family used to say.

"I started this small gardening works after seeing the dedicated works of Achayan and Prathyush chettan. I didn't have any prior experience in this area and started this as a pastime activity only. My grandfather was an ardent farmer. He used to cultivate wide varieties of tubers, fruits and vegetables in our ancestral land. Even though, I started it as a leisure activity, now I could feel the happiness whenever touching the soil." Dr Renjith told.

Rabindranath Tagore rightly pointed out in his Gitanjali that the god resides in between those who work on soil and not in heavily built worshiping centers like temples, mosques, churches, etc. He urges the sadhus to stop their futile worships at temples, leave their white dresses and join farmlands with ploughs

To worship the real god. Excerpts from the Malayalam translation of Gitanjali by the great mystic poet of Kerala and the first Jnanpith award winner, G. Sankara Kurup reads as follows:

Similarly the importance of farming and agriculture was upheld by the popular quotation of Sardar Patel "**I know only one culture that is agriculture**". It seems that there will be a paradigm shift in the way of living in the post-COVID19 world giving more attention to agriculture.




Hobby Section: Special skills

Organic Future

Kerala has already initiated plans like "Subhiksham" to self-sustain every home with their own vegetable garden. The greenery around the BMT wing quarters is truly a model and inspiration for all.

കരിനിലമുഴുമാ കർഷകരോടും,
വർഷം മുഴുവൻ വഴി നന്നാക്കാൻ
പെരിയ കരിങ്കൽപ്പാറ നുറുക്കി
നുറുക്കിയൊരുക്കും പണിയാളരോടും,
പെരുമഴയത്തും എരിവെയിലത്തും
ചേർന്നമരുന്നു ദൈവം....
മണ്ണാർന്നിരുകൈകളിലും കൂടി
ചെളിയിലിറങ്ങു...
കളയൂ ശുഭ്രം വസ്ത്രം....

(This article is contributed by Dr. Renjith S, Central Analytical Facility; Mr Joseph Sebastian, Experimental Pathology; Mr Prathyush M, Div of Precision Fabrication)

Retirement Function: Staff Benevolent Fund

Shri Selvan K, Unit Assistant, Head BMT Wing Office, SCTIMST

Camera captures by staff members

Caught Enlighted

Dr Sanjay Ganapathy, Add Prof, Cardiology

Oriental Darter

Dr Sachin Shenoy, Sc F, BMT Wing

The Colors of the Sky

Dr RajBharath R, Associate Professor, Department of Transfusion Medicine, SCTIMST

Orange is the Colour of Heaven

Dr Sanjay Ganapathy, Additional Professor, Department of Cardiology, SCTIMST

Artistic contributions from Chitra members

Fly Through Nature to the End of Modern World

(Ms Arshajyothirmayi , PhD Scholar, Division of Sleep Research, BMT Wing, SCTIMST)

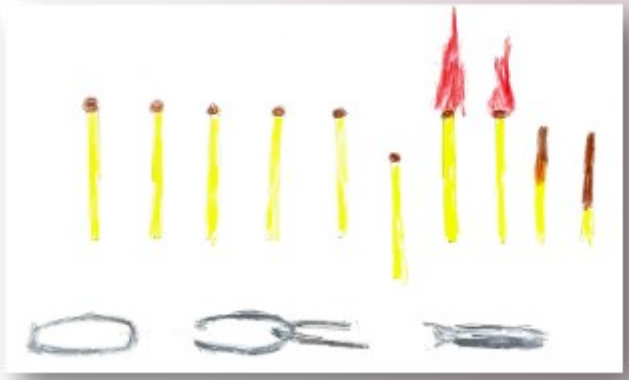
(Er Subjash NN , BMT Wing, SCTIMST)

(Mr Vishnu Raj, BMT Wing, SCTIMST)

(Prabha, Wife, Er Subhash NN, BMT Wing, SCTIMST)

Drawings by children on Independence Day: Web competition

Neha V Krishna, Age 8 yrs



Dhruva S, Age 6 yrs

Dyojit S Gijo, Age 9 yrs

Saavan, Age 12 yrs

Hrishikesh, Age 10 yrs

Advik S Shenoy, Age 4 yrs

Lakshyah Akhil , Age 4 yrs

Jyotsna Senthil Kumar, Age, 10 yrs

Nature Conservation

Ryan Benjamin Bijoy, Age 12 yrs

Poems by Chitra members

നാളെ പുലരവെ

നാളെ പുലരവെ ഞാന് ഉണര്ന്നില്ലെങ്കില്
കരയരുത്, നീഎന്നിക്കായി കേഴരുത്.
മൃത്യു എന്നെ വാരിപ്പുണരുന്ന നേരത്ത്
സ്പര്ശിക്കരുത്, എന്നെ വിട്ടുകൊള്ക.
നിന്റെ ഓര്മകളില് ഞാന്ഇനിയും ശ്വസിക്കും
നീ വിടച്ചൊല്ലവേ-അവയും മരിക്കും!

എന്നിക്ക് മേലെ വീണ് നീ കരയരുത്, അലറരുത്-
ദേഹം മാത്രമെന്നാകിലും-ഉറങ്ങട്ടെ ഞാന്!
നിന്നെ സ്നേഹിച്ചതിനു നാളെ നീ നന്ദി ചൊല്ലരുത്, അരുത്-
ഇന്ന് ഇരുട്ടുവോളം ഞാന് കാത്തിരുന്നു
എന്നെ മാറോടണയ്ക്കാന് എന്നരികില് അണയരുത്
അറിയില്ല ഞാന് നിന്നെയോ നിന്റെ പ്രവര്ത്തികളെയോ!

കിഴക്കേമുറ്റത്തെമാവെനിക്കായ് മുറിക്കരുത്
വിരസവേളകളില് അവളെന്റെപ്രിയതോഴി.
എന്റെ ദേഹം കരിക്കരുത്-ജന്തുക്കള് നിന്നെ ശപിച്ചേക്കാം
എന്നെ കത്തിച്ചുകൊന്നുവെന്ന് കരുതിയേക്കാം.
ഇരുട്ടിവെളുക്കും മുന്നെ ഭൂമിയില് എന്നെഒളിച്ച് വയ്ക്ക
പൊയ്മുഖങ്ങള്ക്ക് കാഴ്ച്ചയാവാനുള്ളതല്ലെന്റെ ദേഹം !

ഈ പറമ്പില് നീ എന്നെ മൂടരുത്- മടുപ്പുതോന്നാം
ഓര്മദിനത്തിനായുള്ള കാത്തിരിപ്പ് വിരസമാകാം
എന്റെ ദേഹി നേരമറിയാതെ വിട ചൊല്ലിയതുപോലെ
ദേഹത്തെ നീ ഉപേക്ഷിക്ക-ഉറങ്ങട്ടെ ഞാന്
ബന്ധങ്ങളാണ് കണ്ണീര്ച്ചാലൊരുക്കിയത്-
മരണത്തിനപ്പുറം വേണ്ട, ഇനി ഞാന് ജീവിക്കട്ടെ!

(Short description: Someone who has been waiting for 'life' to happen all along, leaving instructions how to dispose her body. She was all bound with obligations in her lifetime. She wants freedom and want to 'live' after her death.)

(Dr Aruna S Venu, MPH 2019)

For Better Days

Another day passes
The door closes
Rain falls and I drench
Dry in all this coldness
The nights are short
Yet the days dark
Friends move on, I'm stuck here
Dawn like dusk
Night as day
Black is white, everything grey
Confused my confession echoes
The birds do cry, nobody listens
Mountains to climb, tunnels to dig
Graves in abundance, none to weep
I wait for stars to shine
For birds to sing
For the moon to be
The same scarred self
The leaves to turn green
The flowers to bloom

(Shaheer Aboobacker, MPH 2019)

Anyone needs a translator?

(Dr Amita R, Dept of Transfusion Med)

Children are most excited when grandpa and grandma come for visit. My daughter was particularly excited running around the house, gathering things and remembering important happenings to share with her grandparents. At the first ring of doorbell, my son opened the door and welcomed them. My daughter was bursting with excitement and even before they could sit down, came running with her school notebooks. Grandfather also sharing the spirit asked, little girl, what all have you studied, tell me. She said, Apuppa, today we studied opposites, do u know opposites? Come, I will teach you. Give me your specs. Grandfather also agreed for the role play. I could hear from kitchen, the teacher teaching the grandfather and her brother complaining to grandmother about her "show off." The teacher didn't lose any moment in reprimanding the naughty boy (her brother) "Abhinav, keep quiet and listen". Meanwhile grandfather slowly relaxed on the sofa with day's newspaper and tea. "Ok mole how do you say in Malayalam, "an old man is reading newspaper." My daughter asked, "enthonuapuppa" (what grandfather?) and apuppan repeated. Without any hesitation, my daughter translated "Orupazhayamanushyanputhiya paper, ammepaperndemalayalamentha (Mother, what is the english of paper?); ah saramilla (its okay), Orupazhayamanushyanputhiya paper vayikkunu" (one old man is reading new paper).

Grandfather was left with his mouth open and rest of us couldn't stop laughing for a long time.

SCTIMST Hospital Building on 26 January 2020

Patron: Director, SCTIMST

Editorial Team:

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Feedback may kindly be sent to: **enewsletter@sctimst.ac.in**

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