ENGMEDNEWS

Newsletter of Biomedical Engineering Society of India

March - 2018 | Volume 2/18 | http://www.bmesi.org.in

Contents:

Message from Editor-in-Chief

Greetings

Dear Reader,

ENGMEDNEWS the newsletter of BMESI is intended to cover wide range of news. In this March issue, we are presenting you the interview with a renowned Cardiac surgeon, Padma Vibhushan awardee Dr. M.S Valiathan and his journey of developing the indigenous heart valve. Sir has advised to take up need based "Frugal Innovation" to meet the requirement of current Indian health care market and to reduce the importing of medical devices. Further, the issue highlights the events conducted in various Engineering colleges: Adhiyamaan College of Engineering, Hosur, KIT-Kalaignarkarunanidhi Institute of Technology and Ramaiah Institute of Technology, Bangalore.

The Editorial team requests you to communicate the latest updates of the events related to Biomedical Engineering at your institute.

• *Dr. Niranjana Sampathila*

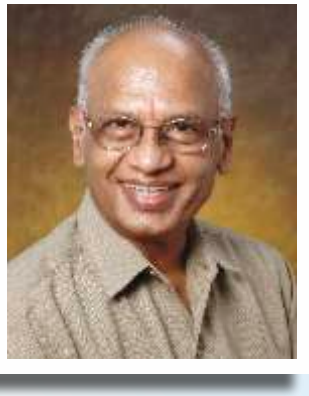
Quote

Let Noble thoughts come to us from everywhere

- The Rig Veda

NOTE: For publication, the interested personnel can send the relevant information on upcoming biomedical events, events held, scientific articles, award ceremonies, biomedical start-up/entrepreneurship. Please send the information supplemented with Photographs to the following mail address:
bmesi.engmednews@gmail.com and bmesiindia@gmail.com

FACULTY FOCUS



Marthanda Varma Sankaran Valiathan

Marthanda Varma Sankaran Valiathan, was born on 24th May 1934 in Mavelikara, a small town in Kerala. Professor Valiathan became the first Vice-Chancellor of Manipal University and played a significant role in its early development. Dr. M S Valiathan was awarded the Padma Vibhushan, India's second highest civilian honour, in 2005. His early education was in a government school in Mavelikara and then at the University College, Trivandrum. He has completed his medical education at the Medical College in Trivandrum, from 1951 to 1956. Later he went to the Liverpool University, UK as a surgical trainee and obtained his F.R.C.S. from the Royal College of Surgeons, Edinburgh and England in 1960. Further he had training in cardiac surgery at the Johns Hopkins, George Washington, and Georgetown University Hospitals in the United States. There he worked with Dr. Vincent Gott and Dr. Charles Hufnagel who strongly influenced him and instilled a lifelong interest in biomedical innovation.

Professor Valiathan served as the faculty of the Georgetown University Hospital, USA; Postgraduate Medical Institute, Chandigarh; Indian Institute of Technology, Madras (Biomedical Engineering) and the Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram (1974-1994).

Dr. M.S. Valiathan is a Fellow of the Royal College of Physicians and Surgeons, Canada in cardiac surgery. He is an Honorary Fellow of the Indian College of Cardiology and a Doctor of Science of the Delhi, Banaras, IGNOU, Kanpur and Punjab Universities. His major contribution is seen in developing the indigenous prosthetic valves. More than 85,000 valves have been implanted in patients. The valves are also being exported to other countries. The multidisciplinary team at the Sree Chitra Institute led by Dr. Valiathan, developed a series of disposable devices such as blood bag, oxygenator and cardiotomy reservoir, and a vascular graft which are in commercial production in several industrial units in Kerala and Tamil Nadu.

Professor Valiathan is a Hunterian Professor of the Royal College of Surgeons, England. The French Government honoured him by making a Chevalier in the order of Palmes Academiques. He is a recipient of many Awards for Science, Technology and Education, which include the R.D. Birla Award, O.P. Bhasin Award, Jawaharlal Nehru Award, Dhanwantari Prize, Aryabhata medal, Basanti Devi Amirchand Prize, J.C. Bose medal, Kerala State Science and Technology Award, B.C. Guha Award, Pinnamaneni Foundation Award, Sat Pal Mittal Award, G.M. Modi Award, M. V. Pylee Award, and H.K. Firodia Award. He received the Dr. Samuel P. Asper International Award from the Johns Hopkins University, USA for his contributions to medical education.

He has published several outstanding research papers on endomyocardial fibrosis Cardiac Surgery, Bio Materials & Artificial Internal Organs, Health & Health Policy. Currently, Dr. Valiathan is engaged in promoting research in basic science, based on cues from Ayurvedic concepts and procedures. The research in prominent institutes is being supported by government funding in the form of “A Science Initiative in Ayurveda” (ASIIA). ASIIA made good progress and has been taken over by the Department of Science and Technology, Government of India, for regular support under a “Task Force in Ayurvedic Biology”, which appears on the DST website.

Interview

We were fortunate to get Dr. Valiathan for an interview for the newsletter. The following is the excerpt of the conversation between ENGMED team and Prof. Valiathan.

ENGMED: Sir, can you tell us how did you developed an interest towards research?

Dr. Valiathan: My first place of training was at John Hopkins, Baltimore in 1965. There, my chief was Dr. Vincent Gott, he had done some great work in cardiac medical devices. In medical devices, it is important that we have devices which does not promote clotting. Blood remains normal when it is flowing through blood vessels and heart. But as soon as it comes out, it will clot. There were no such materials which could stop clotting or thrombosis and this was a problem for over 100 years. Vincent found by accident, that by taking a metal or polymer and coating it initially with colloidal graphite and then dipping it in benzalkonium chloride (used as antiseptic widely in hospitals) and once its dried, dipping it in heparin solution will make the surface anticoagulant. This method was used for all metals and plastics used in surgery and it was named as GBH, Graphite-Benzalkonium-Heparin (GBH) method. Poly methyl methacrylate polymer if we take, it will create clots in 10 minutes but with GBH coat on it, it could last for two weeks. This was a massive discovery and was published in Science in 63'. When I joined, I knew nothing about GBH but later I became very interested in this after spending time with Dr. Gott. I eventually started working with GBH and we found many applications for it.

ENGMED: Sir, your team was responsible for one of the biggest breakthrough in Indian medical devices history. What led you to develop an indigenous heart valve?

Dr. Valiathan: You see in western countries, so many valves are there. Their way of industry and R&D groups working are different. They will make small changes in their design and try to beat the other existing products. The motive is mainly commercial. I was very lucky because after Hopkins, I moved to Georgetown and there my mentor was Dr. Charles Hufnagel who was the first man to do heart valve transplant surgery in 1952, before heart-lung machine came. My interest grew working with him. When I came to Chitra, there was no valve replacement or no open heart surgery actually. Patients had to go to Madras, Vellore or Bombay and also most people couldn't afford the surgery. So, the chief minister told me that we need a hospital with specialties and that is what we should aspire for. But what we had to experience was, the moment we started open heart surgery in 76', we had hundreds of patients coming in! we had limited resources, we could buy about only 10 valves!. So it became a real problem for me. How could I tell a breathless patient that we cannot operate him and his turn will come after 2 years. So that was the problem, it was the need that drove us towards this. Here I would like to mention something of huge importance - Frugal Innovation.

You see, in western countries, so many valves are there. Their way of industry and R&D groups working are different. They will make small changes in their design and try to beat the other existing products. The motive is mainly commercial. If we had followed Western countries in the valve development, we could've never done it. Initially, when you say you want to develop a valve, people will say why not use a porcine valve or a cadaveric valve and put in on the patient. But this is out of shear ignorance. First of all, we had very few autopsies and very few people would agree to donate as well. But you are talking about hundreds and thousands of patients here. It should be an industrially feasible program and not just accommodating for few valves. We also needed valves of different sizes. For which we'll need a large supply of cadavers which we'll not get in India. Similarly, porcine valves which have worked well in western countries, costs more than the mechanical valves because the rejection ratio due to infections and other reasons were high in a freshly procured porcine valve and hence you couldn't count on this to form an industry for preparation of valves. So we decided to create a program for developing the heart valves.

(Interview continued on page no 7)

National Conference on "Biomedical Signal and Image Processing", February 22-23, 2018, Organized by Department of Biomedical Engineering Adhiyamaan College of Engineering (Autonomous), Dr. M. G. R. Nagar, Hosur in association with BMESI

The Chief Guest Mr. G. Muralidhar Bairy, Joint Secretary, BMESI - India, emphasized the importance of Biomedical Field, Opportunities, Growth of Biomedical Field and Future Needs of Medical Equipments. The guest of honour Mr. Rodda Koteeshwara, Head - BME, St. Johns Medical College, Bangalore discussed the opportunities and challenges for Biomedical Engineers. Dr. T. S. Udhaya Suriya, HoD, Department of Biomedical Engineering, Adhiyamaan College of Engineering, Hosur welcomed the gathering. Dr. N. S. Bhadarinarayana, Dean, Adhiyamaan College of Engineering, Hosur adorned the Chief Guest & Guest of Honour. The dignitaries released conference CD and the Seminar Volume. Dr. P. Ganesh Babu (coordinator), proposed the vote of thanks. Mr. Muralidhar Bairy, Joint Secretary, BMESI, delivered a keynote address on 'Biomedical Signals' after that participants presented their papers.

On the second day, Mr. Vijayan, Psychologist, Thiruvannamalai delivered a lecture on 'Growth of Biomedical & Future generations of equipments'. Mr. Sreenath, Head, BME, RMR Hospital Thiruvannamalai has delivered a lecture on 'Equipment's needs in hospitals'.

Two-day National-level Seminar on "Recent Trends in Medical Imaging Technologies for Skin and Lung Cancer Detection". Organized by KIT-Kalaignarkarunanidhi Institute of Technology, sponsored by ICMR and BMESI, January 5-6, 2018

Mr.S.Muttan, Professor and Head, Dept. of ECE, College of Engineering Guindy, Anna University, Chennai was the Chief Guest of the day. Dr. D. Jude Hemanth, Associate Professor, Dept. of ECE, Karunya University, Coimbatore and Dr. B. Senthilkumar, Professor, Dept. of ECE, KIT-Kalaignarkarunanidhi Institute of Technology, Coimbatore were the keynote speakers for the first day session. Dr. Parthiban Ramasamy, Dermatologist, Life care Medical Center, Coimbatore, Dr. P. T. Vanathi, Associate Professor, Dept. of ECE, PSG College of Technology, Coimbatore and Dr. S. Santhi, Dept. of ECE, Professor, KIT-Kalaignarkarunanidhi Institute of Technology, Coimbatore were the keynote speakers for the second day session.

Mr.S.Muttan, Professor and Head, Dept. of ECE, College of Engineering, Guindy, Anna University, Chennai spoke on the Machine Vision Systems and its long term evolution. Dr.P.T.Vanathi, Associate Professor, Dept. of ECE, PSG College of Technology, Coimbatore insisted the opportunities that are available for innovation and building a career in the field of Medical field and highlighted the Issues & Challenges in Lung Cancer detection.

One week workshop on Real-Time Signal Processing and its Applications Organized by Department of Medical Electronics, Ramaiah Institute of Technology, Bangalore, during 19-25, January 2018 with EMB Student Chapter, Bengaluru and ITIE Knowledge solutions.

The workshop provided an insight to the aspirants to implement linear and non-linear optimization techniques, real-time processing techniques on periodic, aperiodic signals, random signals, their models and hands-on experience. Mr Prabhu Palanisamy, Research Scientist, Honeywell Technology Solutions, Bengaluru delivered a talk on"Natural language Processing and speech recognition".Mr Manjunath G A, Senior Architect, Honeywell Technology Solutions, Bengaluru conducted a session on "open CV and real-time image processing with hands-on". Dr. Nithin Nagaraj, Assistant Professor, NIAS, Bengaluru delivered a talk on "Wavelet-based signal processing and its applications". The hands-on sessions were taken by Dr. Basavaraj V Hiremath, Assistant Professor, Dept. of ML, RIT.

Dr Narayanappa CK (Coordinator), Prof Mukundarao (Ex-ProfEmeritus), Dr Rathna G N (Principal Research Scientist, Department of Electrical Engineering, IISc, Bengaluru), Dr N.Sriraam (Professor & HoD, Department of ML, RIT) and Prof Kumaravelu (Department of ML, RIT).

Mr Ankit Arora, Deputy Manager, India Medtronic Pvt. Ltd., gave a talk on "Intraoperative signal and image guidance for neurosurgical workflows". Mr Srinivas Halvi, Associate Professor, DSCE, Bengaluru delivered a talk on "Fusion-based Face recognition system using ID transform domain". Mr Sadashiva C, Assistant Professor, Dept. of ECE, RIT, conducted session on "Speech Signal processing with hands-on". Mr Sanjeev Kubakaddi, Founder of ITIE Knowledge Solution, Bengaluru delivered a lecture on "Basics of Signal Processing and its Applications in the Biomedical field" honoured by Mrs. Uma Arun.

Dr. Veerabhadrappa, Associate Professor, Dept. of ECE, JSSATE, Bengaluru delivered a talk on "Automation of HRV and Pulse signals". Mrs Prabha Ravi Assistant Professor, Dept. of ML, RIT deliverd a session on "EMA for Health condition Monitoring speakers". Dr Narayanappa C K, Associate Professor, Department of ML, RIT has taken a hands-on session on "EMA using MATLAB". The workshop was chaired by Dr N. Sriraam, Prof. & HoD, Department of ML, RIT.

The Department of Biomedical Engineering, MAHENDRA COLLEGE OF ENGINEERING, Minnampalli, Salem, has organized a Guest Lecture on "Latest innovative techniques in EMG" on 29.02.2018.

Dr. V. David Chelladurai, PT., DPT, Doctor of physical therapy, Clinical Lecturer and Physical Therapist, McLaren Healthcare Corporation, Flint, Michigan, USA has delivered this lecture on "Latest innovative techniques in EMG". The objective of this Lecture is to avail students the latest techniques on Electromyograph, which will lead to open a varied job vacancies and creating awareness on students to undergo research on EMG. Dr. N. Malmurugan Principal, Mahendra College of engineering welcomed the gathering. Dr. R. Samson Ravindran, Executive Director, Mahendra Engineering Colleges delivered the Presidential address. Dr. K. Swaminathan, Head of the Department, Biomedical Engineering, MCE, gave introduction to the guest. Dr. N. Mohana Sundara Raju, Dean-Academics, Mahendra College of Engineering, thanked the guest and the gathering.

BOOK

Dr. Sudip Paul
Assistant Professor
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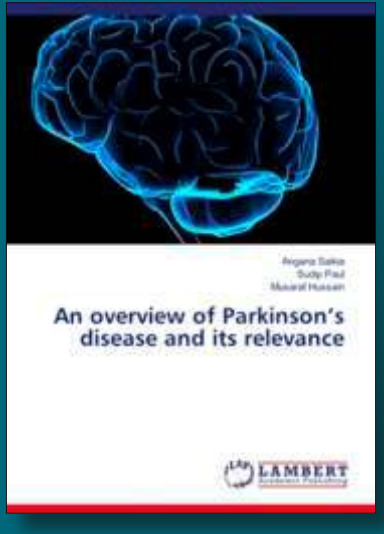
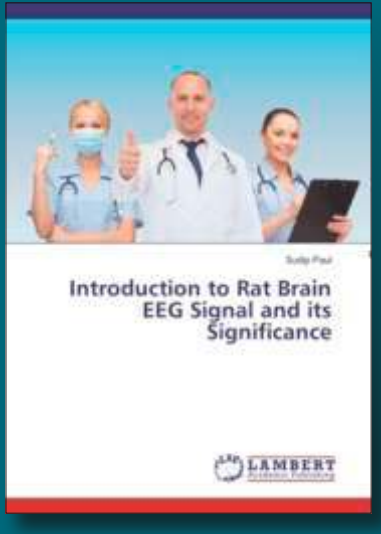
Shillong, India.





(Interview with Prof. M.S. Valiathan: continuation from the page 3)

***ENGMED**: Sir, your team must have faced many hurdles to come up with the finished design. Can you recollect some of the challenges you overcame while developing the heart valve in Chitra Institute?*

Dr. Valiathan: We were only three people when we started. Myself, a biomedical engineer and a veterinary surgeon; for both of them it was their first job. And I too did not have much experience in this, I had only worked as a fellow with Vincent Gott but to direct a program I had no experience. It was only 3 of us and we didn't have a choice. And we lacked the engineering facilities as well.

Along the course of developing the heart valve, we had to make many number of new innovations. Suppose we wanted to test the valve, we had to make a pulse duplicator which would mimic the flow of blood in and out of the heart. We had to develop a wear tester to test the abrasion strength of the material used for the valve. We had to design them such that it met the international standards.

A disc heart valve contains a valve housing (metal or alloy), a disc and then a sewing ring which is fixed like a tyre around the ring so that it could be sutured. With engineering drawings, we made the design of a disc valve. We chose the disc to be made of poly-acetyl, a very cheap material. The valve had three struts to hold the disc in place. We agreed to use titanium struts and weld it to the frame. But who would make the metallic housing and the welding for us? We can always say the valve was developed in Chitra research center but we had aid from a lot of other institutions. We took the help of Space Department in Banglore for the welding. But when we put it in the wear tester, it broke. The weld came off. We needed to Nano-analyze it. So we took it to National Aerospace Lab, Banglore. They told us that in the welding chamber, there are traces of oxygen and it has caused the weld embrittlement. We knew it couldn't be used in the cardiovascular patients. So we decided to have an integral valve without any weld, which was really innovation. In those days CNC machines costed about 80 lakhs and our whole institute budget was not that much. So there we used a pantograph machine to make our first frame.

Later after many rounds of tests we found out that the bell ring absorbs moisture and we realized that this was the reason why a famous foreign company had changed its valve. This they did not publish. Failures nobody does, we need to find out ourselves. So we realized this is why they changed it. Then we changed to integral cage titanium with single crystal sapphire. A new material which was biocompatible and totally inert. When we put this in the wear tester, we observed an interesting thing that the struts were beginning to wear as titanium was less hard than the metal. And because of the titanium wearing, the sapphire disc would escape. So we had to rest this idea as well.

We changed to chromium cobalt alloy with sapphire after that. The fabrication was done in Banglore. We even got titanium nitride coating on it because we had doubts whether Cr-Co alloy was officially bio-compatible. It worked very well, went through all the engineering tests. It was very exciting for us. We then put it in the animals as it was mandated by ISO. Mitral valve replacement in animals was not an easy thing to do and we needed to have atleast three animals to live for three months and then the autopsy of it should show that the valve was working well and it has not damaged any other organs. We had 4 animals in which we replaced the valves and when they were being monitored, one of the animals dropped dead.

Failure of a model meant a setback of 1.5 years, as the new model has to undergo and pass all the tests. With the third model we were very hopeful, so the animal dropping dead came as a shock to us all. It was big news and we had to face a lot of criticism. The autopsy of the animals showed that the disc had fractured in that animal. I decided this model was dead, but looking at the other 3 animals doing well, my engineers argued we can't rule this model out because of just 1 case as it was a manufacturing defect. There we had to take a decision. I explained to my team that I am supposed to put this in a human being and I can't do it even if I have a smidgen of doubt. I was even ready to drop the valve project.

But finally I had my way. We decided on going through all this again. But we had to have a different disc. We decided this time to go with non-metallic discs. So we started researching on plastics which could be used. Ultrahigh molecular weight polyethylene was selected at last. Because of the last failure, we had a lot of pressure on our heads; from DST, State Government, people were even complaining to PM. Performing all the tests with this new material would've taken a long time. First of all, we wanted to test the wear to see whether it was acceptable. Cage being a metal and disc a plastic, we did a subsystem testing of the device. We had to build devices to make the sub-system testing as well and we developed them in Trivandrum. We tested the materials for 2 months of abrasive test and later 5 months of another intensive subsystem testing.

That saved us a lot of time as the making of the whole valve and testing would've taken long. Finally, on 1990 December 6th we found success and today hundreds of thousands of valves has been exported.

ENGMED: Why do you think, after the TTK Chitra valve, there hasn't been much path-breaking developments in medical devices?

Dr. Valiathan: In fact, 80% of hi-tech instruments we are importing and it is not just in the field of medicine; in agriculture, science and Tech, everywhere. It's a sorry state I feel. Even with all these research going on, why is this happening? Because there is no culture of product development here. We focus far too much on theories and analysis, only then it is science for us. That is one of the fundamental problems.

Another important point I wish to make is about frugal innovation. In 2016, we imported devices worth 20,000 crores which are accessible for only about 25% of the people and not at all for the rest of the country. 25% is a big market for a western manufacturer with millions of customers in a country like ours. They are not interested in the remaining 75%. But we are, and only by frugal innovation we can find a way to address this.

For example, consider a CT scanner machine which has ten different functions. That's what the company makes. But when you look at the utilization of the device, we are using only 5 functions, so why do you want to have 10? You can redesign and the cost comes down to 30%. Similarly, materials we can change to bring down the cost and so on. Innovation goes into all these. So if you are going to think about the vast majority of the population, frugal innovation is important. You cannot do it the western way.

ENGMED: What do you feel needs to be done to improve the culture of product development, especially in the medical sector? How do you think biomedical engineers and doctors make it happen?

Dr. Valiathan: There are a lot of bio-engineering programs in India, offered by many institutions and universities. They were already there since 1973. PG programs along with UG and also PhD were offered. But the problem is that nothing is manufactured. There is no IP on any of the devices developed. There is only a nominal connection, they go and see something in the hospital, but just that is of no use. The familiarization I agree, is a good thing. But in essence, that interest in developing products which comes to the westerners naturally, here we don't have it. Here the idea is to get a degree and leave. The device development is not there and that somehow we have to create. Only in institutions this can be done. If you have a professor or a leader of that caliber and if they are interested in this, then it will happen.

In Chitra, I often used to tell my engineers that we are here to develop devices. You may analyze the different aspects and properties of it while designing it and even publish papers on it, am not against that but our aim was to develop it! So once you start doing it, then everybody will follow. It becomes exciting and after a while the motivation becomes self-sufficient.

One person knowing everything and planning everything will never work. Nothing will come out of that. If you have an engineer, a medical person and both are good in their areas and both are agreeing on a target, then they must constantly interact. There was not a day we were not talking. All the surgical operations I used to handle and when they were working on a pantograph, milling machine, I did not know it but I went and saw it. I realized how the work was done. I understood the working and applications of electric discharge machine. I understood all that which I was needed to know. The particular engineering drawing and in depth knowledge of it, I didn't have to know all that. My engineers also understood that the mitral valve was different from aortic valve, that the sewing had to fit into that place. They were so much involved that during the PhD presentation of one of the engineers I had hired, the examiner commented that he was talking like a doctor. That is the kind of people we need, who are based in engineering but know a good part of medicine. Not necessarily a medical degree, but the commitment. Similarly, the doctors too should know the basic engineering. When you understand the procedures, say for accelerated testing, and realize that with it 10 years of wear testing of a device can be done in a year, it becomes very interesting.

ENGMED: Sir, from being a cardiac surgeon to writing books on Ayurveda. How did this transition happen? How did you kindle this interest towards Ayurveda?

Dr. Valiathan: This change happened much much later. It's good to have a change. When you are doing something you should be fully absorbent, not doing anything else. But when you have done something enough, which you yourself have to decide, then you have to do something different. There are so many challenges out there. After I retired from performing surgeries, I was being called up for management responsibilities. But I still wanted to do something more in medicine. And there I thought, Ayurveda!

Ayurveda has a very rich history and has been practiced for over 3000 years. It has seen tough times. The Islamic rule, the British rule, they all tried to destroy it. Gurukulas, they all perished. They got no support from anybody, they had nothing.

It was really was in a pathetic state at one point of time. They did not have any social status; our people never respected it much. Nowhere one could get educated. No ayurvedic colleges. There were no gurus left to teach. Commercially you couldn't buy anything, you had to make it yourself or search for vaidyas to make it. Today it's difficult to imagine what it was like. But, it refused to die! People are still going towards it. What is it that gives it this vitality? That's a very interesting question! And for that, you have to study the subject well to get an answer. You have to study it personally to understand its vitality. So that's how it started, just studying and understanding initially and it took few years.

The period between 1st to 6th century was the golden period of Ayurveda when all the major scriptures were written. But, majority of the research in Ayurveda after the 20th century, are focused on herbal drugs. There were some 2000 medicinal plants which Charaka describes, we take these plants, isolate the compounds and then purify them, characterize them, study their effects on various tissues, this kind of research. Thousands of papers have been published. But nothing came out of all this. So Ayurvedic research meant herbal drugs and this became the notion.

But there are whole lot else in Ayurveda, which nobody else has looked at; mainly because we did not have the modern biology then. For example, one of the fundamental concepts Ayurveda talks about are Vata (wind), Pitta(bile) and Kapha (phlegm). Everybody makes fun of it. I myself used to it. I was in disagreement with the fact that they can determine physiology. But now I understand that VPK are very fundamental. They are what it's called phenotypes in our language. These are decided based on a person's traits. Man's height, his behavior, the way he speaks, facial and physical features, emotional responses and so on. Looking at all these characteristics its decided whether a man is predominantly Vata, Pitta or Kapha. And that determines the predisposition to disease, the speed with which the decease progresses and the treatment response as well. But is there a biological evidence for this? That is our question today. Back when I was a student, there was no way it could've been determined. Because modern biology did not exist. We did not have gene sequencing. We couldn't measure gene mutations. But today we have all that. So I thought we should work on this. In one of our research we found that, for the 3 doshas (abnormalities in Vata, Pitta or Kapha) there are specific patterns in the mutations. They are very important mutations in polymorphism which are used for molecular characterization. And these changes taking place, have specific patterns. This result was published in Nature and it attracted a lot of attention. I like to call it ayurvedic biology. Biology with cues coming from Ayurveda. Scientists are looking more into Ayurveda these days and many foreign countries are taking note of this as well. So it's very exciting for me.

***ENGMED*: Sir, what do you wish to convey for young budding biomedical engineers?**

Dr. Valiathan: I would say concentrate on devices and instruments. They are not just gadgets; they are lifesaving tools. That is what India needs. If we want to reduce the 80% of our medical devices import, only engineers can do it, nobody else. Frugal innovation is necessary and we cannot follow the western practices. I am not dispensing the other methods, we should know them, but realize that we cannot follow a testing procedure worth five crores. We have to have a different way of doing it. Develop methods that could reach a larger percentage of the population.

One of the frugal innovation that we did in Chitra was to develop a device to replace 'Laser Doppler Anemometer'. The device measured the turbulence in the blood flow using Laser Doppler effect and it cost about 1 Cr at the time. So we decided to go about it from another angle. We thought of measuring the pressures in the flow on either side of the valve. If there was a valve narrowing, the downstream pressure is less than upstream. Previously cardiac catheterization was used to check the pressures across the valve, which was an invasive method. In our hospital, we had an echocardiograph with which we could measure the velocity changes of the blood as it passes through a narrow orifice. Based on this, we developed a mathematical formula to derive the blood pressure. This was verified and validated by cardiac catheterization as well. Hence it was accepted. So we developed a pulsed Ultra Sound Doppler with which we could measure the pressures. We could even photograph the turbulence. Now that was very cheap, it did not cost us 1 Cr.

***ENGMED*: Sir, you are the prime example for the phrase, 'age is just a number'. What drives you to work even now?**

Dr. Valiathan: (He laughs) It makes me happy doing it. That's the simplest way I can put it. I don't think there is anything else special. I think you have a wonderful field to work and a huge job to be done here. If we can reduce the import of medical devices to about 50% even, I think it's a worthwhile target to work for. That's the type of things we must do, it will bring so much satisfaction.

NOTE: Idea expressed here are of the individuals and not of BMESI. ENGMEDNEWS is published by Biomedical Engineering Society of India. Send your articles to the following email: bmesi.engmednews@gmail.com, and a copy to bmesi.india@gmail.com

ENGMEDNEWS

Newsletter of Biomedical Engineering Society of India

Biomedical Engineering Society of India

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Place of Birth: Date of Birth:

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B. Home:

E-mail Id:

Please tick the address preferred for mailing: Office ☐ Home ☐

Present position, Length of Service and Responsibilities:

Nature of experience and interest in Biomedical Engineering including publications: (Attach additional sheets if necessary)

Education (Degree, Year of passing etc):

Membership of other professional organisations:

I certify that the statements on this application are correct and agree to abide by the rules and bylaws of the society.

Date: Signature of Applicant

Note: Application money payable with this form: Life Membership Subscription Rs 1500/- and registration fee.

Details of payment:

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Department of Biomedical Engineering,
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Membership No: Elected on:

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Place of Head office:	Year of Establishment:

Address for communication:

Phone :
Fax :
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Brief Profile of organisation: (sheet may be enclosed):

Whether Biomedical course / Department / Division exist?

Certification/ Recognition (like, ISO 9000, ISI etc.)

Membership of other professional organisations:

I certify that the statements on this application are correct and agree to abide by the rules and bylaws of the society.

Date: Signature of Applicant

Note: Application money payable with this form: Life Membership Subscription Rs. 15,000/- and Reg. fee Rs.100/- Details of payment:

DD No. Bank:

Demand Drafts should be made payable to the BIOMEDICAL ENGINEERING SOCIETY OF INDIA, payable at Udupi or Manipal. Completed application form together with payment should be sent to:

Mr. Muralidhar Bairy G, Joint Secretary, BMESI,
Department of Biomedical Engineering,
Manipal Institute of Technology, Manipal-576104

FOR OFFICE USE

Application Received on: Member Receipt No:
Membership No: Elected on:
Sent on: