

On behalf of DiaSys, we had the opportunity to interview Dr. Mohan. Dr. Mohan talks about future of diabetes and latest research in the field. Enjoy the interview.

DiaSys: Congratulations on receiving Harold Rifkin award for distinguished international service in the cause of diabetics.

Yes, about the award, this is called as the Harold Rifkin award for distinguished international service in the cause of diabetics. Harold Rifkin was a very famous diabetologist. In fact, he had written a textbook when I was a student which is called Rifkin and Elimber textbook. Max Elimber was another famous diabetologist. So these two had written a very famous book called Rifkin and Elimber textbook. Apart from that he was a very good scientist, clinician, very well known. In fact, the award was named after him by the American Diabetes Association. The first recipient of the award is himself. Then after many years, I don't know if it's this year or last year, ADA was finding difficult to keep all these awards going. So now Rifkin family supports it. I met Harold Rifkin's grandson. He is not a doctor, he is a businessman. He had come for the award ceremony. His son was a doctor but he didn't come for the ceremony but he wrote to me later. But his grandson, Alan Rifkin is a businessman who lives in New York but he comes specifically for this award thing. Anyways, that's about Harold Rifkin.

ADA has several awards. Some are given for pure science, some basic science, insulin and discoveries. There are many other awards given. The one that is given for international excellence is this one. Of course, it doesn't mean that you have to be outside US, although

many are from US. Around half of them are from US and other half is from Europe, 1 or 2 from Australia, and I think 1 Japanese person might have got. Nobody else from Asia has got this award. And from India also, I am the first one to get it. This is an award for distinguished international service in the cause of diabetics. First, 4 very senior distinguished people of ADA will propose you. Then we have no idea who the committee is.

Even the president of the area does not know who the committee is, it's totally done confidentially. They selected me. Criteria are that you should have worked in research, clinical, education and you should have worked in more than your own country. If you work just in India, it is good but it's not enough. They say you should have helped other countries. So I had done lot of training to people in Africa, Tanzania, Nepal, Vietnam, Cambodia, Bhutan, Srilanka, Swedan, US, UK and many other countries. Big National Program in Training, the CCBEM where we trained around 100 cities in India, more than 12500 physicians have been trained in diabetes. This is the largest training program in the world on diabetes by one organization and it's a record. The other reason is my publications. I started working in the field of diabetes when I was 18, with my late father Prof. Vishwanath who was the founder of diabetes and pioneer. I started working when I was a first year medical student. Since then I have been working now for 45 years in this field and right from when I was 18, I started publishing with my father. It was very early. Long before I finished my MBBS, I was traveling around publishing and by the time I finished MBBS, I had 20-30 papers. By the time I finished MD, I had 40-50 papers. I also probably hold the world record for a medical doctor who has published the most number of research papers, as I have crossed 1150 research papers. There may be 1 or 2 scientists who have done more but they are full time scientists not a doctor who is in practice. And there are collaborators who collaborate with so many universities and get lot of publications. For us, being a private centre, private doctor, not part of university, not funded by government, our own research, it's a world record. In fact this week, there have been 4-5 papers in the lancet back to back. There is another one on how dairy products are protective against arteries. This I think is one of the main reasons.

The other thing is, when they ask me the area what is that I feel happy about, I said creating centres of excellence is one of my satisfactions. We started in small rented premises and then from there we grew into this centre and today we have 43 branches with 2 more coming up now, totally 45 branches spread all over the country now. 430000 patients registered in electronic record which is the largest in the world. This helps us in the research. This helps us

to pull out so many papers from our records which nobody has. This has been another unique thing. But more than anything else, it's the team work.

We built huge teams like clinical teams, research teams, basic science teams, epidemiology teams of doing various projects by themselves. Food and Nutrition research- we produce our own rice called Dr.Mohan's high fibre rice, brown rice, atlas of Indian foods and so on. Now we have an education academy. We train PhD students, fellowship in diabetes, eye disorders, podiatry, post-doctoral fellowship in diabetes, laboratory technology and many other fields. It's almost like a virtual mini university on diabetes that we have built. With all these we are able to do lot of work. I won't say personally I'm doing all these work but my team does a lot of work. Our job is to keep the focus and see if everything goes along a particular way. That way, we have been very lucky.

DiaSys: Why diabetes is called the mother of all diseases?

Dr.Mohan: Because it is a basic background on which many other diseases come. If you see, once you have a high sugar level, it predisposes you to various infections like lung infection, kidney infection, boils, gall bladder infection, and many other infections including TB. Stress is definitely one of the factors because once you have stress, the counter regulatory hormones increase. Adrenaline level, non-adrenaline level, cortisol level, growth hormone level, all these hormones increase in stress. Once all these hormones increase, they are all counter regulated hormone ie they oppose the action of insulin. Insulin only reduces the sugar; all these hormones increase the sugar. Once these all go up, insulin cannot work. So the sugar level goes up. So when you have stress, sugar level goes up. Now for stress to produce diabetes, basically there must be a background genetic factor or something waiting to come out. Then when you are stressed it will come out.

The stress is normally a severe stress like you lost a job, lost somebody close to you, or lost money and everything in flood, tsunami, or something which really shakes you up and which doesn't allow you to sleep, your BP goes up, Sugar goes up, so that's called stress induced level. The good thing is that if stress goes down, the sugar might become normal also. I have seen some patients who had some stress develop diabetes and after the stress goes away, the diabetes will go away. So we encourage them to do yoga, meditation, Pranayama, walk, listen to music, and relax themselves.

DiaSys: What are the recent advances in the diagnosis & treatment of diabetes?

Dr.Mohan: Recent advances are in many things. One of the first things is continuous glucose monitoring. You can now get a graph which tells you the blood sugar 24hrs. You can get it on a weekly average, on a daily basis, you can get individual graphs and on hourly basis also. This was not available even 5 years before. Today we can know we can individualize patient treatments and this has become a big and instant technology, of course even machines are also getting better. The next thing is number of medicines. Earlier only two classes of drugs were there, today we have 7 or 8 classes of drugs. All kinds of medicines we have. We have so many choices. Insulins have got better and better. Better pens, pumps, artificial pancreas are slowly coming where the pump itself decides how much insulin to give. And artificial intelligence is coming in a big way. Today AI can read diabetic retinopathy pictures. So technology is becoming better and better almost equal to humans now.

Next week we are having a press conference, where I am bringing in people who have finished 99yrs of age. Some are nearing 100 and going strong. They have diabetes for 40yrs, 50yrs, 60yrs and still doing well. So what more you need? They can live their full life despite diabetes and doing extremely well. Thanks to all the technology, medicines, follow up, their own discipline, all put together has helped them to live a long healthy life. I could not have said these 20 years back. Today they are happily crossing 80, 90, and 95. I don't see a day which is far off when humans have been living 150yrs. Not this diabetic thing, even in allopathy. Very soon people will start living for 150 years.

Let's say, If you have reached such stage, you get your first job when you are in 30 or 35, you imagine in last 100 years how many jobs have changed, how many technologies have gone. So whichever job you learn at that time, for the next 100-120 years you have been planning to work, so for 80 years you have to wait a job. What job is gonna be there you don't know because everything is going to keep changing and changing. And you have to learn all the time. So the whole this is going to change. And before we realize it, things are happening. Once you conquer all the diseases, of course you will die one day but you will live much longer than you can ever imagine.

DiaSys: As a patriarch in the Diabetes fraternity, what is your expectation from the Government of India to help control Diabetes?

Dr.Mohan: The PM Modi has released Ayushman Bharat, world's largest governmentfunded healthcare scheme. Under that they are planning to have 150000 wellness clinics and they are planning to cover below poverty line for 50 cr people. All that is going to impact the quality of life of people because definitely if you offer all the best technologies free to people, they are going to live healthier life. The government is taking a lot of initiative in this through the National Control Program for diabetes, cardio vascular disease and stroke and cancers. It is setting up at primary, secondary and tertiary level, for prevention right from schools, colleges, yoga, increasing physical activity, raising awareness about diabetes and many other things. Of course for those already have diabetes, treatments at low cost, low cost drugs, availability in every village.

DiaSys: Recent changes in medical and technology in the Indian Diagnostics field?

Dr.Mohan: See how things have changed. Once you put our emphasis somewhere, India is very quick to adopt to technology for example cell phones. 4-5 years ago I was sitting in an airport and sending an SMS and an American who was sitting next to me said "You Indians are so intelligent and smart, you can send messages using your phones, and you can take selfies and all". They use it only for phone calls and that's it. They don't know what else to do. So what I'm saying is, of course, generation old or not is different. But Indians are very adaptive to technologies.

DiaSys: DiaSys is known for niche parameters like HbA1c, Microalbumin, Cystatin C, Lp-PLA₂, NEFA and Beta-hydroxybutyrate. What is the importance of Beta-hydroxybutyrate and is it necessary to do for monitoring purpose?

Dr.Mohan: Yes, it is very useful in case of critical stage of Diabetic ketoacidosis (DKA). Diabetic ketoacidosis (DKA), a complication of diabetes mellitus, is a severe metabolic disease that often requires intensive treatment. Diagnosis of ketosis associated with DKA can be difficult due to variability in the metabolic state of DKA patients. Recognition of the clinical signs and definitive diagnosis are essential for proper treatment.

DiaSys: To what extent is it preventable?

Dr.Mohan: There are few types of diabetes where a cure is possible. If the diabetes is due to stress, it can be reduced by pranayam or yoga and another form of cure through bariatric surgery. This surgery takes half an hour and it can ensure that an overweight can lose 20-30 kilograms in weight and people who are on insulin and medication can completely get rid of

medication, hence we call it as a remission of diabetes. The reason we don't use the word 'cure' is that if they again put on weight or have stress or do all the wrong things they might get diabetes again. Hence we call it as a remission of diabetes but it is as good as a cure. My weight is still remaining same as before 15 years ago and I maintained body weight.

DiaSys: Has there been any breakthrough in your research?

Dr.Mohan: One of the innovations that we started was through the Madras Diabetes Research Foundation. We have several discoveries like the new types of diabetes which is peculiar to India, a new gene for diabetes through our research. But one of the breakthroughs's that I would like to mention is the discovery of a new type of white rice which is called Dr. Mohan's high fiber rice. This is the first white rice in the world which has 5 times higher dietary fiber than any other white rice in the world. Our studies with this rise show that it does not increase the blood glucose levels that much and the glycemic index is much lower. It became very popular and today it is available in the markets all over Chennai, Tamil Nadu and all other part of India.

We thank Dr. Mohan for his valuable insights and his time.