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Infosys Prize 2015 winner: 'Drug development is a long and expensive road'

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He was awarded the prestigious Infosys Prize 2015 in Life Sciences for his outstanding contributions in deciphering the molecular structure, at the atomic level, of key proteins involved in the biology of pathogenesis of malarial parasite. His work on the deadly malarial parasite has the potential value for vaccine design, and development of therapeutics for malaria.

Dr Sharma holds a PhD from Northwestern University, USA, in Protein Crystallography, and a post-doctoral from Oxford University, UK, in Structural Biology.

In his exclusive interview with BioSpectrum's Raj Gunashekar, he touches upon his award-winning research work, his passion for photography and ornithology, tackling R&D challenges, funding opportunities, and India's optimistically changing research landscape. Excerpts:

Q: Firstly, a big congratulations Dr Sharma. What were your initial thoughts when you first heard that you were a winner of the coveted Infosys Prize?

A: Thank you. I was very surprised to hear about the award via a phone call from Infosys Science Foundation. I shared it with my mother and rest of the family who were all elated. I feel deeply honored by this prize, and with gratitude thank all who have supported me over the past 15 years in India.

Q: Tell us about your award-winning work on the malaria parasite proteins.

A: I established a laboratory in ICGEB 15 years ago on the theme of understanding key malaria parasite proteins from a structural biology perspective.

Specifically, human malaria parasites like P falciparum have evolved specific protein families that are dedicated to assist a parasitic lifestyle.

Most malaria parasite proteins of intense interest from basic and translational biology perspective are additionally complex because of their peculiar amino acid composition. This feature has been very challenging to us and others; however we stuck to our focus of tackling these difficult proteins and making them amenable for structural and biochemical studies.

In addition, we decided to focus on proteins that would enlighten vaccine development, or allow new targets for drug discovery. Indeed, for modern vaccine validation and design, a structural underpinning is critical in context of complex parasitic (or viral) proteins.

Our thrusts on these topics would not have been possible without extensive and highly enriching collaborations within ICGEB, India, and internationally.

Over the past 6 years, we have been able to make a very pressing case for inclusion of protein translation enzymes as new drug targets, not only in malaria drug discovery themes but also in many related pathogenic diseases.

We feel that sustained focus on this framework of progress will enable discovery and development of next-generation anti-malarials and anti-pathogenics.

Q: How do you intend to commercialize your research?

A: We have established very robust systems for drug screening against specific, high-value targets in malaria parasites.

In linkages with medicinal chemists, we are further developing some of the anti-malarial compounds.

Drug development is a road that is long and expensive to travel on, and therefore it will be premature to speculate on commercialization.

Q: You have extensively worked abroad in research and teaching. What are the major differences between the West and India in this?

A: I think it is time to discuss this issue in context of specific institutions in the West and India.

Indeed, it is not the stereotypical West versus India debate anymore.

We in India have several very high-quality institutions of great repute, replete with tremendously talented scientists.

And, not all institutions in the West have cutting-edge academic and research capabilities like some in India.

Indeed, in modern times, scientific excellence is a worldwide phenomenon. Human ingenuity cannot be beholden to geographical boundaries.

I have been very lucky to spend time in multiple countries, amongst institutions that excel in their respective domains.

Within the establishments that I have been associated with, whether abroad or in India, the academic cultures are not very different.

Q: Any suggestions to bolster R&D in India?

A: Success in R&D depends on three critical factors to my understanding.

First is the scientific and technical talent, where India is already very rich.

Second is the organizational ability, where again, India has achieved remarkable integration over the past many decades, and most logistical and governance structures are in place.

The third critical component is funding. Here, besides an increased support from the government, India can consider enhanced engagement with philanthropists and the private sector.

Q: Do you think scientists can also become successful entrepreneurs in our country? Explain.

A: Yes, indeed. Any individual with ideas, drive and vision is capable of successful entrepreneurship.

My first PhD student, upon completion of his doctoral work, had post-doctoral offers from many renowned institutions. He however moved away from basic science, and launched a biotechnology company in Hyderabad, and is now a very successful entrepreneur.

There are several other examples of such successes. I feel that these sporadic inspirations have to be channeled and mentored properly.

It may be useful to provide option of at least one business/entrepreneurship academic course in various doctoral programs, so that young academicians are able to nourish their entrepreneurship inclinations and skills.

Q: Most scientists and researchers speak of funding paucities in Life Sciences R&D in the country. What's your take on this?

A: I agree with most scientists on this issue, which is incidentally a worldwide gripe.

However, if one takes a longer-term view of funding for bioscience in India, the scenario has been very positive.

Over the past 3 decades, science funding has gone up significantly, and specifically since late 90's there has been notably stronger investment from the government.

At the present moment, the fiscal situation is not very rosy worldwide, and during such times science along with perhaps arts suffer for funding.

As the national and international economies rebound, we hope that more funds will be available for everyone.

I am also of the view that R&D must try and attract greater funding from philanthropic organizations and individuals within India.

Q: Is it risky to be a scientist given the long periods for research along with uncertain funding woes?

A: 'Risky' is a word I associate with professions which our brave brothers and sisters choose when they join national forces in India's defense. From that perspective, the risks taken by almost any other profession seem feeble.

In my view, scientists have the privilege of following their passion while being employed. Their long periods offer chance for relentless dedication, and vagaries of funding present windows of opportunity to diversify.

Q: What are the attributes needed to become a successful researcher or a scientist?

A: Perseverance.

Q: What made you to return to India?

A: To be amongst my family and friends in a place where I had a sense of belonging.

Q: How do you balance both professional and personal life?

A: I am surrounded by bands of highly loyal and supportive people, both in my professional and personal life. This makes me not only lucky but also allows me to have seamless transition between the two.

Q: Tell us about your hobbies.

A: Over a sustained period of time I would say that I have been very loyal to photography, art-house cinema and music (guitar). I live in deep awe of nature, admire all plant and animal life, and lately have been indulging in ornithology.

Q: What would you attribute to the person that you are and the achievements that you have made? Any fond childhood memories or strong influences that you have had in your early days?

A: I have had a privileged childhood and upbringing, where essentially all decisions - big and small - were made by me, whimsically or otherwise.

I was exposed to a very liberated, highly-academic, secular and scientific home environment that I feel was critical in my development.

I also had tremendous mentorship during my 5 years in Oxford University.

Looking back, I feel lucky that I have had exposure to pluralistic and international educational institutions.

Q: What message do you have to all the students who are dreaming of becoming a scientist or even are at a crossroad whether to become one?

A: If one wants to sustain their intellectual flame ad infinitum, then science is the path.