

# Defining the path of a physician–scientist

Karishma Kaushik's research at University of Pune focuses on chronic wound infections, from probing the complex wound infection microenvironment to enabling personalized therapeutic approaches. She is a recipient of the Ramalingaswami Re-entry Fellowship, a program funded by the Government of India to support the research of early-career scientists and their return to the country from abroad.

## Karishma Kaushik

The physician–scientist in India is a rare breed. This is certainly not surprising given that India does not have dual MD–PhD training programs. As a result, the members of India's very small pool of physician–scientists have almost always pursued their medical and research degrees consecutively through separate programs, significantly lengthening their time spent in academic training. My decision to become a physician–scientist arose from a desire to find a career niche that was in line with my professional strengths and interests.

Early on in medical college, I discovered that I enjoyed academic medicine as much as clinical rounds. This led me to read journal articles, attend local conferences and workshops, write and publish reports on interesting clinical cases and even conduct self-funded, small-scale research projects. For one such project, I analyzed the bacteriological profile of street foods from across the city of Pune. I collected a variety of ready-to-eat food samples and used microbial culture techniques to detect possible food-borne pathogens. I found evidence of bacterial contamination with enteric pathogens, and this work was one of my first publications. It is important to note that the medical college curriculum in India offers very limited exposure to the basic sciences or research, and the emphasis is almost entirely on the development of treating physicians. Looking back, I am happy to have followed my inclination to look beyond the clinical experience, which in fact led me to discover a career path.

During my residency in clinical microbiology, I carried out a nationwide study to genotype circulating Varicella-zoster virus (VZV) strains and compare them with the Oka strain used for vaccination in India. This work was motivated by recent outbreaks of chicken pox in the Indian military, including among previously vaccinated people. On the clinical side, I identified patients in the infectious phase of chicken pox and collected fluid



Credit: Kaushik Balasubramanian

from the blisters on these patients. In the clinical laboratory where I spent long hours in my residency, I applied molecular tools to differentiate circulating strains from the strain used in the vaccine. In my work, I determined that the circulating, clinical VZV strains were genotypically distinct from the vaccine strain, raising the need to monitor post-vaccination protection and possibly developing an India-specific VZV vaccine. This experience steered me toward becoming a physician–scientist, and I decided pursue a PhD after almost nine years of medical education.

I moved to the United States to obtain my PhD and quickly found myself immersed in basic science, far out of my comfort zone. I worked in a biological physics research group and studied interdisciplinary approaches to overcoming antibiotic resistance.

Having received a Ramalingaswami Re-entry Fellowship, I returned to India to establish an independent research program at the University of Pune that focuses on the study of chronic wound infections, from both a basic science and health-care perspective. We dissect the complexity of the wound infection microenvironment to enable composite treatment approaches, inform drug development and move the field toward precision-based, personalized therapeutics. Today, I am one of India's very few trained physician–scientists. Like many people challenging the status quo, I have encountered a certain resistance. For example, there are limited professional positions as well as few funding opportunities tailored to physician–scientists in India. And, even in everyday life, I am often asked if I am a 'real doctor' or a 'true basic scientist'.

Given the significant contributions made by MD–PhD programs the world over, it would be valuable for India to develop a cadre of research-driven medical specialists. My long-term goal is to facilitate an MD–PhD program in India that will train a new breed of physician–scientist to address the country's healthcare challenges through discovery and innovation.

Given that across the world, and particularly in India, physician–scientists represent a very small cadre of specialists, I consider it a professional responsibility to facilitate the development of programs and mentoring networks that foster this critical link between healthcare and biomedical research. □

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