

# Bioelectronic Medicine

An Interview with Sangeeta S. Chavan, Ph.D.,  
Professor, Institute of Bioelectronic Medicine, Feinstein Institutes for Medical Research

**INSTITUTION BRIEF** The Feinstein Institutes for Medical Research ([feinstein.northwell.edu](http://feinstein.northwell.edu)) is the home of research at Northwell Health. Its more than 5,000 researchers and staff have made important discoveries in many medical fields, including cancer, sepsis, inflammation, autoimmune disorders, Parkinson's disease, Alzheimer's disease, schizophrenia and bioelectronic medicine. It has experts in molecular research and is driving groundbreaking efforts in cancer, clinical research and health outcomes and is the world's scientific headquarters for bioelectronic medicine.

**EDITORS' NOTE** Dr. Sangeeta S. Chavan is a professor at the Feinstein Institutes for Medical Research and also serves as Associate Professor of Molecular Medicine at the Donald and Barbara Zucker School of Medicine at Hofstra/Northwell. Dr. Chavan received her Ph.D. in Immunology/Applied Biology from the University of Mumbai. Her doctoral studies were focused on understanding the role of immune cells in cancer. Prior to joining the Feinstein Institutes, Dr. Chavan completed her postdoctoral fellowships at the University of Massachusetts Medical Center and Northwell Health, where she studied molecular and cellular basis of changes in the immune system in response to pathophysiological challenges. Dr. Chavan's research is focused in the field of Bioelectronic Medicine, a new discipline that takes advantage of body's neural network to treat diseases without the use of pharmaceuticals. She is interested in understanding the molecular and functional basis of neural circuits that regulate various immune responses. Dr. Chavan leads a multidisciplinary team of investigators with expertise in electrophysiology, molecular biology, and cell biology, and carries out both clinical and pre-clinical studies with the focus on identifying novel therapeutic strategies for treatment of inflammatory conditions. Research carried out by her group have paved the way for recent successful clinical trials using electrical vagus nerve stimulation as a therapeutic strategy for rheumatoid arthritis and inflammatory bowel disease. Dr. Chavan has published nearly 80 peer-reviewed papers and book chapters. She has been invited to speak at multiple national and international scientific meetings, and has organized and chaired scientific sessions. In addition to her research efforts, Dr. Chavan serves on the editorial boards of Molecular Medicine and Bioelectronic Medicine, and as an ad-hoc reviewer for a number of journals.



Sangeeta S. Chavan

**Will you provide an overview of the Feinstein Institutes for Medical Research and your main area of focus?**

Feinstein Institutes for Medical Research is the research arm of Northwell Health, the largest health system in New York with 70,000 employees. Our 5,000 researchers and staff have made significant discoveries across a range

of fields including bioelectronic medicine, sepsis, cancer, and autoimmune, psychiatric and neurodegenerative disorders. In addition to pre-clinical research, Feinstein researchers are also involved in more than 2,500 clinical studies. These studies result in more than 1,300 peer-reviewed papers per year in high-profile journals, and many patent applications.

My research is focused on understanding the role of the nervous system in regulation of immune responses. Specifically, I am interested in mapping

neural circuits that control immune responses, with the hope of identifying novel molecular targets and therapeutic strategies for the treatment of inflammatory and metabolic diseases.

**How has technology impacted the way research is being conducted?**

The field of biomedical science has clearly evolved over the years. For example, advances in molecular biology now allow us to understand the changes in cells at a molecular level, whereas developments in microscopy let us take a look at a single cell as well as interaction between different cells. Scientific developments allow us to listen to the signals transmitted in the nervous system, quantify these, and modulate using different stimulation modalities. These advances in technology has helped us to study different organ systems in our body in silo or together.

When I started my graduate studies, the nervous system and the immune system were considered to be two independent systems. There was no direct evidence that the immune system could be controlled by neural reflexes. The technological advances in the fields of neuroscience and immunology has now enabled us to study the interaction between these two important physiological systems and help us to understand how these different organ systems interact and regulate each other at both cellular and molecular levels.

**How critical is it for you to be a part of a health system that places such a major focus and commitment around research?**

It is extremely important to have a supportive environment to be productive at your work place. Active research at the healthcare system is important as it benefits researchers, as well as patients, by virtue of wider treatment options and opportunity to be included in clinical trials.

Leadership at Northwell Health advocates this and supports research efforts both in labs and clinic. Feinstein researchers are encouraged to produce knowledge to cure disease. Due to this major focus and commitment to research, the environment at Feinstein is extremely collaborative, enabling open collaborations between clinicians and scientists, that have resulted in many clinical studies based on observations made in the lab.

**You also teach at the Zucker School of Medicine at Hofstra/Northwell. Will you discuss your passion for teaching and mentoring next generation coming into the industry?**

In addition to my research programs, I am actively involved as a mentor for both undergraduate and graduate students. We have three different graduate programs here at the Feinstein Institutes. Two of the programs are run by the Medical School; the first one is a combined M.D.-Ph.D. degree program that allows students to earn both the M.D. and the Ph.D. in areas pertinent to medicine. The second is a Ph.D. program that offers highly qualified students an opportunity to pursue their graduate studies. The third program is funded by Elmezzzi Graduate School of Molecular Medicine and trains physician-scientists. These programs provide opportunities to conduct state-of-the-art research and are designed to develop outstanding scholars for careers in research. I have been involved in these programs as a mentor for many years now, and that has been one of the most rewarding experiences of my job. It has provided multiple opportunities to discuss scientific advances and challenges with these bright minds. I am excited to work with my students and expose them to different avenues of science and help them to meet their goals.

**Is it hard to be patient when your research is working on issues that take a long-term focus and commitment?**

It is hard because we know that it is going to take a long time to see our research benefit patients directly – but research is never about a quick answer. A successful research project requires commitment, perseverance and patience. I am extremely patient when experiments are in progress, but as the project nears completion, I become impatient to know the results. It is very rewarding overall, but you have to be patient and committed towards your work. ●