

Bioactive lipids: The hidden superheroes

When we talk about lipids, we usually think of dietary triglycerides and cholesterol and their association with cardiovascular disease. But lipids are so much more than a cause for another health concern. Did you know that lipids play a very important role in cell metabolism and cell function in general? The story of the study of lipids is a long and interesting one that dates back to the 15th century. In the 20th century several Nobel Prizes have gone to scientists working on various interesting aspects of lipids.

The word lipid has its origins in the Greek term lipos, meaning fat. The term was first introduced by a French pharmacologist, Gabriel Bertrand. Lipids play an important role in the body. They help in storing energy, are a crucial structural component of cell membranes, and help in signaling (which is how a biological cell responds to external stimuli).

Dr. Siddhesh Kamat works specifically with bioactive lipids, which are important compounds that help in regulating various important functions in the human body. Bioactive lipids are compounds that bind themselves to important cellular proteins (e.g. receptors, channel proteins) and help in bringing about biological effects dealing with the cell's metabolism and signaling. Any disruption in the homeostatic levels of these bioactive lipids in the human body often leads to diseases. The focus of Dr. Kamat's work is trying to understand how the bioactive lipids communicate signals in normal health and why dysregulation in their metabolism causes diseases. Dr. Kamat's lab works with a particular type of bioactive lipid called lysophosphatidylserine or lyso-PS. His work has helped identify how the disruption of lyso-PS leads to various neurological and autoimmune disorders and especially worked out how this lipid causes a human neurodegenerative disorder called PHARC (an acronym for Polyneuropathy, hearing loss, ataxia, retinitis pigmentosa, and cataract). His work on lyso-PS lipids has also shed light on how this bioactive lipid is important in the functioning of our immune system. Additionally, Dr. Kamat's lab has also shown how bioactive lipids are involved in eliminating disease-causing pathogens and various allergens from the human body. Overall, his lab's work on lyso-PS lipids has led to the interesting conclusion that there is potential crosstalk happening between the brain and the immune system in the body.

Lipidomics began emerging as a discipline in 2003 and as the name suggests, it involves the comprehensive study of all cellular lipids on a large scale using analytical chemistry principles and technologies such as mass spectrometry. Besides studying bioactive lipids, from a technological standpoint, Dr. Kamat's lab has also developed cutting edge mass spectrometry based lipidomics technologies to profile the complete array of cellular lipids. These lipidomics technologies are now becoming very popular across various disciplines of biology to quantitatively measure diverse lipids and understand their association with human health and disease.