Dr. Seetharama Jois

Dr. Seetharama D. Jois is a Professor of Cancer Immunology and Computation & Structural Biology, Department of Pathobiological Sciences, School of Veterinary Medicine at Louisiana State University. Before this, he worked as a professor of Medicinal Chemistry in the School of Basic Pharmaceutical and Toxicological Sciences, College of Pharmacy, University of Louisiana at Monroe for 17 years. His research philosophy is to investigate life processes at a molecular level and use fundamental and applied research to improve human health. Proteins interact with each other in a highly specific manner, and these specific interactions play key roles in many cellular processes. In normal life processes, these protein interactions are well coordinated to perform the functions of the cells. Any deregulation of this process can lead to the development of many diseases. His current research is on epidermal growth factors (EGFR)-related non-small cell lung cancer (NSCLC).

Human epidermal growth factor receptors (EGFRs) are known to form homo and hetero-dimers on the cell surface to carry out the signal transduction process—however, dysregulation of the protein expression or mutation results in enhanced dimerization, leading to different cancers. There are four EGFR receptors namely, EGFR or HER1, HER2, HER3 and HER4. Both homo- and hetero-dimerization of receptors within this family lead to downstream signaling. So far, eight EGFR ligands have been reported. How the ligand binding induces conformational changes in EGFR extracellular domain is elucidated. In cancer there is aberrant signaling of EGFR receptors either by gene amplification/protein overexpression or by mutation of the receptors. Current treatments for EGFR overexpressed cancer types include antibodies, tyrosine kinase inhibitors (TKIs), which inhibit downstream signaling by directly impairing EGFR tyrosine kinase activity. However, many patients have tumors that become non-responsive to TKIs, thus demanding the need for new treatment strategies in EGFR-driven tumors. We have developed some peptidomimetics to target dimerization of these receptors. The structure of each domain of EGFR is studied independently by different methods such as X-ray crystallography, Nuclear magnetic resonance and recently by Cryo-electron microscopy. This presentation covers details of structural aspects of the four receptors. A brief overview of our research on targeting EGFR and HER2 is covered. This research is supported by R01 funding (5R01CA255176) from the National Cancer Institute of the National Institutes of Health (SJ & DB).