Biographical Sketch of Shanta Messerli

Dr. Shanta Messerli's research efforts have been focused on the general theme of neuronal injury and repair. This has involved studying chemical toxicity and mechanical damage to neurons, possible therapies for neuronal tumors, as well as mechanisms of resistance of tumors to chemotherapeutic drugs. Her current research includes development and testing of signal blocking therapeutics to treat a variety of tumors whose growth depends on the kinase PAK1, including those associated with neurofibromatosis type 2 (NF2). In addition, she is examining the role of multidrug resistance (MDR) transporters in development of resistance to chemotherapeutic drugs. A better understanding of the molecular and cellular mechanisms underlying neuronal injury and repair will provide insight into the development of new therapies for neurological diseases. This work will provide valuable insight into the use of signal blocking therapeutics as a means to treat a variety of neurological disorders.

Along with the development of new therapies, Dr. Messerli is working with the Biocurrents Research Center to develop novel extracellular sensors to measure exchange of physiologically relevant analytes at the surface of cells. This includes development of new methodologies to measure analytes in the microdomains between adjacent cells in tissues, such as between tumor cells within a tumor. The primary initial goal is to measure changes in H^+ activity in the intercellular space of xenograft tumor models before and after drug treatment. It is thought that acidification in the core of tumors protects these cancers from the primarily, weak base, chemotherapeutic drugs. We are currently comparing the use of functionalized nanoparticles and expressible indicators as putative extracellular sensors. The goal is to develop fluorescent indicators to measure concentrations of a variety of extracellular analytes such as pH, inorganic ions and free radicals, which serve as an alternative to currently used electrochemical methods. This work will provide valuable insight into novel methods for monitoring the physiology of single cells and tissues.