SPECIAL SECTION GUEST EDITORIAL

Chemical and Genetic Sensors in Biomedical Research

Chemical and genetic sensors are the cardinal elements in molecular imaging and analyses of normal and pathophysiological processes at the cellular and molecular levels. Diverse molecular designs with unique optical signatures have been designed and are currently used to sense the presence and activity of molecular targets that characterize specific biological processes. These have been used to probe human diseases, explore the mechanisms of pathogenesis, monitor drug efficacy, discriminate healthy from diseased tissues and assess therapeutic outcomes. These applications deploy the molecular sensors over a range of scales from microscopy and subcellular resolution to optical tomography of entire organisms. Development of these probes and methods for their analysis typically involve multidisciplinary teams that have assembled to address specific biological questions. In this special section, we have collated nine significant and exciting papers involving chemically or genetically designed molecular sensors with optical signatures that have been used in biomedical research. These papers address different aspects of contrast-mediated molecular imaging and photodynamic therapy, including studies performed with bioluminescent enzymes, photoproteins, receptor-specific probes, quantum dots, nanoparticles, and photodynamic therapy agents. As molecular medicine becomes the mainstay of future medical practice, there will always be a need for the development of molecular probes that respond to specific molecular processes. We thank all contributing authors for their efforts in preparing the manuscripts.

We have attempted to review each submission with rigor and have made great efforts to bring comprehensive and thorough articles to the reader. However, Dr. Contag did not review, read, or comment on the manuscript entitled "Advantages of multicolor flourescent proteins for whole-body and *in vivo* cellular imaging."

Samuel Achilefu, Ph.D.
Washington University
School of Medicine

Christopher H. Contag, Ph.D.
Stanford University
School of Medicine

Alexander P. Savitsky, Ph.D.
Russian Academy of Sciences

Ralph Weissleder, MD, Ph.D.
Harvard Medical School