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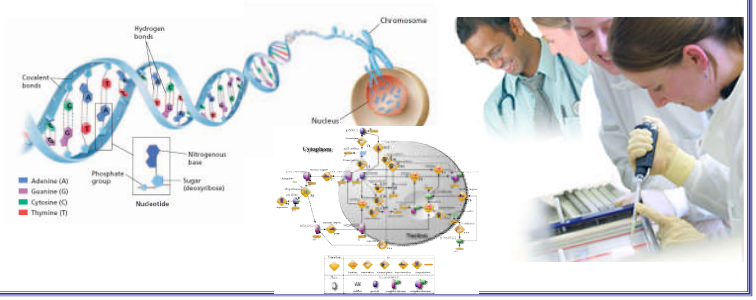
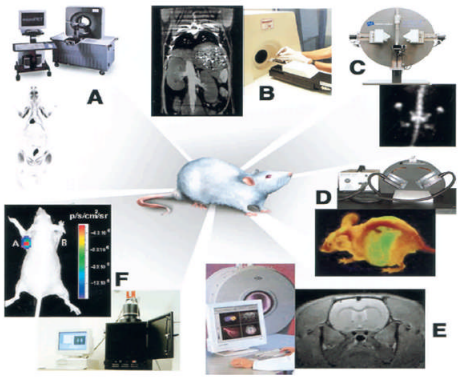
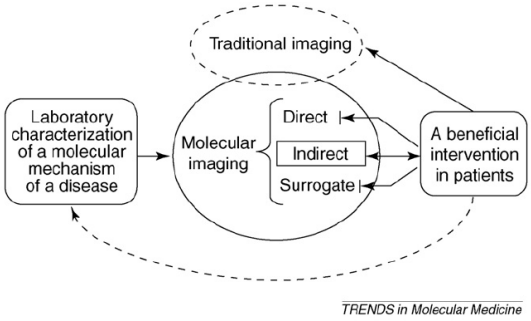
Overview

Molecular imaging is a rapidly emerging field, providing noninvasive visual quantitative representations of fundamental biological processes in intact living subjects. Fundamental biomedical research stands to benefit considerably from advances in molecular imaging, with improved molecular target selection, probe development and imaging instrumentation. The noninvasiveness of molecular imaging technologies will also provide benefit through improved patient care. Molecular imaging endpoints can be quantified, and therefore are particularly useful for translational research. Integration of the two disciplines of molecular imaging and molecular medicine, combined with systems-biology approaches to understanding disease complexity, promises to provide predictive, preventative and personalized medicine that will transform healthcare. In the past, our researches are focused on developing several novel approaches, such as novel molecular probes and reporter genes, in the molecular-genetic imaging, molecular-targeting imaging, in vivo cell trafficking imaging and in vivo molecular interaction imaging. These approaches will be to provide the potential for: (i) understanding a living subject abnormal biology in a more rapid and noninvasive manner, and with less labour than is the case with conventional pathology- or clinical chemistry-based assays; (ii) earlier detection and characterization of disease and its pathogenesis and (iii) rapid assessment of therapeutic effectiveness at a molecular level, long before phenotypic change. In our laboratory, we utilize these developed approaches to investigate the molecular pathology and to create the imaging tool for early diagnosis in cancer, cardiovascular disease, neurosciences and inflammation diseases.







Research Projects

•Investigation of the Impact of Intermittent Hypoxia in Glioblastoma Multiforme Progression and Resistance to Radiation Therapy
•Development of an Optimal TKGFP Fusion Reporter Gene for Use in Translation Medicine in Molecular-Genetic Imaging
•The Impact of Acute and Chronic Hypoxia in Radiosensitivity in Glioblastoma Multiforme Progression
•Imaging the HIF-1 Signal Transduction Activity and Tumor Cell Trafficking in Breast Cancer Progression
•Molecular imaging assessment of the impact of NMDA receptor-mediated neurotransmission on rejuvenation of the aging brain
•Development of SPECT and PET agent for targeting on the NMDA receptor glycine-site in humans and in rodents
•Molecular imaging assessment of the role of SDF-1/CXCR7 in modulating post-ischemic angiogenesis driven by endothelial progenitor cells
•Investigation of Molecular Mechanisms of Eosinophil Cationic Protein Targeting and Activation in Allergic Inflammation
•Molecular Imaging Assessment of the Mechanism in Biomaterial-mediated Tissue Regenerations

Publications (2008-2011)

•Hsieh CH, Chen FD, Wang HE, Hwang JJ, Chang CW, Lee YJ, Gelovani JG, Liu RS. Generation of Destabilized Herpes Simplex Virus type 1 Thymidine Kinase as Transcription Reporter for PET Reporter Systems in Molecular-Genetic Imaging. J Nucl Med. 2008 Jan;49(1):142-50.
•Hsieh CH, Kuo JW , Chang CW, Lee YJ, Gelovani JG, Liu RS. Construction of mutant TKGFP for real-time imaging of temporal dynamics of HIF-1 signal transduction activity mediated by hypoxia and reoxygenation in tumors in living mice. J Nucl Med. 2009 Dec;50(12):2049-57.
•Hsieh CH, Lee CH, Liang JA, Yu CY, Shyu WC. Cycling hypoxia increases U87 glioma cell radioresistance via ROS induced higher and long-term HIF-1 signal transduction activity. Oncol Rep. 2010 Dec;24(6): 1629-36.
•Wu CP, Hsieh CH, Wu YS. The Emergence of Drug Transporter-Mediated Multidrug Resistance to Cancer Chemotherapy. Mol Pharm. 2011 Jul 26.
•Hsieh CH, Chang HT, Shen WC, Shyu WC, Liu RS. Imaging of the impact of Nox4 in cycling hypoxia-mediated U87 glioblastoma invasion and infiltration. Mol Imaging Biol. 2011 Aug. Accepted.
•Hsieh CH, Shyu WC, Chiang CY, Kuo JW, Shen WC,, Liu RS. NADPH oxidase subunit 4-mediated reactive oxygen species contribute to cycling hypoxia-promoted tumor progression in glioblastoma multiforme . PLoS One. 2011 Aug. Accepted.