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Non-Invasive Imaging of Reporter Gene Expression and Viral Retargeting

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Non-invasive, repeated, quantitative imaging in whole animals to monitor biological processes, as opposed to structural features, has made great advances in the last five years. Optical techniques that employ fluorescence and bioluminescence, and radionuclide based techniques that utilize positron emission tomography (PET) and single photon emission tomography (SPECT) have been adopted into routine laboratory use by cell and molecular biologists, because of great gains in dedicated instrumentation and the development of new reagents. Our laboratory has utilized these technologies to measure reporter gene expression in tumor xenografts, virally delivered "cargo", and in transgenic animals. We have employed luciferase reporter genes for optical imaging of gene expression, and reporter genes that sequester positron-emitting ligands and substrates to image reporter genes with microPET instrumentation. Using these technologies, we have also measured – repeatedly, non-invasively and quantitatively – adenovirus untargeting from normal tissues and adenovirus retargeting to tumors by recombinant sCAR-EGF molecules and tumor-restricted expression following adenovirus vectors in which the COX-2 promoter drives reporter gene expression.

Profile: Distinguished Professor, Departments of Biological Chemistry and Pharmacology, Director for Basic Research, UCLA Jonsson Comprehensive Cancer Center. Research interests; molecular imaging, cyclooxygenase 2 biology, molecular biology of memory and learning.