EDITORIAL

A Picture Is Worth . . .

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The usual answer of course is "a thousand words," which is a little more than I have available for this editorial. Our new editor-in-chief, Steve Goodman, has created a Bioimaging section for the journal, and my task is to introduce you to the section and briefly explain its relevance to *Experimental Biology and Medicine*. Bioimaging in some ways represents the essence of the journal's mission, which is (roughly quoting from the journal itself) to publish multidisciplinary and interdisciplinary research in the biomedical sciences via articles that represent cutting-edge research at the overlapping junctions of the biological, physical, and engineering sciences. Bioimaging is certainly at those very "overlapping junctions" and in recent years has become a tool that bridges the investigative range from cellular components to animal models to humans—bench to bedside indeed. Bioimaging includes *in vivo* and *in vitro* measures of the structure and function of biological systems. The latter measures (nonstructural bioimaging) tend to fall into two broad categories: functional imaging, referring to direct observation of the consequences of cellular, organ, or system processes through changes in indirect parameters such as perfusion and metabolism; and molecular imaging, referring to imaging of specific cellular and molecular processes (e.g., measuring gene expression or complex protein-protein interactions, following trafficking and targeting of cells, imaging drug effects at a molecular and cellular level, or assessing disease progression at a molecular level).

Historically, there has been a substantial gulf between *in vitro* use of imaging to understand the molecular pathways of normal and abnormal cellular processes and the *in vivo* human imaging of surrogates of the consequences of those pathways (e.g., perfusion and metabolism). Small animal imaging was often primarily a matter of converting living tissues to postmortem samples for invasive monitoring techniques (e.g., autoradiography). The advent of the techniques delineated above has dramatically narrowed this gulf and now allows monitoring of some very detailed cellular processes in living systems, including cell signaling and protein expression.

Recently there have been substantial developments in molecular imaging probes for optical, nuclear (positron emission tomography [PET] and single photon emission computed tomography [SPECT]), magnetic resonance imaging (MRI), and ultrasound imaging techniques. This progress coupled with developments in instrumentation now provide *in vivo* tomographic imaging of those probes over the spatial scale from genetically engineered mice to nature's experimental laboratory of human pathology. Bioimaging (and specifically molecular imaging) is one of the major disciplines that will help convert the human genome basic science revolution into the molecular medicine era we anticipate. This is because it represents a primary mechanism to determine the phenomic expression of the genome in living systems via reporter genes, enzyme expression, neurotransmitters (receptor labels), and other mechanisms. Molecular imaging also plays a critical role in drug discovery and development because it can directly quantify movement and bioavailability of drugs (pharmacokinetics) as well as assess their therapeutic and toxic effects on living systems (pharmacodynamics), and can do so in both animals and humans longitudinally.

For these reasons EBM has decided to devote a section to bioimaging. It is our goal to attract high-quality manuscripts that focus on both cutting-edge technological advances in bioimaging and on their use to advance our understanding of biological systems. We look forward to publishing papers from both the *in vitro* and *in vivo* worlds of bioimaging and from time to time including invited reviews to assist in the education of our readership on the application of these techniques to their research. We would appreciate both your contributions and your comments on this new section.

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