

# Functional and Molecular Imaging: Key Components of Personalized Healthcare

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### *Abstract—*

The ongoing revolution in biomedical imaging has produced technologies capable of depicting both tissue structure and function with high fidelity. Advances in nuclear medicine, magnetic resonance imaging, computed tomography and optical imaging facilitate multimodality, multiscale imaging ranging from display of gross pathology to the products of gene expression. Use of multiple modalities also permits a multi-dimensional look at tissues, based on the way in which they interact with X-rays, magnetic fields or sound waves, as well as how they metabolize a variety of components.

The convergence of biomedical imaging with bioengineering, genomics and bioinformatics is creating a climate in which “personalized healthcare” becomes feasible. Sophisticated analysis and combination of imaging and genomic data enhance our ability to: (1) predict the lifetime risk of an individual's developing a given disease; (2) direct the disease in its pre-clinical phase; (3) diagnose the disease thoroughly, down to its molecular level, (4) treat the disease minimally invasively; and (5) monitor the effectiveness of treatment.

This presentation will showcase the tools of functional and molecular imaging and demonstrate how they can be used for personalized healthcare.

### **Bio-**

**Dr. Steve Seltzer** has been the Chairman of the Department of Radiology at Brigham and Women's Hospital and the Philip H. Cook Professor of Medicine at Harvard Medical School since 1997. He also currently serves as Chairman of the Board of Trustees of the Brigham and Women's Physician Organization. Dr Seltzer received his baccalaureate and medical degrees from the University of Pennsylvania. He did his Radiology Residency at the Peter Bent Brigham Hospital from 1976 to 1980, and joined the Brigham Faculty immediately afterwards. His clinical interests are in the field of abdominal imaging, particularly advanced applications of helical CT. His research interests are in the arena of perception and psychophysics, focusing on improving our understanding of how radiologists detect, locate and classify abnormalities on diagnostic images.

Active in many radiological organizations, Dr. Seltzer is a past President of the Association of University Radiologists. In 2001, he completed a 3 month stint in Washington, DC as Special Assistant to the Director of the Biomedical Imaging Program at the NIH, National Cancer Institute. The focus of his stay there was on the optimization of the American College of Radiology Imaging Network, and the growth and development of the National Institute of Biomedical Imaging and Bioengineering.