

Maroney-Bryan Lecture

Dr. Bruce R. Rosen

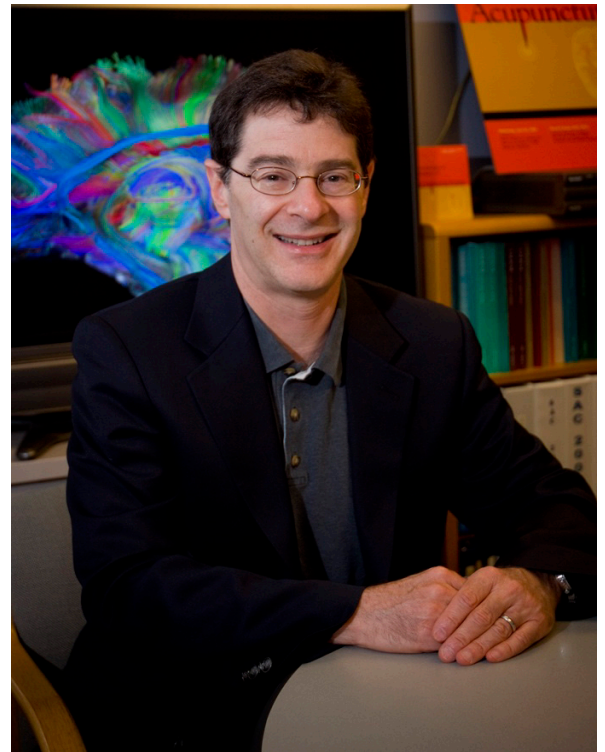
April 18, 2014 4:00 PM
1005 Genome and Biomedical
Sciences Facility

Functional Molecular Imaging with MR-PET

The field of molecular imaging has grown at a rapid rate in recent years, as imaging technologies enable ever-finer examination of the human brain and other organs, and as clinicians and researchers alike seek to understand the mechanisms that underlie conditions such as cancer, heart disease, brain disorders and diabetes. Early detection of disease and monitoring of potential therapeutic interventions requires technology sensitive to the subtle changes that occur at the cellular and molecular level.

PET and MRI are widely used in vivo for both clinical and research applications. Used with novel MR, nuclear, and multimodal probes, these imaging modalities have begun to revolutionize the types of questions that can be asked in vivo, permitting examination of physiological and pathological functions in living cells, tissues, and organs at their most basic level. Used in combination, the individual strengths of MRI and PET can inform one another to yield new insights that expand the types of physiological information that can be gained through in vivo imaging and thus also expand the impact of human health imaging by enlarging the window of anatomical size, time scales, resolution, sensitivity, and specificity of detection for which imaging is currently used.

Combined MR-PET imaging technology allows investigators to employ the benefits of MRI such as phased array coils for high speed, high resolution functional imaging, while simultaneously acquiring quantitative metabolic or receptor-specific neurochemical data. Simultaneous MR-PET imaging has the distinct advantage of spatial co-registration of biochemical function with anatomical structure. Perhaps more importantly, MR-PET allows researchers to temporally co-register physiological data using PET and functional MRI (fMRI), such that the hemodynamic information from fMRI may be used to feed quantitative analysis of PET data. Using this information, researchers can understand the interplay between blood flow, receptor occupancy, and metabolism—as well as the contributions of each in disease and therapy response. As such, combined MR-PET has significant clinical potential to impact not only all aspects of patient care, from screening to disease assessment and therapy monitoring, but also to lead to new dual-modality MR-PET probes that can provide complementary information for precise quantitative assessment of biological function not obtainable in other ways.



Dr. Rosen is Professor of Radiology at the Harvard Medical School and Professor of Health Science and Technology at the Harvard-MIT Division of Health Sciences and Technology. He is Director of the Athinoula A. Martinos Center for Biomedical Imaging at Massachusetts General Hospital.

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1005 GBSF UCD Campus
4:00 PM Lecture
5:00 PM Reception

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