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Professor of Radiology
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Research Students and Postdocs in Molecular Cancer Imaging

The Bioengineering & Nanomedicine Program https://sites.google.com/view/benmd of Massachusetts General Hospital and Harvard Medical School has been trying to solve an important clinical problem, "curing cancer," by applying first principles from chemistry and engineering. For this goal, we have a multi-disciplinary team of researchers and physicians including chemists (organic and polymer), engineers (biomedical, mechanical, optical, and software), biologists (biochemistry, cancer biology, immunology, immuno-oncology), physicists (laser physics), and surgeons (gastrointestinal, oncology). This is a very unique environment, where experts from several fields come and work together to achieve the same goal.

Our research is focused on the development of new targeted agents for diagnosis, staging, and treatment of human diseases, especially cancer, using state-of-the-art molecular imaging technology and relevant animal models. Our approach from the phenotypic tissue level screening (mode of action) to the microscopic observation to find cellular level targets (mechanism of action) is rather practical because it is based on the quantitative structure affinity relationship design and in vivo feedback. Since this has been an excellent strategy that has served us productively, we will continue to use this approach to design new therapeutic agents using artificial intelligence by the machine learning process to prepare the first-in-human clinical trials of selected agents in the current application.

Researchers will work closely with chemists, engineers, and surgeons to develop and optimize novel targeted contrast agents using multi-disciplinary approaches. Their responsibilities in the laboratory will include the design of novel fluorophores and targeting drugs, including synthesis, purification, characterization, and conjugation with biomolecules. Students also will work with engineers on building imaging devices and software for intraoperative imaging.

Our bench-to-bedside program uses cultured cancer cells and relevant small (mice, rats) and large (pigs) animal models of cancer and metabolic, cardiovascular, and neurodegenerative diseases for preclinical testing of our novel contrast agents and therapeutics. In this program, researchers will be trained in sterile cell culture technique, cell-based assays, immunoassays, and histological analysis using state-of-the-art molecular imaging, as well as animal handling, real-time intraoperative imaging, and image-guided animal surgery. Researchers will also be involved in efforts to assess the early-stage pharmacokinetics, pharmacodynamics, and toxicology of our novel targeted agents, which would be required to advance our candidate therapeutics to the clinical phase.

Highly motivated 2-3 exchange students or postdoctoral fellows who are interested in translational research are encouraged to apply. We welcome candidates who have a solid background in, but are not limited to, chemistry, biology, or engineering with motivation and fostering enthusiasm for clinical research.