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Quantitative image-based phenotypes for cancer metastasis systems biology

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11:45 am – SMBB Auditorium (2650)
Sorenson Molecular Biotechnology Building (USTAR Bldg) - 2nd Floor

Bio: Joel S. Bader, Ph.D., is Professor of Biomedical Engineering at Johns Hopkins University and Interim Director of the High-Throughput Biology Center at the Johns Hopkins School of Medicine, with secondary appointments in Computer Science and Human Genetics. Prior to joining Johns Hopkins, Dr. Bader was employed by CuraGen Corporation (1995-2003) and is co-inventor of the Roche/454 Genome Sequencer. Dr. Bader has a Ph.D. in Theoretical Chemistry from U.C. Berkeley (1991), where he was an NSF Predoctoral Fellow, and performed post-doctoral research at Columbia University (1992-1995). Dr. Bader has a B.S. in Biochemistry from Lehigh University (1986, Phi Beta Kappa, Tau Beta Pi).

Abstract: The overwhelming majority of deaths from cancer are attributable to metastasis, rather than growth of the primary tumor. In breast cancer, metastatic recurrence can occur years to decades after apparently successful surgery. Current methods do not allow individualized assessment of metastatic recurrence risk nor do they offer effective therapies for metastatic breast cancer patients. We are developing and applying methods to identify the basic mechanisms of metastasis. We will describe work with experimental partners using organoids, clusters of 300-500 primary mammary cells, to interrogate metastasis-related phenotypes. We will describe genes and pathways whose activation changes cellular behavior to create an invasive phenotype. We will also present results using spectral methods to convert images of organoid invasion into quantitative phenotypes representing the invasive boundary between the organoid and the surrounding matrix. We plan to use these methods in population studies to understand the genetic basis of metastasis and in well-defined model systems to validate candidate genes.