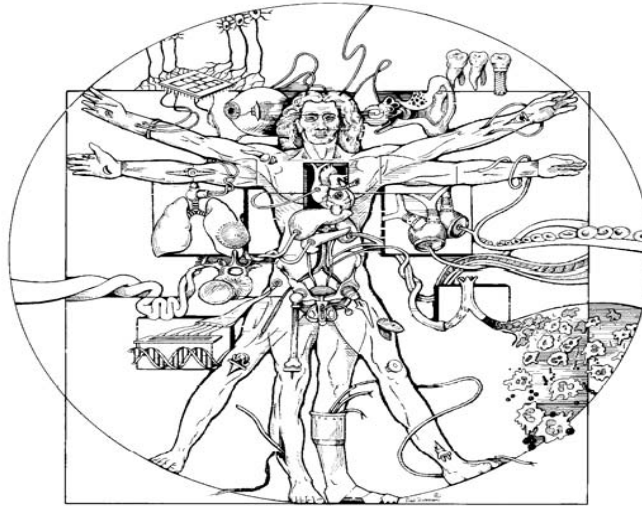


Biomedical Engineering Seminar



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“MicroBioengineering: Sensors for Microbial Contamination”

Abstract: Microbial contamination in foods, water and air, the recent threats of biological terrorism, and the emergence of such diseases as SARS and bird flu have emphasized the importance of quick, accurate and continuous assessments of microbial health hazards. Using a unique combination of leading-edge technologies, we have developed a hand-held, continuous, real-time monitor for detection of microbes, together with microbe capture technology for identification. Together these are capable of statistically sampling the environment for pathogens [including bacteria, fungi, spores and viruses] and exotoxins, identifying the specific pathogens/exotoxins, and determining cell viability. This system is sensitive enough to detect very low levels [~ 20 cells/cm² on surfaces or ~ 100 cells/50 mL solution] of microbes in minutes. Rapid, low-cost, disposable diagnostics for general pathogens are possible as are groups of functionally related pathogens, e.g., pulmonary pathogens, as well as specific pathogens. Diagnostics for multiple pathogens or groups of pathogens can be placed on the same platform, e.g., chip, which are capable of detecting and identifying microbial contamination on surfaces [e.g., foods, food preparation areas, medical areas] and in fluids [e.g., water, air, body fluids].

Detection of microbes is based upon intrinsic fluorescence of the cells and spores such as that from metabolites, amino acids, and other specific cell components. The multi-wavelength fluorescence detection device requires no reagents or sample contact and distinguishes viable cells, non-viable cells, and spores. This technology can detect bacterial spores inside mail and also ‘reads’ the diagnostics, employing pattern recognition algorithms for detection and pathogen identification.

The microbe capture technology which provides identification is based on molecular recognition of pathogenesis using iron acquisition and eukaryotic receptor adhesion strategies as well as peptide ligands produced by combinatorial chemistry methods. These non-antibody-based ligands are tethered to the sensor in a patterned array and statistically sample the environment. Pathogen identification is made based on which ligands are bound by microbes. Furthermore, these capture technology sensors can also be used for culture and other classical microbiological identification methods [e.g., PCR, ELISA].

Monday, September 24, 2007

2:00 pm

Keating 103

Host: Urs Utzinger, Ph.D. (626-9281)

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