Overview of the UC Davis Superfund Research Program

Biomarkers of Exposure to Hazardous Chemicals

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Research Projects

1: Transport and Remediation
- Developing microbial communities
  that possess remediation potential
  - Findings: Isolated a natural bacterium that degrades MTBE, a gasoline additive known to contaminate groundwater around gasoline stations

2: Biosensors
- Improving immuno- and bioassays with new and emerging nanotechnology
  - Findings: Phase matching of the excitation and the emission in the 2D arrays with particles produces a highly enhanced fluorescence signal

3: Immunochemical Biomarkers
- Developing immunoassays for chemical detection
  - Findings: Phase matching of the excitation and the emission in the 2D arrays with particles produces a highly enhanced fluorescence signal

4: Pulmonary Biomarkers
- Identifying peptide/protein adducts in urine, lungs and nasal cavities due to chemical exposure
  - Findings: TCC and its metabolites were measured in urine following exposure to TCC-containing bar soap

5: Cell-based Assays
- Developing cell lines with unique properties of responding to chemicals
  - Findings: Non-dioxin-like PGs, PBDEs, TCS and TBBPA are potent modulators of a common target, RyR1 and RyR2 (Ca2+ channels

6: Reproductive Biomarkers
- Developing and applying biomarker assays for evaluating human reproductive health
  - Findings: TCC induces androgen-like effects in male rats, such as increases accessory sex organ weight

7: Nanoscale Particle Remediation
- Developing tools to aid in evaluating the health effects of nanoparticles
  - Findings: Develops unique nanoparticles (GdO3, SiO) as a means to simulate exposure to similar materials for the purposes of tracking the translocation of these particles in the body while also determining dissolution rates

Support Cores

A: Analytical
- Develops analytical methods to detect hazardous chemicals for the variety of UCD-SRP projects
  - PBDEs, TBBPA
- Develops methods to detect the parent and key metabolites of chemicals to identify biomarkers of exposure
  - triclosan (TCS), triclocarban (TCC)
- Validates alternative analytical methods such as:
  - Immunochemical assays
  - Cell-based assays

B: Proteomics
- Identifies biomarkers of early response
- Develops and provides workflows for proteomics services including:
  - profiling of complex protein mixtures
  - analysis of posttranslational modifications

C: Training
- Provides trainees with:
  - research assistantships
  - non-resident tuition waivers
  - enrichment funds
- Provides investigators with support for SRP-related projects through hosting:
  - undergraduate researchers
  - visiting scholars
  - Fulbright scholars

D: Research Translation
- Organizes workshops for Trainees
  - Survival Skills Workshop for Young Investigators
- Organizes a Public Lecture Series
  - SAY-IT (Science and You-Informational Talk)
- Provides support for the UCD Entrepreneurship Academies
- Assists small business startups
- Hosts internship opportunities for undergraduate writing minor

E: Administration
- Fiscal support and management
- Grant application support
- NIH NRSA Fellowships
- SBIR/STTR
- Early Independence Award Program
- Seminar support:
  - Environmental Toxicology Series
  - Biotechnology Series
  - NIOSH Western Center for Agricultural Health and Safety

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