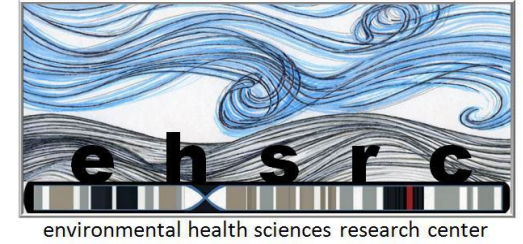


Exposure Science Facility

ENVIRONMENTAL HEALTH SCIENCES RESEARCH CENTER
THE UNIVERSITY OF IOWA



Facility Goal

The overarching goal of the Exposure Science Facility (ESF) is to:
facilitate the research efforts of EHSRC investigators as they seek to understand the external environmental stressors that adversely affect outcomes following an exposure.

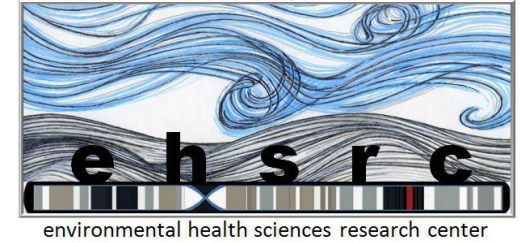
Facility Services

- Cost-effective instrumentation lending service
- Expertise in measuring and analyzing environmental contaminants
- Guidance on modeling and display of contaminants and affected populations

Facility Research

- Pulmonary and Dispersion Modeling
- Environmental Monitoring
- Environmental Contaminant Analytical Analysis

Personnel



Patrick O'Shaughnessy, PhD	Director
Hans Lehmler, PhD	Investigator
Ching-Long Lin, PhD	Investigator
Thomas Peters, PhD	Investigator
Jeonghyeon Ahn, PhD	Facility Coordinator

ESF Labs

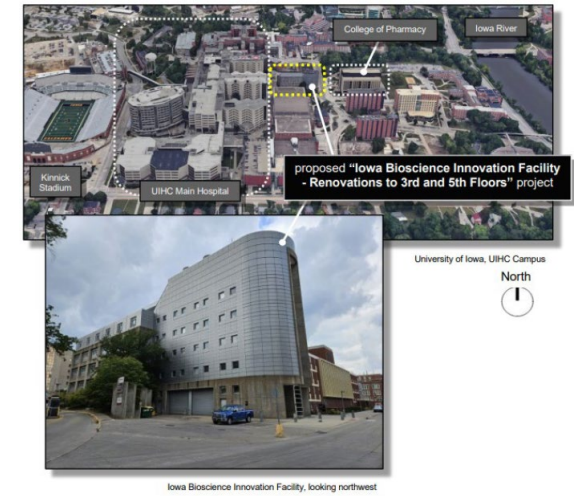


Exposure Science Laboratory

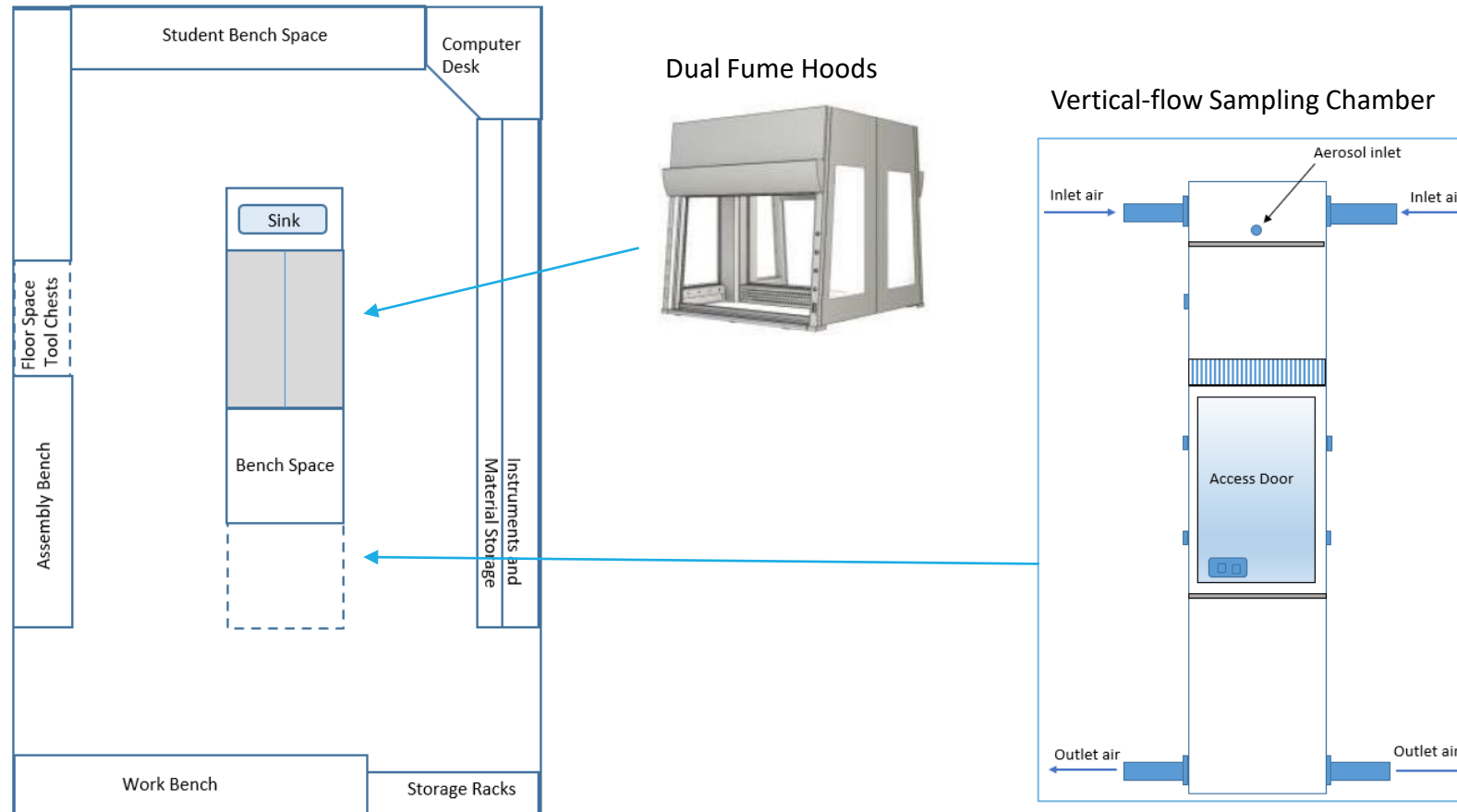
- Health Sciences campus
- Directed by Patrick O'Shaughnessy

Analytical Toxicology Laboratory

- Oakdale campus (will move the IBIF in 2026)
- Directed by Hans Lehmler



ESF Exposure Science Laboratory



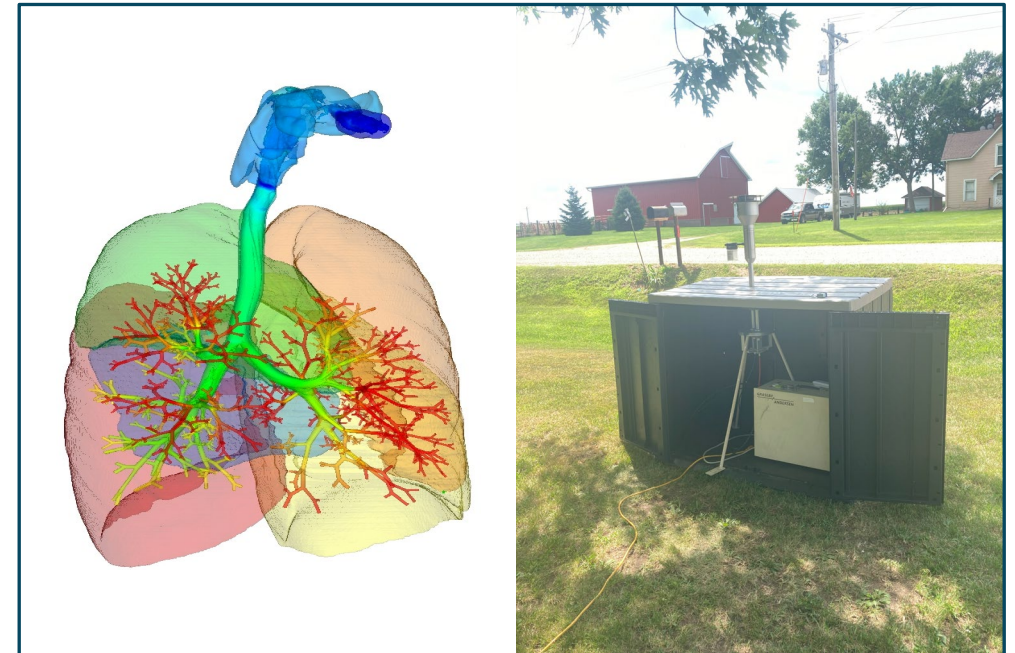
Instruments and Software

Sampling

- Aerosol Monitors
- Gas and Air Monitors
- Recording Devices and Computers

Modeling Software

- Plume Dispersion - AERMOD
- Computational Fluid Dynamics



Exposure Assessment Instruments

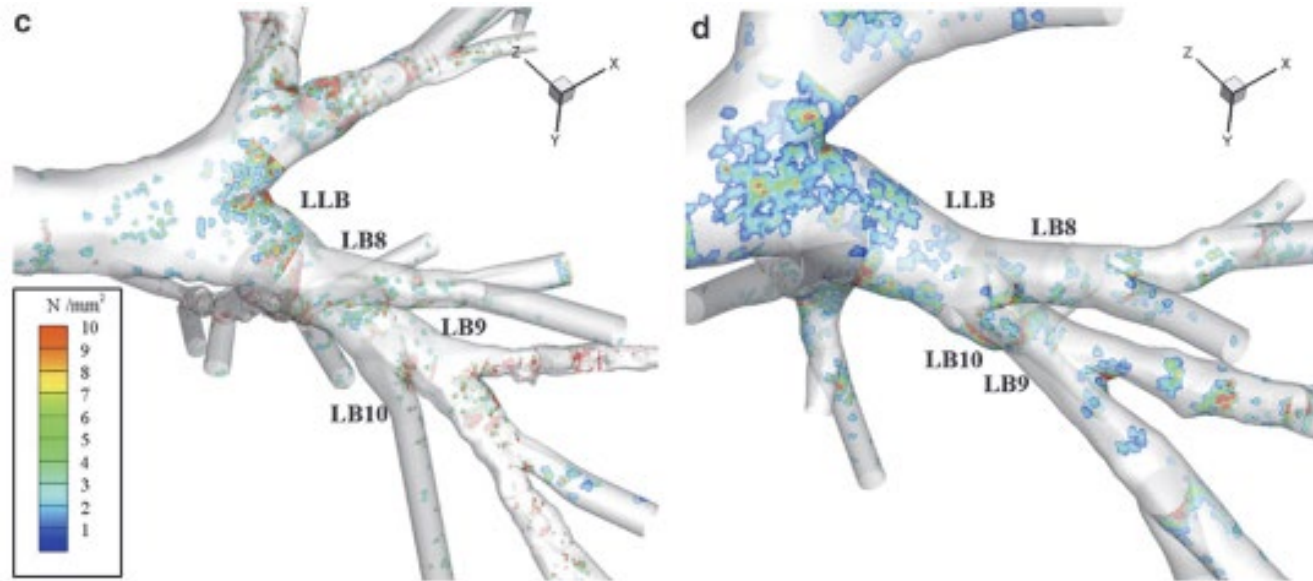
- Aerosol measurement
- Gas and air measurement
- Airflow calibrators and pressure sensors
- Meteorological stations
- Recording devices and computers
- Sampling Equipment

Computational Fluid Dynamics

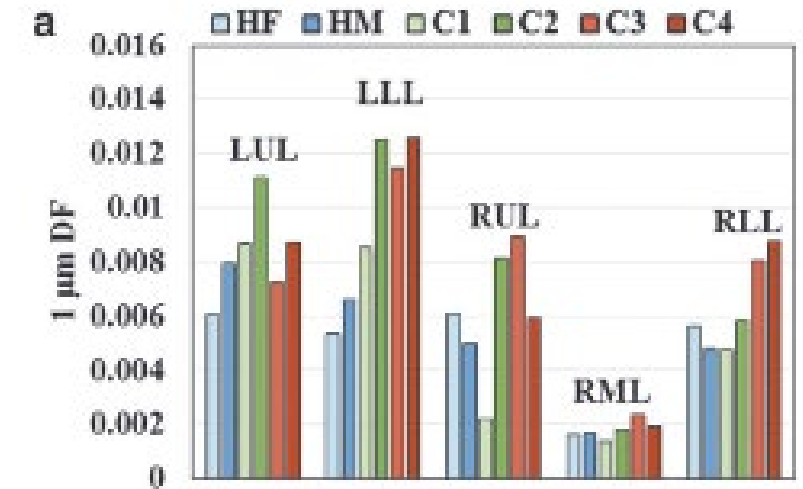
Dr. Ching-Long Lin



Asthma Imaging Cluster Analysis

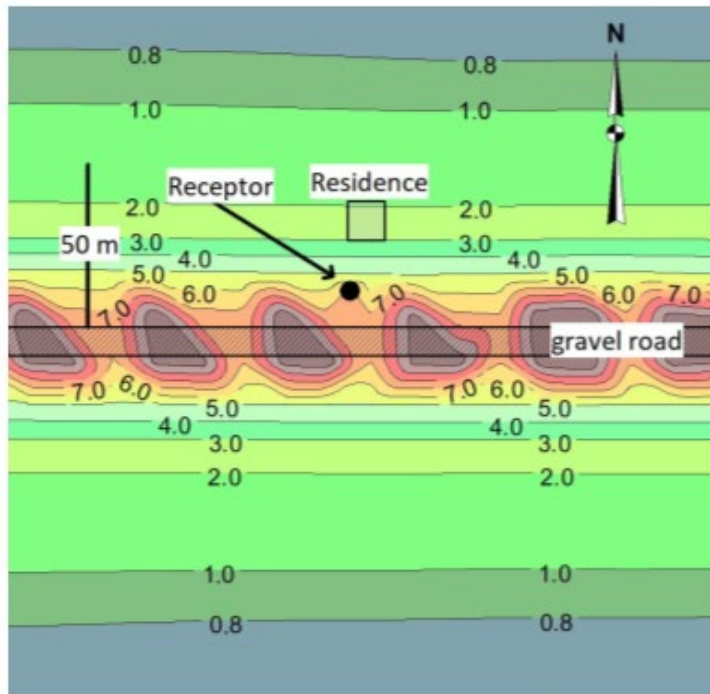


4 μm diameter particle deposition in two of four asthma clusters

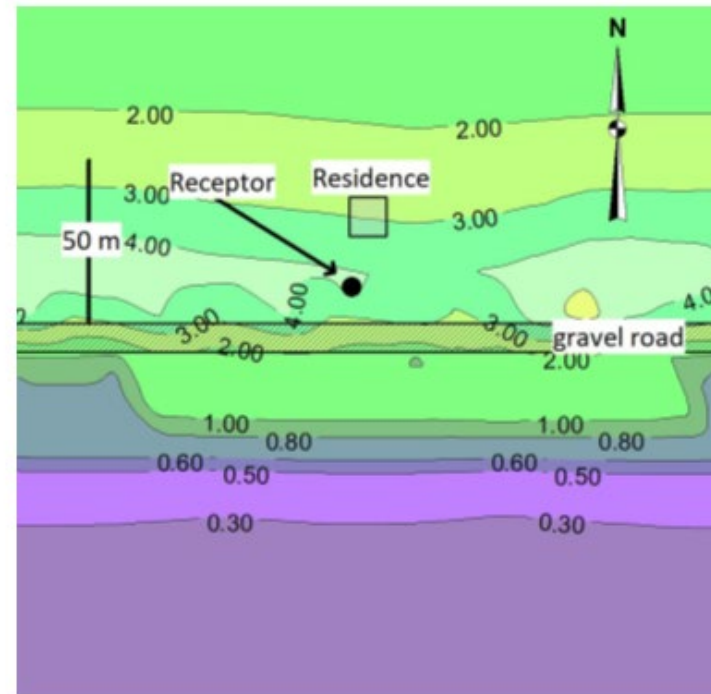


Regional deposition fraction relative to healthy subjects and asthma cluster type for 1 μm particle.

Dispersion Modeling



Wind speed: 1 mph
Wind direction: 225°



Wind speed: 10 mph
Wind direction: 225°

Ambient Sampling

Dr. Thomas Peters



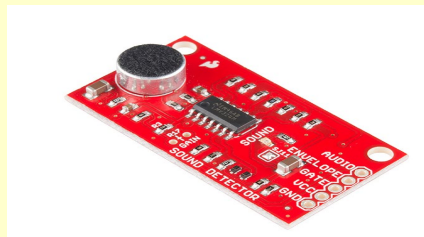
Optical particle counter
measures $PM_{2.5}$ and PM_{10} every
6 sec



Ultrasonic anemometer
measures wind speed and
direction



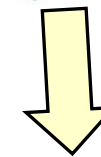
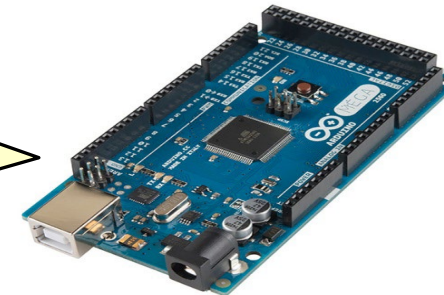
Camera takes pictures and
detects motion



Microphone measures sound levels

Microcontroller

Collects data and triggers camera



Storage

Data saved onto an
SD card

Ambient Sampling

PM Sampling Trailer

- Aerosol Monitors
- Weather Station
- Gas Monitors



Examples of Current Projects

Purple Air Monitors

- New study to demonstrate relationship between indoor air quality and pulmonary conditions
- New study to expand gravel-road research to demonstrate long-term PM concentrations



Examples of Current Projects

BPA and Surrogates

- New study to determine residential floor dust and airborne concentrations
- Emphasis on determining sources and efficient vacuuming techniques
- Collaboration between the two labs of the ESF



ESF Analytical Toxicology Laboratory and Expertise

HANS LEHMLER

ESF Analytical Toxicology Laboratory



Analytical Expertise

Individual PCB analysis (GC-ECD; GC-MS)

Individual PCB and OH-PCB analysis (GC-ECD; GC-MS)

Enantioselective PCB and OH-PCB analysis (GC-ECD; GC-MS)

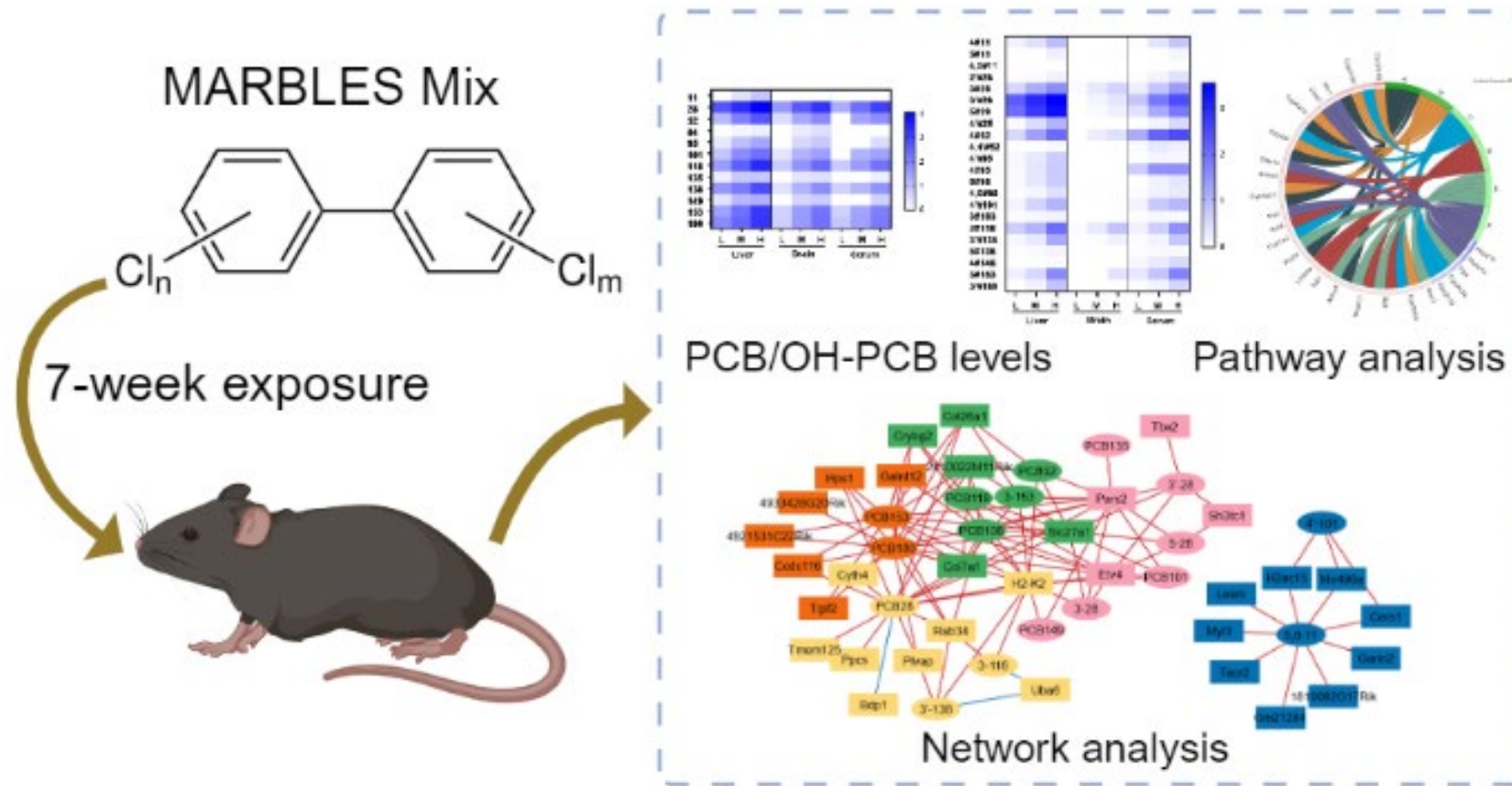
Congener specific PCB analysis (GC-ECD; GC-MS)

PAH analysis (GC-MS)

Pesticides analysis (GC-MS)

Nontarget analysis of PCBs and pesticides (LC-HRMS)

Interactions of Polychlorinated Biphenyls and Their Metabolites With the Brain Transcriptome of Female Mice



Bullert et al., 2024

Equipment Upgrades of the ESF Analytical Toxicology Laboratory



Agilent 7000E Triple-Quad GC-MS System



SCIEX Triple Quad 7500 LC-MS/MS System

