Overview

- Current project status
- Project design
- Questionnaires and other materials
- Project timeline
FOX Project - an exposure assessment pilot

Collaborators

- Biomonitoring California (CECBP)
- UC Irvine, Center for Occupational and Environmental Health
  - Leslie Israel, DO, MPH
- Orange County Fire Authority (OCFA)
  - Wellness and Fitness (WEFIT) Program

Funding - $75,000

- CDC Cooperative Agreement (Year 2)
- State special fund
Wellness & Fitness (WEFIT) Program

Components:
- Wellness and Fitness Medical Evaluation*
- Peer fitness trainers
- Rehabilitation
- Health and Fitness education

Oversight Committee
- Labor-management collaboration
- Letter of support

Firefighter liaison: Marty Driscoll

* Performed at UC Irvine
Project Aims

- Assess levels of ~40 chemicals in blood and urine collected from 50-100 firefighters in Orange County, California

- Measure a subset of these chemicals in dust from 3 Orange County fire stations
Project Aims (cont.)

- Develop and test protocols/procedures applicable to a larger firefighter study
  - Recruitment/enrollment
  - Exposure assessment questionnaire
  - Biospecimen collection/processing/shipping
  - Laboratory analyses
  - Report results to participants
  - Participant response to results
  - Lessons may apply to other occupational studies
Chemicals of Interest

Analysis by Environmental Chemistry Lab/DTSC

- Brominated flame retardants (PBDEs, etc.)
- Newer brominated flame retardants (DBDPE, etc.)
- Perfluorinated chemicals (PFCs)
- Polychlorinated biphenyls (PCBs)
- Organochlorine pesticides (DDT, hexachlorocyclohexane, hexachlorobenzene, etc.)
Chemicals of Interest

Analysis by Environmental Health Lab/CDPH

- Metals (Pb, Hg, Cd, As)
- Pesticide metabolites
  - Organophosphates (TCPy)
  - Pyrethroids (3-PBA)
- Polycyclic aromatic hydrocarbon (PAH) metabolite (3-Phen)
Project Design Components and Funding Sources

- Focus group and individual interviews to evaluate project materials
- Recruitment/Informed consent/Enrollment
- Exposure questionnaire
- Biospecimen (blood and urine) collection, processing and shipping
- Biospecimen chemical analysis – Biomonitoring California labs

Green = CA special fund
Purple = CDC coop agreement
Project Components (cont.)

- Fire station walk-through with checklist
- Fire station dust collection and analysis
- Data analyses /Report generation
- Results report-back
  - Online survey to assess understanding

Green = CA special fund
Red = In-kind support
<table>
<thead>
<tr>
<th>Field Testing</th>
<th>Data Collection</th>
<th>Results Reporting</th>
<th>Participant Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Firehouses</td>
<td>UC Irvine</td>
<td></td>
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<tr>
<td>Firefighter focus groups &amp; interviews</td>
<td>Firehouse dust collections (n=3)</td>
<td>Enrollment</td>
<td>6-9 months Receive some results by mail (metals, nonpersistent chemicals)</td>
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<tr>
<td>Test biosample collection and handling protocols</td>
<td>Firehouse exposure source checklist</td>
<td>Blood and urine collection</td>
<td>18 months Receive balance of results by mail (persistent chemicals)</td>
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<tr>
<td></td>
<td></td>
<td>Exposure assessment questionnaire</td>
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<td></td>
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<td>Study evaluation questionnaire</td>
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<td>Medical record abstraction</td>
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<td>Online survey after receiving second set of test results</td>
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**FOX Project Design**

* UC Irvine and CECBP
Peer Evaluation of Project Materials

Focus group discussions or interviews

- Firefighters from Orange County Fire Authority
  - May or may not subsequently become FOX biomonitoring participants
  - Timeline - June/July 2010

- Objectives:
  - Review document content and style
  - Evaluate comprehension of test results report-back materials
Inclusion criteria
- Firefighter employed by OCFA ≥1 year
- Scheduled for routine Wellness & Fitness (WEFIT) exam September through December 2010

Recruitment - flyer
- Electronic reminder for WEFIT appointment
- Fire stations
- OCFA newsletter

Participants consented & enrolled at beginning of WEFIT appointment
Project Design: Informed Consent

- Participant is given choice to:
  - Participate in the FOX Project
  - Receive individual results
    - In addition to summary findings
  - Donate unused blood and urine samples along with de-identified personal data for future studies

- Participants will be compensated
Exposure Questionnaire

- **Purpose** – identify occupational factors and work behaviors
  - Incident response frequency
  - Incident activities conducted
  - Personal protective equipment use and maintenance

- **Chemicals targeted:**
  - Flame retardants
  - Perfluorinated chemicals
  - PAHs

- **Challenge** - acquire useful data from a 15-minute survey
Firefighter Specimen Collection and Analysis

- **Blood**
  - 5 mL
    - Lavender top EDTA
  - 10 mL
    - Red top #1
    - Red top #2
    - Red top #3

- **Urine Cup**
  - 110 mL

- **Centrifuge**
  - Pb, Cd, Hg
  - PCBs, PBDEs, Newer BFRs, DDT/DDE, HCH
  - PFCs

- **Ship to CECBP**
  - Frozen
  - Refrigerated
  - Weekly
  - Splits/Archive

- **Pyrethroid pesticides**
- **Organophosphate pesticides**
- **Metals (arsenic, mercury, etc.)**
- **PAHs**
- **Creatinine**

**Notes:**
- **Ship to CECBP**
  - Frozen
  - Refrigerated
  - Weekly
  - Splits/Archive
Critical Values/Follow-Up

○ **Comparison with clinical reference values**
  - Lead: >10 ug/dL for adults
  - Mercury: to be determined
  - Other: to be determined

○ **Protocol for follow-up**
  - Review by UC Irvine or CDPH staff
  - Contact participant by phone and mail immediately if needed
  - Contact information provided for Dr. Das at CDPH and Dr. Israel at UC Irvine
Fire Station Dust Collection

Purpose:
- Evaluate protocols/procedures for indoor dust collection, processing and analysis as a potential source of persistent chemical exposure
Fire Station Dust Collection

**Protocol:**
- Select 3 fire stations for sample collection
- Industrial hygiene (IH) walk-through to identify chemical sources
- At each station collect:
  - Vacuum cleaner bag
  - Three hard surface dust samples
Fire Station Dust Collection

- Analysis of vacuum cleaner bag contents
  - PBDEs, PFCs, newer brominated flame retardants, PCBs, organochlorine pesticides
  - Metals: lead, mercury, arsenic + 15 others
Fire Station Checklist

- Characterize selected environmental factors in specified fire stations
  - Non-stick cookware (perfluorinated chemicals)
  - Electronic devices, fire vehicles with ripped foam seats, furniture with foam padding, foam pillows, carpeting (flame retardants)
  - Pesticide application in past 30 days
  - Station heating source, number of fire vehicles (PAHs)
- Completed by IH and/or firefighter
Participants who chose to receive results

Receive by mail at two time points

- Up to a year after biospecimen collection
  - Blood and urine metals
  - Nonpersistent chemicals (PAH, OP-specific and pyrethroid pesticide metabolites)

- Up to two years after biospecimen collection
  - PBDEs, PFCs, organochlorine pesticides

Participants will be provided contact information for designated UC Irvine and CECBP staff
Results Interpretation Survey

- **Purpose** - learn what firefighters think of their results, evaluate report-back materials and methods
- **Timing** - after second set of results are returned
- **Plan** -
  - 5-minute online survey
  - Monetary incentive
Data Analysis

- **Descriptive analyses**
  - Presence and distribution of chemical levels measured in firefighters

- **Comparisons**
  - NHANES data for adults
  - Other studies in adult or occupational groups where data is available
  - California Occupational Blood Lead Registry
  - World Trade Center firefighter study participants
    - Lead, cadmium, PAH metabolite (*Edelman et al. 2003*)
# Project Timeline

<table>
<thead>
<tr>
<th>Date Range</th>
<th>Event Description</th>
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<tbody>
<tr>
<td>May 2010</td>
<td>CDPH/UC Irvine Institutional Review Board (IRB) submissions</td>
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<tr>
<td></td>
<td>Collect 1st set of firehouse dust samples</td>
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<td>June-July 2010</td>
<td>Field test instruments and procedures</td>
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<tr>
<td>Sept 2010</td>
<td>Begin recruitment</td>
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<tr>
<td>Jan 2011</td>
<td>Complete all data and biospecimen collection</td>
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<tr>
<td>Jan 2011</td>
<td>Begin data analysis</td>
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<tr>
<td>Aug-Dec 2011</td>
<td>Return participant lab results #1</td>
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<tr>
<td>Aug-Dec 2012</td>
<td>Return participant lab results #2</td>
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<tr>
<td>Dec 2012+</td>
<td>Prepare project report</td>
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Project Staff

- CECBP staff
- Other CDPH staff
  - Lori Copan
  - Dina Dobraca
  - Kate Kelsey
- UC Irvine Center for Occupational & Environmental Health
  - Leslie Israel, DO, MPH
  - Cristina Fan, OHNP
  - Hannah Nguyen
  - Idalia Reynoso
- Orange County Fire Authority/
- WEFIT
  - Marty Driscoll
  - Bob James
  - Joe Kerr
  - Fausto Reyes
- Others
  - Kate Durand, CIH
  - Joe Fedoruk, CIH
  - Elaine Vaughan, PhD
Questions?