Firefighter Occupational Exposures (FOX) Project

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and
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Biomonitoring California

Scientific Guidance Panel Meeting
November 2, 2010
Sacramento, California
Overview

- Review collaborative efforts of UC Irvine COEH, Orange County Fire Authority and Biomonitoring California
- Update FOX project status
  - Review project timeline
  - Review pilot project steps
“FOX” Project: An Exposure Assessment Pilot

• Collaborative Efforts
  – UC Irvine, Center for Occupational and Environmental Health
  – Orange County Fire Authority (OCFA)
  – Biomonitoring California (CECBP)
Collaborative Efforts

1979 COEHs established under a mandate from the California legislature

– Creation of UCI COEH championed by Dr. Dwight Culver
– Dr. Luderer suggested UCI COEH-OCFA collaboration
OCFA: Wellness & Fitness (WEFIT) Evaluation

• WEFIT medical evaluation is component of the WEFIT program
• Implemented in January 2004
• Nonpunitive annual - biennial evaluation
• Evaluation - comprehensive history, physical exam, spirometry, audiometry, vision and laboratory tests, submaximal treadmill testing and fitness testing
• Results – personalized individual reporting with a health risk assessment

* Performed at UC Irvine
# Project Timeline

<table>
<thead>
<tr>
<th>Date Range</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 2010</td>
<td>CDPH/UC Irvine Institutional Review Board (IRB) submissions</td>
</tr>
<tr>
<td></td>
<td>Collect 1&lt;sup&gt;st&lt;/sup&gt; set of firehouse dust samples</td>
</tr>
<tr>
<td>June-July 2010</td>
<td>Field test instruments and procedures</td>
</tr>
<tr>
<td>Aug-Sept 2010</td>
<td>IRB Revisions from field testing</td>
</tr>
<tr>
<td>Oct 2010</td>
<td>Begin recruitment</td>
</tr>
<tr>
<td>Feb 2011</td>
<td>Complete all data/biospecimen collection</td>
</tr>
<tr>
<td>Jan/Feb 2011</td>
<td>Begin data entry and analysis</td>
</tr>
<tr>
<td>Aug-Dec 2011</td>
<td>Return participant lab results #1</td>
</tr>
<tr>
<td>Aug-Dec 2012</td>
<td>Return participant lab results #2</td>
</tr>
<tr>
<td>Dec 2012+</td>
<td>Prepare project report</td>
</tr>
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</table>
FOX Project Aims

• Assess levels of ~40 chemicals in blood and urine collected from 100 firefighters in Orange County, California
• Measure a subset of these chemicals in dust from 3 Orange County fire stations
• Develop and test protocols/procedures applicable to a larger firefighter study
• Lessons may apply to other occupational studies
Chemicals of Interest

• Flame retardants (eg. Polybrominated diphenyl ethers and others)
• Perfluorinated chemicals (PFCs)
• Metals (Pb, Hg, Cd, Mn, As)
• Organochlorine pesticides
• Pesticides metabolites
  • Organophosphates (TCPy), Pyrethrroids (3-PBA)
• Polycyclic aromatic hydrocarbon (PAHs)
• Phthalates
<table>
<thead>
<tr>
<th>Field Testing</th>
<th>Data Collection</th>
<th>Results Reporting</th>
<th>Participant Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completed</td>
<td>In Process</td>
<td>6-9 months</td>
<td>Online survey after</td>
</tr>
<tr>
<td>Completed</td>
<td>Blood and urine collection</td>
<td>Receive some results by mail (metals, nonpersistent chemicals)</td>
<td>receiving second set of test results</td>
</tr>
<tr>
<td>Pending</td>
<td>Exposure assessment questionnaire</td>
<td>18 months</td>
<td>Receive balance of results by mail (persistent chemicals)</td>
</tr>
<tr>
<td>Completed</td>
<td>Study evaluation questionnaire</td>
<td>Project staff* contact info provided</td>
<td></td>
</tr>
<tr>
<td>Completed</td>
<td>Medical record abstraction</td>
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<td></td>
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</table>

**FOX Project Design**

* UC Irvine and CECBP
FOX Recruit/Consent/Enroll

• Inclusion criteria
  – Firefighter employed by OCFA ≥1 year
  – Scheduled for routine WEFIT exam October through January 2011

• Recruitment - flyer
  – Electronic reminder
  – Fire stations
  – OCFA newsletter

• Consent & enroll at WEFIT appointment

The Firefighter Occupational Exposures (FOX) Project

The FOX Project is a joint effort of the Orange County Fire Authority (OCFA), University of California, Irvine (UCI), and Blemonting California, a state of California program. The purpose of the FOX Project is to learn more about firefighters’ exposure to certain chemicals in their work environment. These chemicals include flame retarders, polychlorinated hydrocarbons (PCBs), metals (such as arsenic, mercury, lead, and cadmium), perfluorinated chemicals (PFCs), and some pesticides.

You can volunteer to participate if you:

• Are an OCFA firefighter
• Are scheduled for your WEFIT exam from mid-October 2010 through January 2011

You are invited to participate in the FOX Project and learn more about chemicals that may affect your health.

As a FOX participant, you’ll be asked to:

1. Provide an extra urine and blood sample during your WEFIT evaluation.
2. During your WEFIT exam, fill-out a 15-minute questionnaire about your work activities.
3. Complete a 5-minute survey at the end of your WEFIT exam to help us understand your experience as a FOX Project participant.
4. If you decide to receive your personal test results, complete a 5-minute online survey to tell us what you think about your results.

There is no compensation for participating in this project.

The FOX Project will be conducted at the UCI Center for Occupational and Environmental Health during your WEFIT evaluation. For more information, contact Dr. Leslie Israel at 949-824-8685 or Marty Driscoll, OCFA, at (714) 573-8896.
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 information for future studies

• Participants receive no monetary compensation
Firefighter Occupational Exposure Project
Orange County, CA.

**EDTA Tube**
- Min Vol: 2 mL
- Store in refrigerator at 4°C
- Ship weekly with fridgepack
- EHLB Analysis: Mn, Cd, Hg, Pb
- EHLB Archive

**Red Top Tubes**
- Keep upright at room temperature for at least 20 min (maximum 24 hrs)
- Spin tubes @ 2000 rpm for 15 min. Transfer serum into tubes using a pre-baked glass pipette.
- Spin tubes @ 2000 rpm for 10 min. Transfer serum into amber vials using a pre-baked glass pipette.

**A.**
- Min Vol: 6 mL (approx. 7 pipette transfers)
- Max Vol: 75% full
- Store in freezer at -20°C
- Ship with dry ice
- EHLB Archive
- ECL Analysis: PBDEs, PFCs BFRs PCBs/OCPs Lipids

**B.**
- Excess serum for archive (approx. 7 mL each)

**Urine Cup**
- Min Vol: 26 mL
- Cool immediately
- Store cup in freezer at -20°C within 2 hours of collection
- Ship with dry ice
- EHLB Analysis:
  - Creatinine 1 mL
  - 3-Phen 2 mL
  - phthalates 1 mL
  - 3-PBA TCPy 2 mL
  - Hg (preserved) 2 mL
  - As (speciated) As (total) 2 mL
- EHLB Archive
  - Archive (x3)
  - Archive (x1) 10 mL
Critical Values/Follow-Up

• **Comparison with reference values**
  – Lead: $\geq 10 \, \mu g/dL$ for adults
  – Mercury: to be determined
  – Other: to be determined

• **Protocol for follow-up**
  – Review by UC Irvine and Biomonitoring California staff
  – Contact participant by phone and mail immediately if needed
  – Contact information provided for Dr. Israel and Dr. Das
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
Study Evaluation Questionnaire

- Participants respond anonymously
- 5 minute questionnaire
- Opportunity to provide feedback on the recruitment, enrollment, specimen collection and exposure questionnaire components
Medical Record Abstraction

- Information abstracted from the WEFIT questionnaire by UCI includes:
  - Firefighter rank and special assignments
  - Firefighter activities on duty/other employment
  - Dates of current, prior and initial WEFIT evaluations
  - Chronic medical conditions/medications
  - Tobacco use
  - Height, weight and body fat measured by skin calipers
**FOX Project Design**

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<td>UC Irvine</td>
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<tr>
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<tr>
<td>Firefighter</td>
<td>Firehouse</td>
<td>Blood and</td>
<td>Receive some results</td>
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<tr>
<td>focus groups</td>
<td>dust</td>
<td>urine collection</td>
<td>by mail</td>
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<td>&amp; interviews</td>
<td>collections</td>
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<td>(metals, nonpersistent</td>
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<td>Evaluate study</td>
<td>(n=3)</td>
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<td>chemicals)</td>
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<td>Firehouse</td>
<td>assessment</td>
<td>Receive balance of</td>
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* UC Irvine and CECBP
Project Staff

• UC Irvine Center for Occupational & Environmental Health
  – Leslie Israel, DO, MPH
  – Cristina Fan, OHNP
  – Hannah Nguyen
  – Idalia Reynoso

• Biomonitoring California Staff

• Other CDPH
  – Lori Copan
  – Kate Kelsey

• Orange County Fire Authority/ WEFIT
  – Marty Driscoll
  – Bob James
  – Joe Kerr, Local Union President
  – Fausto Reyes, Risk Manager
  – WEFIT Oversight Committee

• Others
  – Kate Durand, CIH
  – Joe Fedoruk, MD, CIH
  – Elaine Vaughan, PhD
Questions?