Agency for Toxic Substances and Disease Registry (ATSDR)

Haven Well
Community Advisory Board Meeting
City of Portsmouth, NH

October 14, 2015
ATSDR Presentation will focus on

- Who we are and what we do
- How we got involved
- What we are doing
- What we know about PFCs
- Health Studies (types, questions to consider, etc.,)
ATSDR is involved with the Pease site and committed to working with you.
WHO IS ATSDR AND WHAT DO WE DO?
ATSDR works with communities to protect people from environmental exposures

ATSDR does this by investigating chemical exposures, recommending actions to protect people, educating the public, and conducting research to protect health.
ATSDR
Public Health Consultation Process

**Inputs**
- Environmental Data
- Community Characteristics and Input

**Evaluation**
- What are contaminant levels?
- How do people contact contaminants? - exposure
- Could exposure lead to illness?
- Are there relevant health data?

**Findings & Recommendations**
- Is the exposure a problem?
- What needs to be done?
Conclusions

 Can the exposure cause harm?
 To whom?

Recommendations

 How can exposures be reduced?
 Do we need more information?
 Do we need to educate the community about what exposures (past or current) mean to them?
 Are other actions needed?
HOW DID ATSDR GET INVOLVED?
New Hampshire Department of Health and Human Services (NH DHHS) requested

- scientific and technical assistance
- comments on their biomonitoring protocol and
- CDC laboratory analysis of serum samples collected in the community

New Hampshire Department of Environmental Services (NH DES) identified

- a need to evaluate people’s exposures to Perfluorinated Chemicals (PFCs) contamination in drinking water
WHAT IS ATSDR DOING?
Biomonitoring

- New Hampshire Department of Human Services (NH DHHS)
  - lead for the collection and analysis of the bio-monitoring data

- CDC/ATSDR
  - providing scientific and technical assistance to NH DHHS
Drinking Water Evaluation

ATSDR and the New Hampshire Department of Environmental Services (NH DES) Health Consultations

- Private Well Evaluation
- Public Water Supply Evaluation
WHAT RESEARCH IS KNOWN ABOUT EXPOSURE TO PFCs?
What research is ongoing?

Number of publications related to the risk assessment of perfluoroalkyl and polyfluoroalkyl substances (PFASs) (normalized to the results from 2011)

Source: DeWitt, J (editor), Toxicological Effects of Perfluoroalkyl and Polyfluoroalkyl Substances, Humana Press, 2015
# Human Health Effects – What has been studied?

## Occupational Studies
- Pulmonary function
- Cardiotoxicity
- Cerebrovascular disease
- All heart disease
- Ischemic heart disease
- Gastric ulcer
- Colon polyps
- Hematological parameters (hematocrit, hemoglobin, red blood cells, white blood cells, platelets)
- Liver disease
- Liver enzymes (ALT, GGT, AST)
- Serum lipids (total cholesterol, non-HDL cholesterol, HDL-cholesterol, triglycerides, LDL-cholesterol, VLDL-cholesterol)
- Chronic renal disease
- Nonmalignant kidney disease
- Blood urea nitrogen
- Serum creatinine
- Hormones (cortisol, estradiol, testosterone, FSH, LH, TSH, etc...)
- Thyroid function (TSH, T4, free T4, T3, etc...)
- Serum uric acid
- Antibody response following vaccination
- Neurological effects (memory loss, confusion)
- Onset of menopause
- Fetal growth (low birth weight, birth length, abdominal circumference, small for gestational age, ponderal index, head circumference)
- ADHD, impulsivity
- Age of puberty
- Atopic dermatitis
- Birth defects
- Stillbirth
- Premature Birth
- Thyroid cancer
- Kidney cancer
- Testicular cancer
- Prostate cancer
- Ovarian cancer
- Non-Hodgkin’s Lymphoma
- Diabetes
- Lupus
- Multiple sclerosis

## Exposed Communities
- Pregnancy-induced hypertension
- Hematological parameters
- Osteoarthritis
- Liver enzymes (ALT, GGT, bilirubin)
- Serum lipids (total cholesterol, non-HDL cholesterol, HDL-cholesterol, triglycerides, LDL-cholesterol, VLDL-cholesterol)
- Renal function
- Thyroid function (TSH, T4, free T4, T3, etc...)
- Diabetes
- Uric acid
- Ulcerative colitis
- Chron’s disease
- Rheumatoid arthritis
- Diabetes
- Lupus
- Multiple sclerosis
- Antibody response following vaccination
- Neurological effects (memory loss, confusion)
- Onset of menopause
- Fetal growth (low birth weight, birth length, abdominal circumference, small for gestational age, ponderal index, head circumference)
- ADHD, impulsivity
- Age of puberty
- Atopic dermatitis
- Birth defects
- Stillbirth
- Premature Birth
- Thyroid cancer
- Kidney cancer
- Testicular cancer
- Prostate cancer
- Ovarian cancer
- Non-Hodgkin’s Lymphoma
- Diabetes
- Lupus
- Multiple sclerosis

## General Population
- Asthma
- Cardiovascular effects (stroke, angina, blood pressure, myocardial infarction)
- Osteoarthritis
- Serum lipids (total cholesterol, non-HDL cholesterol, HDL-cholesterol, triglycerides, LDL-cholesterol, VLDL-cholesterol)
- Glomerular filtration
- Kidney disease
- Thyroid function (TSH, T4, free T4, T3, etc...)
- Diabetes
- Uric acid
- Antibody response following vaccination
- Infectious disease incidence
- Neurological effects (memory loss, confusion)
- Hormones (cortisol, estradiol, testosterone, FSH, LH, TSH, etc...)
- Sperm quality (motility, morphology)
- Endometriosis
- Fertility
- Fetal growth (low birth weight, birth length, abdominal circumference, small for gestational age, ponderal index, head circumference)
- Neurodevelopment
- ADHD, impulsivity
- Age of puberty
- Atopic dermatitis
- Birth defects
- Stillbirth
- Premature Birth
- Thyroid cancer
- Kidney cancer
- Pancreatic cancer
- Liver cancer
- Prostate cancer
- Breast cancer
- Colorectal cancer

## Colorectal cancer
- Diabetes
- Lupus
- Multiple sclerosis
Human Health Effects with Strong Supporting Evidence

- Lipids (high cholesterol)
- Uric Acid (hypertension, kidney)
- Liver Function and Disease
- Low Birth Weight
ATSDR’s PFC-related Activities

- ATSDR has updated the Toxicological Profile for PFCs – public comment draft is available via ATSDR’s Toxic Substances Portal
  - Includes Minimum Risk Levels (MRLs) – screening values for daily exposure – for PFOA and PFOS
  - Public comment period ends December 1, 2015
ATSDR’s PFC-related Activities
CDC/NCEH’s PFC-related Activities

- CDC/NCEH continues to monitor PFC concentrations in the general US population via the National Health and Nutrition Examination Survey (NHANES).

![Graph showing PFC concentrations over time](image)

- **Explanations**
  - 95% upper confidence level
  - Median value: 30.2
  - 95% lower confidence level

- **Categories**
  - Total population
  - Females
  - Males
  - Teens
  - Adults
WHAT IS A HEALTH STUDY?
What is a health study?

Exposure
- e.g., blood PFC levels; PFCs in drinking water; chemical plant worker exposure to PFOS

Outcome
- e.g., cancers, low birth weight, birth defects, ADHD, cholesterol levels, immune system biomarkers
WHAT ARE THE TYPES OF STUDIES?
Types of Studies

**Studies of Exposure**
- Environmental monitoring and modeling
- Biomonitoring

**Studies of health outcome occurrence**
- Cancer and birth defect registries (analysis of registry data)
- Community surveys (e.g., determining the prevalence of autism or ADHD in a community)
Types of Studies

Epidemiological studies of exposure-outcome relationships

- **Ecologic study**
  - assessing exposure at the level of **geographical unit** such as census tract or zip-code level and comparing disease rates among these geographical units

- **Cohort and case-control studies**
  - assessing exposures to individuals and comparing disease rates among groups of exposed and unexposed individuals and among groups with different levels of exposure
WHAT QUESTIONS SHOULD BE CONSIDERED BEFORE DECIDING TO CONDUCT A HEALTH STUDY?
Questions to consider before deciding to conduct a health study

1. Can a study answer the question?

2. Is there a complete exposure pathway, well-defined exposed population, and ability to assign levels of exposure with adequate accuracy?

3. Is there justification for studying the specific health outcome(s) being considered? (e.g., is there suggestive biological evidence? A finding in a previous study?)

4. Can the health effect(s) be validly ascertained or measured?
Questions to consider before deciding to conduct a health study

5. Is there an appropriate comparison population?

6. Is the exposed population sufficiently large so that risks can be estimated with precision?

7. Can information on other risk factors that need to be taken into account be obtained?
# Pros and Cons of Conducting a Health Study

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<thead>
<tr>
<th>Positive things a health study might do:</th>
<th>Negative things a health study might do:</th>
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<tbody>
<tr>
<td>Document disease and/or exposure</td>
<td>Document no significant relationship between a disease and exposure</td>
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<tr>
<td>Demonstrate a relationship between exposure and disease</td>
<td>Appear to show that there is no problem</td>
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<td>Educate residents about environmental health concerns</td>
<td>Give permission to polluters to continue polluting</td>
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<tr>
<td>Create an opportunity for members of your community to get involved</td>
<td>Identify health problems that you are unprepared to deal with</td>
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<td>Be useful in community efforts to protect the health of future generations</td>
<td>Delay action while waiting for results</td>
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Excerpted from: Is a health study the answer for your community? A guide for making informed decisions.  
Moving Forward

- We're here to listen.
- We want to make sure the community participates in our public health activities.
- We are committed to working with you and will keep you apprised of our evaluations and recommendations.
Questions
Thank You!

For more information please contact
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The findings and conclusions in this presentation are those of the authors and do not necessarily represent the official position of CDC/ATSDR.