

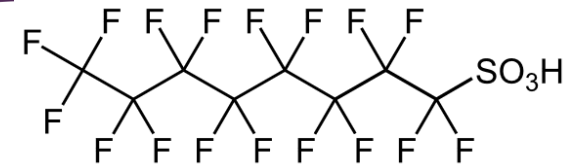


OEHHHA

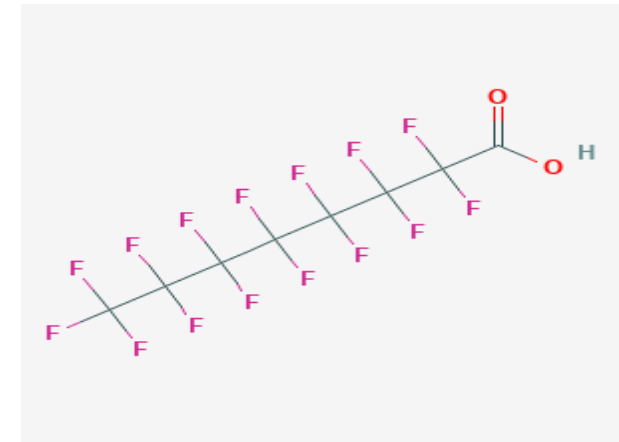
SCIENCE FOR A HEALTHY CALIFORNIA

Perfluoroalkyl and Polyfluoroalkyl Substances (PFASs) - Definition

- ▶ PFAS are carbon-based chemicals where all or most of the hydrogen atoms attached to carbon atoms are replaced by fluorine atoms.
- ▶ Perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) are two PFAS chemicals
- ▶ There are many others in use in industry



Perfluorooctane sulfonic acid (PFOS)



Perfluorooctanoic acid

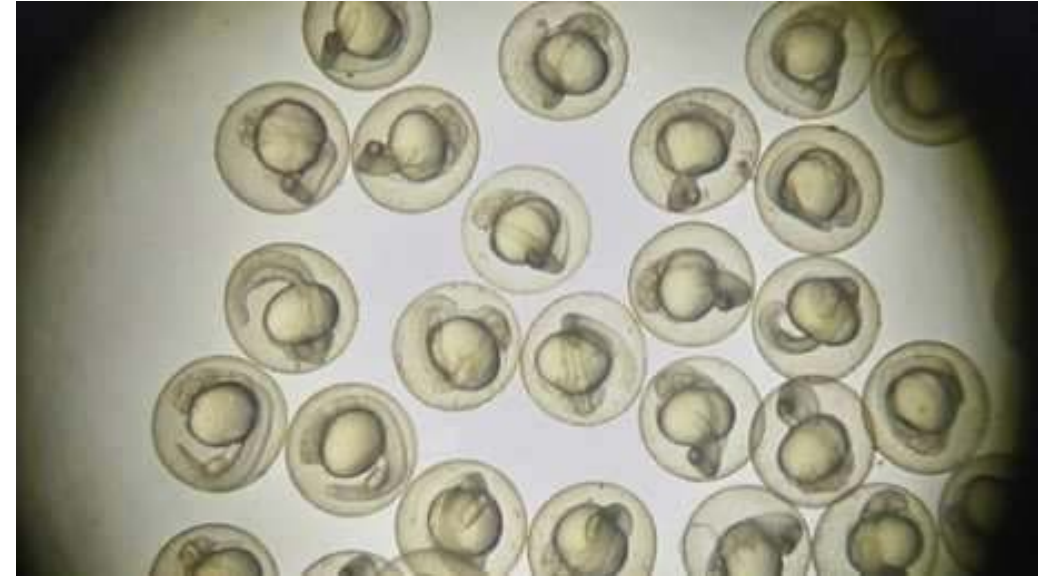
Health Concerns with PFAS

- ▶ Extraordinarily persistent in the environment
- ▶ Widespread occurrence in water, air, soil, food
- ▶ Many PFAS bioaccumulate (readily absorbed but not easily eliminated)
- ▶ PFAS can transfer to the fetus through the placenta and to the baby through breast milk.
- ▶ Health effects include liver toxicity, immunotoxicity, developmental toxicity, cancer, endocrine disruption
- ▶ PFOS and PFOA were listed under Proposition 65 as developmental toxicants in November 2017

OEHHA Work on Notification Levels

- ▶ July 2018: OEHHA recommended to the State Water Resources Control Board *interim* Notification Levels (NL)
 - ▶ PFOA: 14 ppt. Sensitive endpoints: liver toxicity and carcinogenicity
 - ▶ PFOS: 13 ppt. Sensitive endpoint: immunotoxicity
- ▶ Evaluating new science, including new cancer data recently released by the National Toxicology Program, to recommend Notification Levels for PFOA and PFOS
 - ▶ consideration of how body handles chemicals and differences between rodents (elimination time in days to weeks) and humans (elimination time in years)
 - ▶ The NL values and the health effects on which they are based may change.

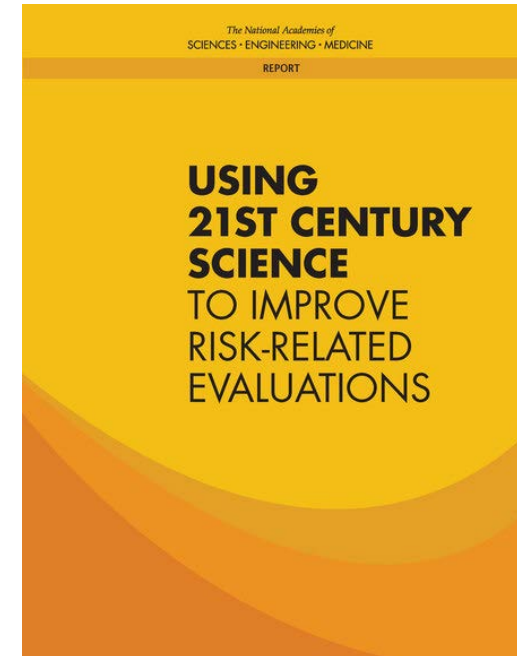
OEHHA Evaluating other PFAS chemicals - New Assays for Toxicity Evaluations (Tox 21)



- Developed by National Toxicology Program, US EPA, FDA, others
- Fast "high throughput" test systems
- Test for perturbations in normal cell function
- Gather information much faster than traditional animal toxicity testing

“Read-Across” methods for predicting toxicity

- ▶ Test known toxicants in high throughput systems - “anchor chemicals” with traditional animal toxicology and/or human evidence of adverse effects
- ▶ Test PFAS chemicals without animal data in high throughput systems and compare results with anchor chemicals
- ▶ Do these chemicals perturb cells or cellular components in the same manner as the anchor chemicals?
- ▶ Other read-across approaches include computer simulations of chemicals interacting with cellular components (in silico methods)
- ▶ OEHHA scientists discussing these approaches with federal scientists and academics working on newer test systems.



BIOMONITORING CALIFORNIA



- Biomonitoring means measuring chemicals in biological samples, in this case from people, such as blood and urine.
- Biomonitoring efforts in the US and Europe demonstrate ubiquitous human exposure to PFAS.
- In deciding which chemicals and groups of chemicals should be biomonitored, OEHHA works through an expert advisory panel, the Scientific Guidance Panel (SGP).



Designating chemical groups for biomonitoring to more efficiently estimate exposures to related chemicals

Examples of Groupings:

- Brominated and chlorinated organic compounds used as flame retardants
- Cyclosiloxanes
- Diglycidyl ethers of *p,p'*-bisphenols
- **Perfluoroalkyl and polyfluoroalkyl substances (PFASs)**
- *ortho*-Phthalates
- Polycyclic synthetic musks
- Pyrethroid pesticides



Biomonitoring for PFAS provides information to the Safer Consumer Products program about exposures to Californians.

California Biomonitoring studies measuring PFAS

- ▶ Studies have measured PFAS in pregnant women in the Bay Area, southern California firefighters, and Kaiser members in the Central Valley
- ▶ Common PFAS chemicals detected in 94 to 100% of samples; for others, the percentage of detections in samples is less, but often still very substantial.
 - ▶ Everyone is exposed to some PFAS chemicals
- ▶ Ongoing California Regional Exposure (CARE) study evaluating PFAS concentrations in people in 8 regions of California, includes 12 PFAS chemicals, with work to expand the number of PFAS measured to 30.
- ▶ Goals of CARE include characterizing exposures across Californians throughout the state, understanding sources of various PFAS, evaluating how concentrations of PFAS in humans change over time.

Prop 65 and PFAS



- ▶ In November 2017, OEHHA listed PFOS and PFOA as known to cause developmental and reproductive toxicity based on developmental toxicity.
- ▶ Maximum Allowable Dose Levels (MADLs) are under development.
- ▶ The MADLs reflect exposures that are considered not to pose significant health risks, in this case for developmental toxicity in humans.

Questions?