

Chemicals in PPCP's

Pharmaceuticals:

- Endocrine Disrupting Compounds
- Phthalates
- Bisphenol A
- Nonylphenol
- Cotinine
- Caffeine
- Fragrances
- Illicit drugs

Personal Care Products:

- Mercury
- Lead
- Triclosan
- Formaldehyde
- Toluene
- Petroleum distillates
- Coal tar
- Dibutyl phthalate
- Parabens

Why PPCP's are an Emerging Issue



- Increased pharmaceutical use
 - 71% increase in prescriptions from 1993 to 2006
 - 14% population increase
 - 60% increase in OTC drugs since 1990
 - 50% of the medications manufactured used in US
- Aging population
 - Age 65+ = 13% population using 34% prescriptions
 - Average senior has > 40 prescriptions
- General population is becoming increasingly medicated
 - Average person uses 11.8 prescriptions/year
 - 62% of doctor visits result in at least one prescription

Additional PPCP Issues

- <50% of the population adheres to the prescription protocols (WHO)
 - Associated with 40% of nursing home admissions
 - Costs \$177 billion/year
 - Accidental poisonings, suicides, inappropriate dosing
- New drugs
- New uses for existing drugs
- New target age groups
- Advertising: ban lifted in 1997 is responsible for an increase of 50% prescriptions.



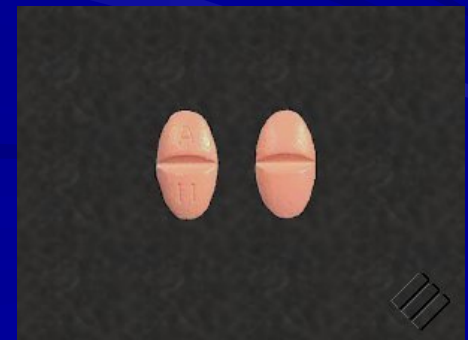
Personal Care Products

- We use 15 to 25 PCP's every day
- Exposes us to >200 chemical compounds
- 1/3 of all PCP's contain at least one carcinogen
- 10,500 chemicals are used in PCP's
- Only 11% have been tested



PPCP's in the Environment

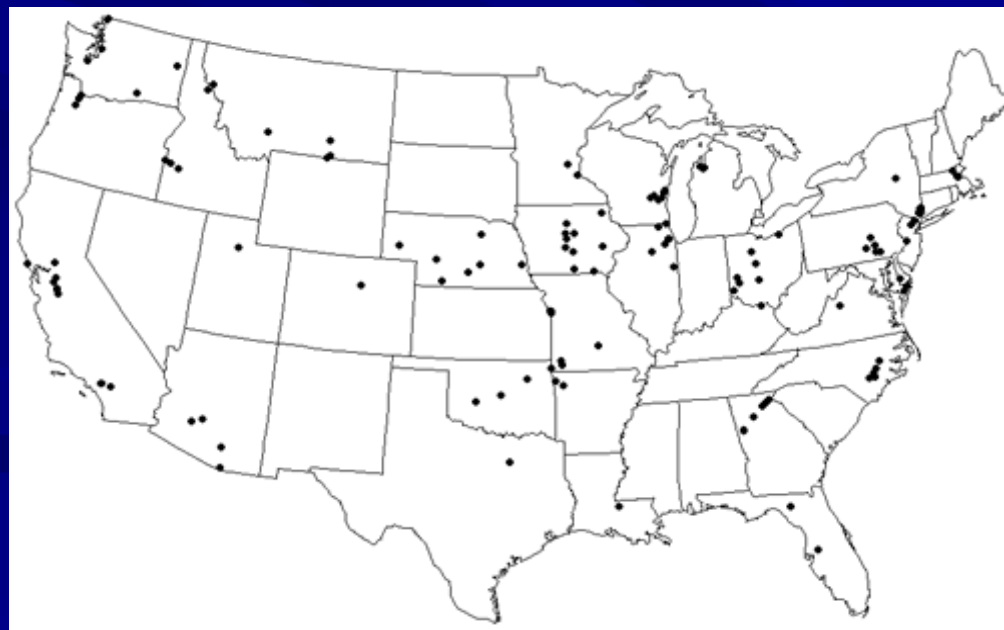
- Pass-through
 - unmetabolized portions are excreted
 - depends upon undissolved state, dose, body type
- Direct disposal
- Landfills
- Municipal Wastewater (more than just hospitals)
- On-Site Sewage Systems
- Biosolids
- CAFO's
- Reclaimed Water



Water-Quality Data for Pharmaceuticals, Hormones, and Other Organic Wastewater Contaminants in U.S. Streams, 1999-2000

By KIMBERLEE K. BARNES, DANA W. KOLPIN, MICHAEL T. MEYER, E. MICHAEL THURMAN, EDWARD T. FURLONG, STEVEN D. ZAUGG, AND LARRY B. BARBER

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Pharmaceuticals in the Environment

- 139 streams in 30 states
- 95 PPCP's tested
- 82 compounds detected
- 80% of the sites had at least one PPCP detected
- 75% sites had multiple PPCP's detected (median = 7, max = 38)
- concentrations low ug/l
- 33 of 95 compounds were EDC's (all detected during the study)

Pharmaceutical Study in the Sequim-Dungeness Area

- One time collection of water quality samples from effluent, surface water and ground water.
- 17 PPCP's detected in effluent
- 4 PPCP's detected in surface water
 - Caffeine, nicotine, metformin, estrone
- 3 PPCP's detected in ground water
 - Concentration 2-20 times less than effluent
 - Caffeine, nicotine, metformin
- Low levels (ug/l)

Impacts to Ground Water

- Ground water concentrations one order of magnitude lower than surface water.
- Zimmerman detected 3 PPCP's in ground water one mile downgradient of the source.
- Documented carbamazepine survived 8 to 10 years in subsurface.



PPCP's are a concern worth Investigating



- Present in the environment
- Effects to wildlife
- Don't know the effects to humans
- Finding chemicals in humans, although don't understand the exposure pathways.
- Cumulative effects of the daily un-intended exposure to low concentrations of multiple chemicals.