



One Nation Under Drugs

Green Chemistry Project
CHM 236
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How Pharmaceuticals Enter the Environment

- Normal human excretion as well as livestock excretion
- Direct Disposal (flushed down the toilet, poured down the drain, etc.)
- Aquatic Environment
- Landfill Leachate



Drug Portal to the World



adapted by Daughton from Ternes (April 2000)

Facts Concerning Pharmaceutical Waste

- 95% of antibiotics are excreted unaltered into the environment.
- 54% of people throw medication into the trash without taking necessary precautions.
- 35% of people flush medicines down the toilet.

Pharmaceutical Waste in Medical Practices

- In 2007, the geriatric population wasted more than one billion dollars worth of drugs due to improper usage and disposal of medication.
- In the behavioral health field, it is procedure to flush medications down the toilet.

What Happens to the Water?

Sewer



Water Treatment Plant



Back into the Environment

Where do the Pharmaceuticals End Up?



Characteristics of Pharmaceutical Waste

◎ Persistence

- Drugs are considered “pseudo-persistent” due to their continuous presence in the environment.
- Significant concentrations of medications remain in landfills and water treatment plants even after filtration.

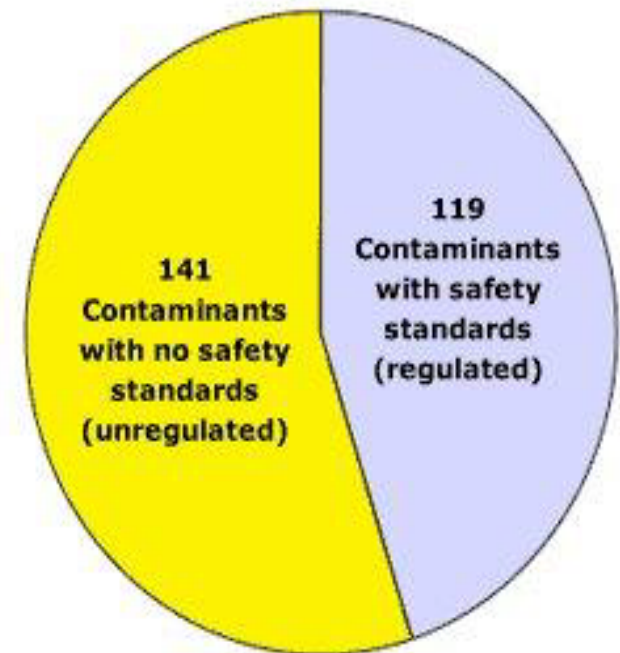
◎ Bioaccumulation

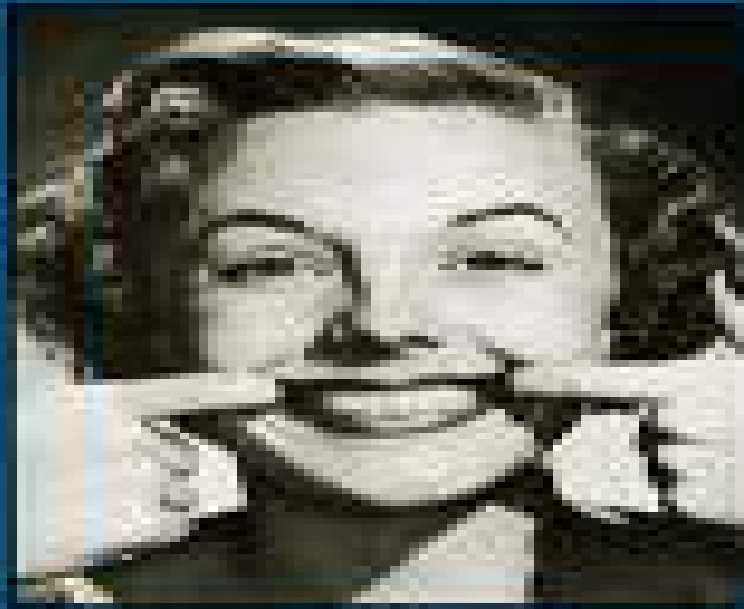
- Increase in the concentration of a chemical in a biological organism over time, compared to the chemical's concentration prior to disposal.

Problems with Pharmaceutical Waste

- According to the Environmental Protection Agency, sewage treatment systems specifically engineered to remove pharmaceuticals do not exist.
- Adding chlorine, a common process in conventional drinking water treatment plants, makes some pharmaceuticals more toxic.

260 contaminants found in nation's tap water, more than half have no safety standards.





*I took my
Prozac today*

If you are drinking tap water that is tainted by pharmaceuticals, you may experience the side effects!

Effects on the General Population

- ◎ Drugs are tested for the safety of human consumption; however, this timeframe is usually just for months, not a lifetime.
- ◎ May produce side effects, such as antibiotic resistance, infertility, or drug allergies.
- ◎ May interact with an individual's routine medication.
- ◎ Pharmaceuticals are prescribed to people who need them, and should not be delivered to everyone in their drinking water.

CURRENTLY ON

EXIT 58A-B



Zoloft



Prozac



Paxil



LAST EXIT BEFORE TOLL



Buspar



Wellbutrin



Celexa



Xanax



Proper Disposal: Local Drug Recycling Programs

- ◎ Call your local pharmacy to inquire if they will take your unused medication.
 - CVS, Walgreens, etc.
- ◎ Check for approved state and local collection programs.
 - Green Pharmacy Program
 - Earth 911
 - Recycling receptacles at police stations

If a Local Program is Not Available

- ⦿ Take your prescription drugs out of their original containers.
- ⦿ Mix drugs with an undesirable substance, such as cat litter or used coffee grounds.
- ⦿ Put this mixture into a disposable container with a lid, such as an empty margarine tub, or into a sealable bag.
- ⦿ Conceal or remove any personal information on the empty containers by covering it with black permanent marker, duct tape, or by scratching it off.
- ⦿ Place the sealed container with the mixture, as well as the empty drug container into the trash.

What Everyone Should Do!

- ◎ Dispose of unused or unwanted medications at take-back sites.
- ◎ DO NOT flush unused medications or pour them down a sink or drain unless indicated on the label to do so.
- ◎ Purchase drugs in small amounts, limiting expired medications.
- ◎ Ask for medications with low environmental impact.
- ◎ Encourage your health provider to take back unused and expired drugs.
- ◎ Commit to health and wellness strategies to reduce your reliance on medications.
- ◎ Consult your pharmacist with any questions.

Every little bit makes a difference!



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