

# PPCP's

- Products people use and products used on livestock
- Not intended to be toxic
- *Thousands* of chemical substances and degradation products
- No evidence (yet) of adverse consequences to human health
- Minute concentrations in environment

# EDC's

- Endocrine system: chemical communication within the body that regulates changes in the body
- EDC's: Chemicals that interfere with the body's endocrine system
- *Thousands* of products: pesticides, plasticizers, PCB's, hormones, fragrances, etc.
- Bioaccumulation concerns

# Sources

- Veterinary drugs: antibiotics
- Prescription and OTC therapeutic drugs
- Fragrances – endocrine disruptors
- Cosmetics
- Sun-screen products
- Diagnostic agents
- Nutraceuticals (e.g., vitamins)
- Consumer products

# The Concerns

- Unintended affects on non-target organisms
- Degradation products may be toxic
- EDC's control reproduction, etc.

# Concerns, cont'd.

- Soil organisms may bioaccumulate.
  - Earthworms from fields where biosolids, manure, or no organic amendments made were harvested and studied.
  - Earthworms from biosolids application site contained the most emerging contaminants.
  - Earthworms from the site had 27x more triclosan than the applied biosolids.

Source: Kinney et al. 2008, ES&T 42: 1863-1870

# Wyoming's Activities

- WWTP influent and effluent monitoring, annually since 2008
- WTP raw and tap monitoring, annually
- Participation in grant-funded biosolids study (MSU)
- Biosolids analysis, 2010
- Evaluation of advanced treatment options

# PPCP Analysis: CWP

## Influent & Effluent

- 34 Compounds (2008)
  - 75 Compounds (2009)
  - 85 Compounds (2010)
  - 91 Compounds (2011)
- Inf, 45 hits. Eff, 35 hits.

## Biosolids

- 118 Compounds (2010)
- Triclosan/Triclocarbon study (2009)

# PPCP Analysis: CWP (2011, all results in ng/L)

<b>Compound</b>	<b>Influent</b>	<b>Effluent</b>	<b>Landfill (SIU)</b>
Acesulfame-K	38,000	32,000	120 x 10 <sup>6</sup>
Acetaminophen	240,000	20	5500
Albuterol	6.2	ND	50
BPA	1,200	1,400	470,000
Caffeine	58,000	38	450
DEET	10,000	1700	85,000
Ibuprofen	17,000	1400	72,000
Naproxen	3,500	30	ND
Sucralose	42,000	54,000	45,000
Triclosan	2800	300	ND



# PPCP Analysis: Biosolids 2009 MSU Study

<b>Location (Sample #)</b>	<b>Triclocarbon ng/g dw (ppb)</b>	<b>Triclosan ng/g dw (ppb)</b>
WWTP 1 (sample 1)	9280	7060
WWTP 1 (sample 2)	7550	200
WWTP 2	7020	90
WWTP 3	4890	110

- Source: Cupples, Cha, *Water Research* 43 (2009) 2522-2530

# PPCP Analysis: Biosolids (2010, all results in ng/g)

## Compound

## Conc Found ng/g dw (ppb)

BPA	ND
Ibuprofen	1340
Naproxen	895
Triclocarbon	19700
Triclosan	17400
Acetaminophen	2800
Caffeine	2550
Cocaine	58.8
DEET	80.9

# Conclusions

- During wastewater treatment, many compounds show a preference for the solid phase.
- Some “removal” may be association with solid residuals.
- Many compounds remain unchanged in WWTP.
- Modeling, calculation difficult.

# Conclusions, cont'd

- Check into advanced treatment tech
- Get some data – indicator compounds
- Know what's in your biosolids
- Public education – easier to control PPCP's in your bathroom or on a farm field?

# Source Control – Your Bathroom Sink

## Triclosan Levels

Biosolids: ~ 1 ppm

Toothpaste: ~ 3,000 ppm

Hand Soap: ~ 10,000 ppm

Hamburger Helper: what's next?

Easier to control < 1 ppm on a farm field or  $10^4$  ppm in your sink, where we are industrially selecting for anti-microbial-resistant microbes?

# The Prescription for Safe Kids and a Clean Environment

Matt Allen

Solid Waste Program Team Leader  
Ottawa County Health Department

# Why Collect Pharmaceuticals

- Prevent accidental poisoning and ingestion
- Prevent abuse
- Remove from waste stream and environment
- Once in wastewater they can be difficult to remove

Awtumn Minnema, 2 years old

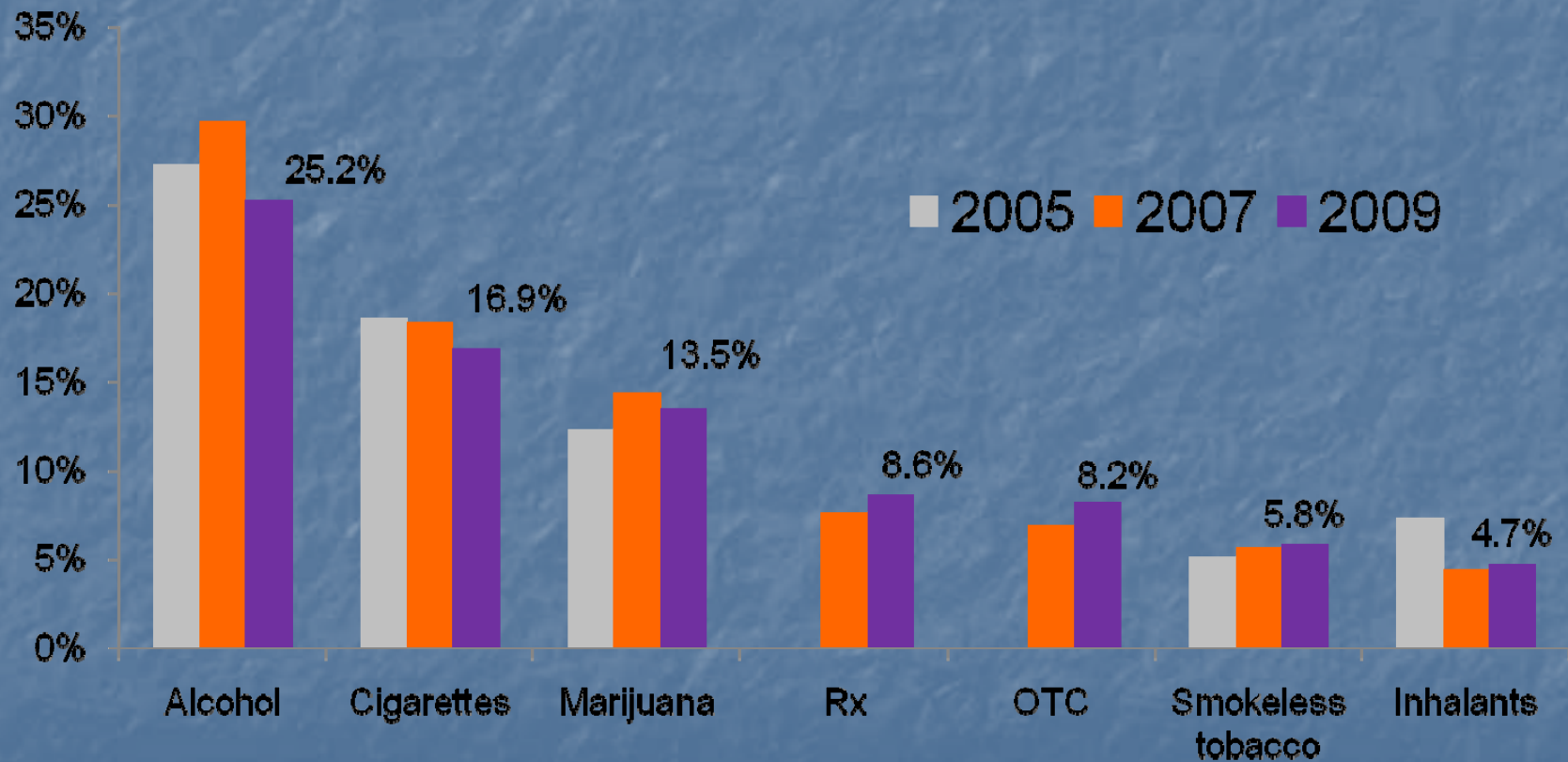




# Awtumn Minnema

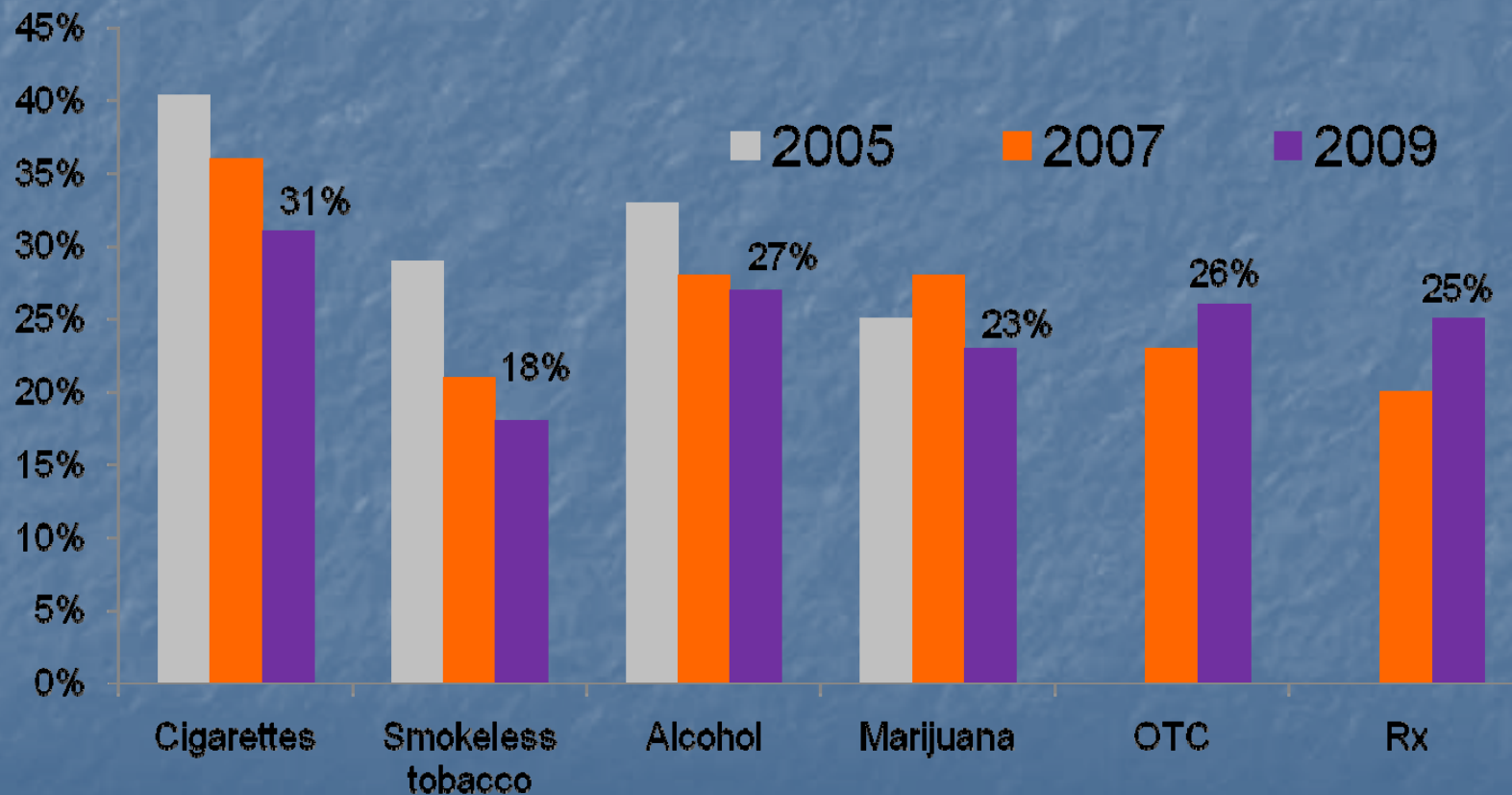
- Ingested her grandfathers anti-psychotic drugs
- Found dead the next day
- Grand Rapids, MI 11/15/2010
- **Toxicology Report Shows Toddler Likely Died of Accidental Prescription Drug Overdose...Chicago Tribune.**

# Current Substance Abuse



# Substances: Age of Onset

Alcohol and Drug Use Initiation Before Age 13  
(Among those who have ever tried)



# Sales of medication

- OTC drug sales have risen 60% since the 1990's
- 3.4 **Billion** prescriptions were written in 2006
- 3.9 **Billion** prescriptions were filled in 2009

# Household Medication Disposal Program

- Continuous
- OCHD accepts meds at 3 locations- Holland, Grand Haven, Hudsonville
- Special one day collection events
- Free
- Cannot knowingly accept controlled substances
- Used daily by residents

# Special Pharmaceutical Collection Event

- September 25, 2010 and September 24, 2011
- Must have law enforcement on site
- MUST register with the DEA for every single day event
- Located at Holland OCHD office
- Past collections at Holland and Grand Haven

# Impact

- Collected approximately 2020lbs in the last 13 months.
- All substance weight, does not include containers or bottles
- 69% solids, 30% liquids, 1% aerosols

# Going Forward

- Grant from the MDA for pharmaceutical disposal
- Use Kent County Waste to Energy facility
- Expand program to area pharmacies/law enforcement locations
- Outreach to Hospice, nursing homes, home health businesses and dr.'s offices
- Look at alternatives to disposal



# Questions?

- Matt Allen
- [mallen@miottawa.org](mailto:mallen@miottawa.org)
- 616-494-5569