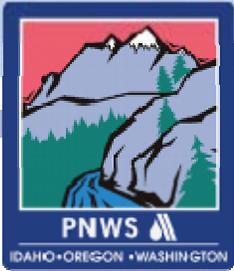


# How Do We Maintain Perspective on Pharmaceuticals in Water?

Linda Macpherson  
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Phone Number 503.872-4406

WB052009002PDX





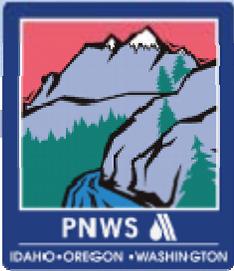
# Roadmap for the talk

- **Framing “the issue”**
  - The risk equation
  - Language and terminology matter
- **Detection vs Concern**
  - Risk as feelings
  - Scientific/engineering explanations
    - Talking about the numbers
    - The value of animal studies
    - Intuitive toxicology
- **Messages**
  - Understanding water and wastewater treatment
  - Using the right terminology — to neither minimize or alarm
  - Thinking about product choice



# Framing the Issue

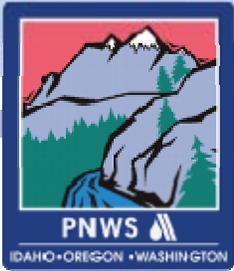




# The risk equation is complex and public concern is already heightened

- The public has a broad conception of risk as qualitative and complex — incorporating considerations such as uncertainty, dread, catastrophic potential, risk to future generations — and the public wants zero risk
- In general the more unfamiliar the issue the stronger the alarm



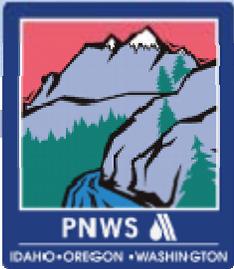


# Issue characteristics that elevate perceived risk

- Involuntary exposures
- Lack of personal control over outcomes
- Uncertainty about probabilities or consequences of exposure
- Lack of personal experience
- Difficulty in imagining the exposure
- Genetic effects of exposure (*impact to future generations*)
- Effects of exposure delayed in time
- Infrequent but catastrophic accidents
- Benefits not highly visible
- Benefits to others (*inequity*)
- Accidents caused by technology not nature

Adapted from Paul Slovic/Risk Media and Stigma/2001



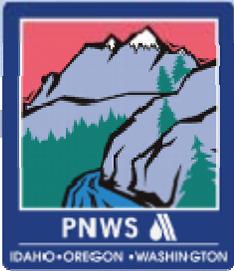


# This issue triggers many of these factors and few appear immune to their influence

- ☠ Involuntary exposures
- ☠ Lack of personal control over outcomes
- ☠ Uncertainty about probabilities or consequences of exposure
- ☠ Lack of personal experience
- ☠ Difficulty in imagining the exposure
- ☠ Genetic effects of exposure (*impact to future generations*)
- ☠ Effects of exposure delayed in time
  - Infrequent but catastrophic accidents
  - Benefits not highly visible
  - Benefits to others (*inequity*)
  - Accidents caused by technology not nature

Adapted from Paul Slovic/Risk Media and Stigma/2001





# Framing the issue appropriately and accurately is challenging

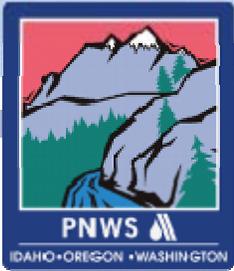
- Residual amounts of the substances we put in the air, on the land or in and on ourselves is likely to end up in the water environment even though it may be at nearly undetectable levels.
- We need to promote greater public understanding about the water environment in a way that **neither creates undue alarm or complacency**





**We added perfumes,  
soaps, etc. to water  
in Roman Times and  
before and we are adding  
them to water TODAY**





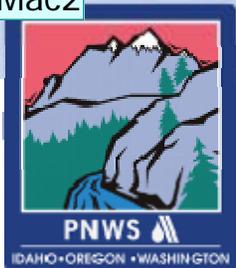
**CH2MHILL**

The State of Water • Salem, Oregon • May 6, 2009



# We generate the pharmaceuticals — wastewater and water treatments are the barriers — they don't create them (EPA Synopsis of the Sources of PPCPs)





# Our capacity to detect ever smaller concentrations of substances in water has outpaced our ability to interpret such findings

- The nature of the compounds and exposure is as important as mere detection
- Concentration, dose, and duration receives less attention than detection



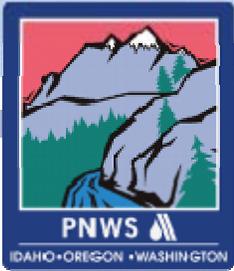
## Slide 11

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**LMac2**

I don't think these images work well here ---- the issue is the way our technology has advanced -- so we would have to show a microscope on the left and advanced testing on the right.

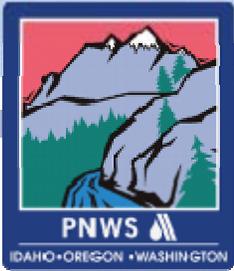
Linda Macpherson, 05/04/2009



# The rhetoric is alarming and shapes public perception of the significance of the issue

- Large numbers of chemicals are getting into the environment in known and unknown concentrations
- “It’s a chemical cocktail out there – and what I take is not what you take”
- Numerous reports of intersex fish and other species have triggered Congressional and public interest.  
NRDC Report on Hormonally Active Agents

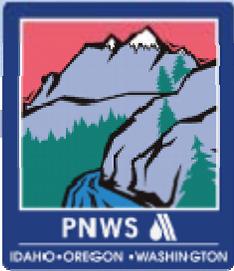




# Fears can be exacerbated by our terminology

- Endocrine disrupting compounds
- Compounds of emerging concern
- Compounds of potential concern
- EOPCs — emerging pollutants of concern
- Emerging contaminants of concern
- PPCPs — Pharmaceuticals and Personal Care Products EPA
- CEPs — Compounds of Emerging Publicity Shane Synder
- Even the words 'chemical' implies danger to the public

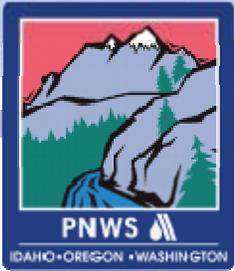




## “Endocrine Disrupting Compounds” sends an ominous message about reproductive health

- The term implies that something in the endocrine system is being disrupted — *even though we know that these compounds are only disrupting at a specified concentration. Some compounds that are hormonally active but not disrupting are also lumped into the definition*
- The public conclusion — anything that is called an EDC is alarming
- We have negatively branded the term and it shouldn't be used in nonscientific contexts

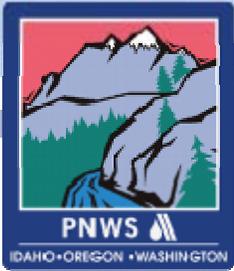




## An '*emerging concern*' of any type is psychologically supercharged to alarm the public

- “Emerging concern” raises the specter of the unknown and the unknowable
- It is likely that the public will misinterpret what is being said based on fear not fact or current knowledge when they hear this term
- The public is chemical phobic (except for medicines which they chose to take)
  - *Did you know that treatment plants are dumping huge quantities of di-hydrogen monoxide into our environment???*



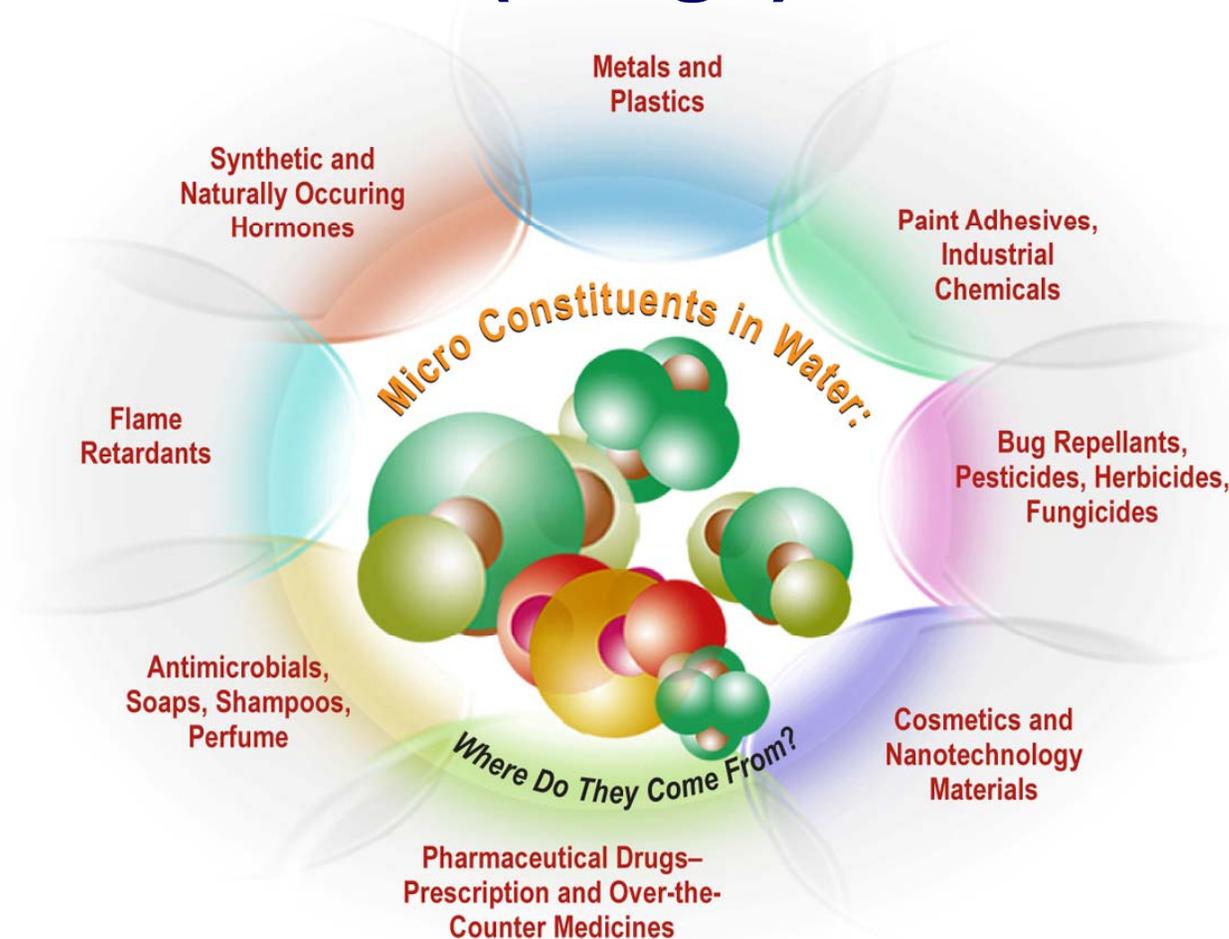


# “Microconstituents” is the term preferred by WEF

- This term is reflective of the very low concentrations measured in water samples
- Avoids immediate negative connotations
- Precludes abbreviation as an acronym
- Doesn't create alarm but.....
  - **Hasn't been embraced by the media (probably because it doesn't alarm)**

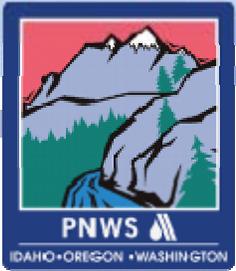


# And It's More than Pharmaceuticals (Drugs)



# Detection vs. Concern

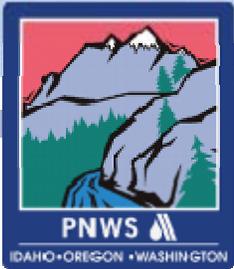




# Two parallel interacting systems affect judgment

- **Reason Based** — using analysis, logic, and calculation
- **Feeling Based** — intuitive, experiential, affect and concern

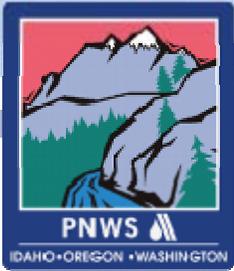




# The language of science/ engineering focus on analytics and risk calculation

- This creates problems because the focus tends to concentrate and exaggerated fears

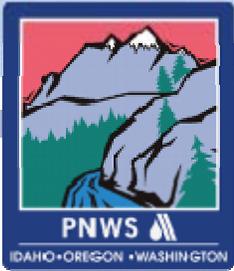




# Public perception of risk is a different calculus than a scientific risk assessment

- Perceived risk represents a blending of science and judgment with important psychological, social, cultural and political factors  
[Slovic in “Trust, Emotion, Sex, Politics, and Science: Surveying the Risk-Assessment Battlefield”]
- Our industry focuses on scientific risk — so there is a disconnect in approach

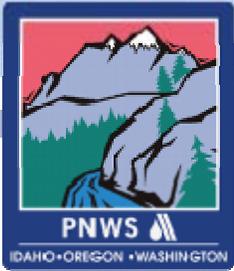




# What does 'detection' mean to the public?

- Personal care products and pharmaceuticals have been present in water and the environment for as long as humans have been using them
- What is new is that we now can detect very small concentrations



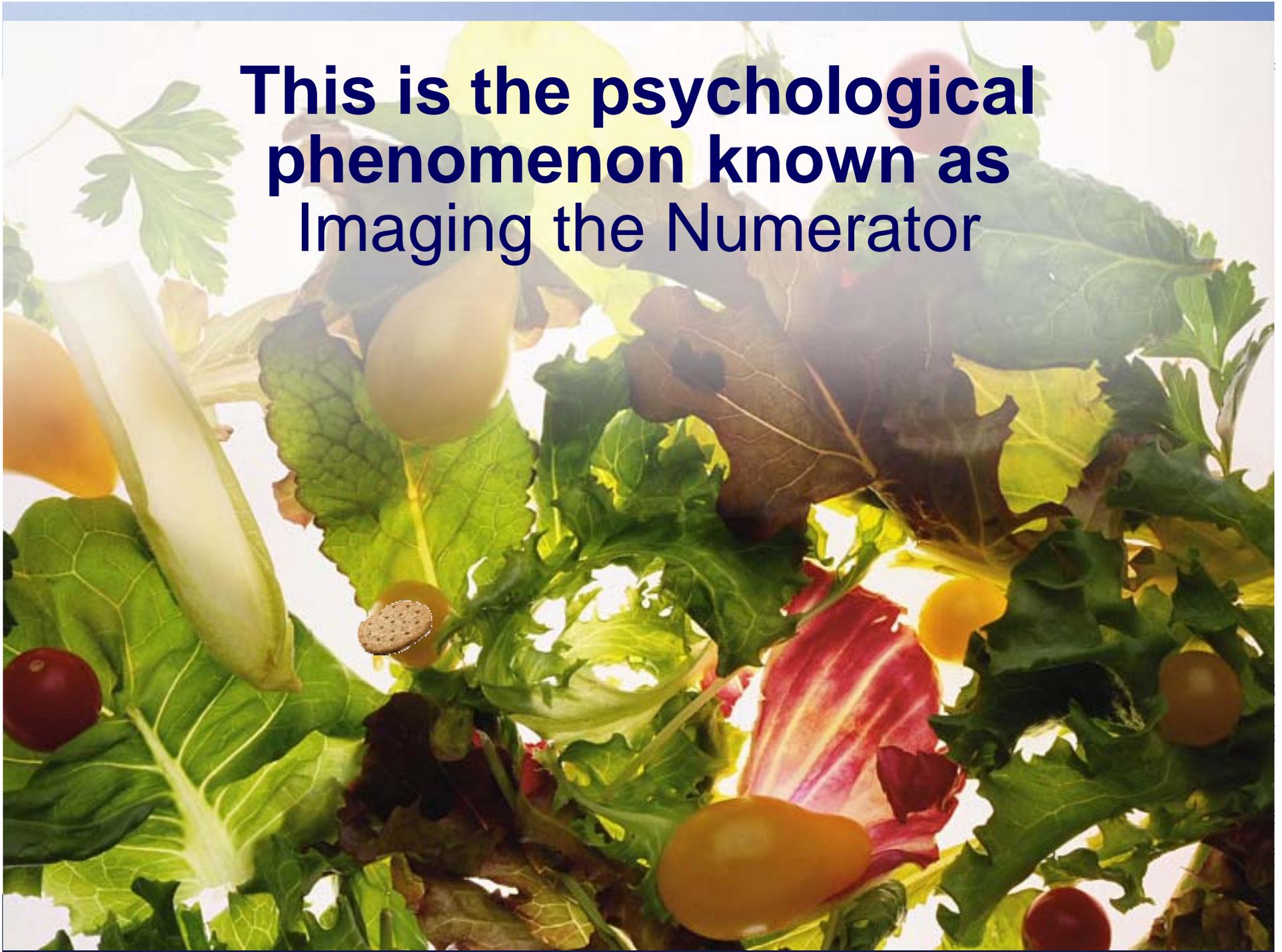


## Be Careful With the Numbers....

- Psychological research reveals that even the **ONE** part in water is perceived as contaminating and dangerous
- Rather than the big number (trillion) people tend to think about the **ONE**
- One crouton in a 20 ton salad has the impact of focusing on the crouton (not the salad)

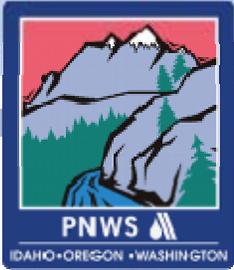


**This is the psychological phenomenon known as  
Imaging the Numerator**



# Were You Looking for “the Crouton”?

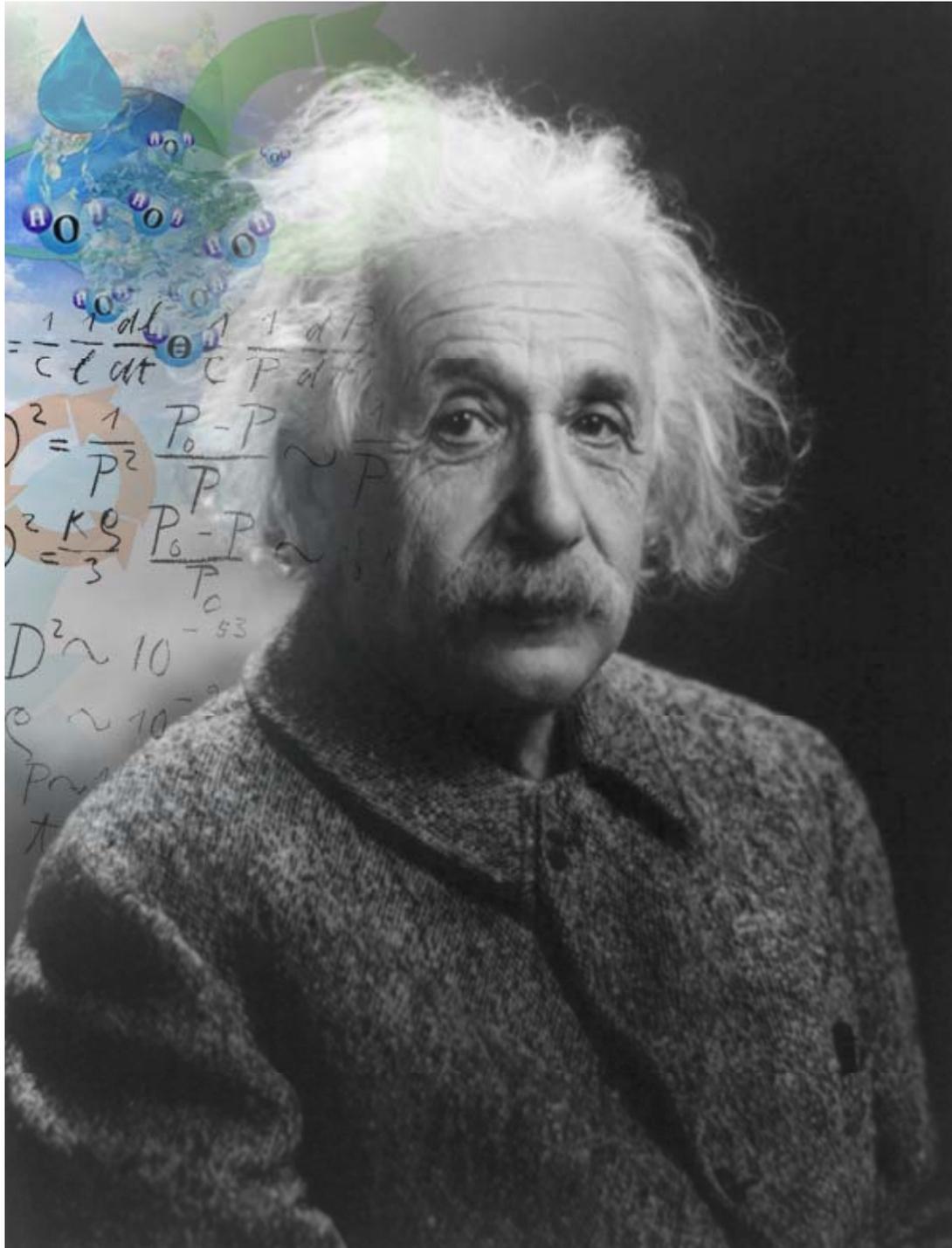




# Risk comparisons rely on mathematics

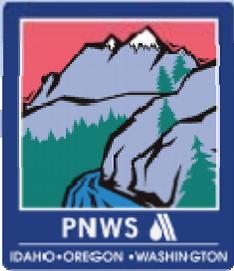
- In general people can't process numbers so they use feelings and images of whether something is good or bad
- Showing a number as a percentage is less frightening so 0.00000000001 % is a better way to express risk than one in a trillion
- Discussing the number of years it takes to get one therapeutic dose and asking "How much are you willing to spend to get this out of receiving water supplies?" informs and involves





**“Not everything that counts can be counted, and not everything that can be counted, counts.”**

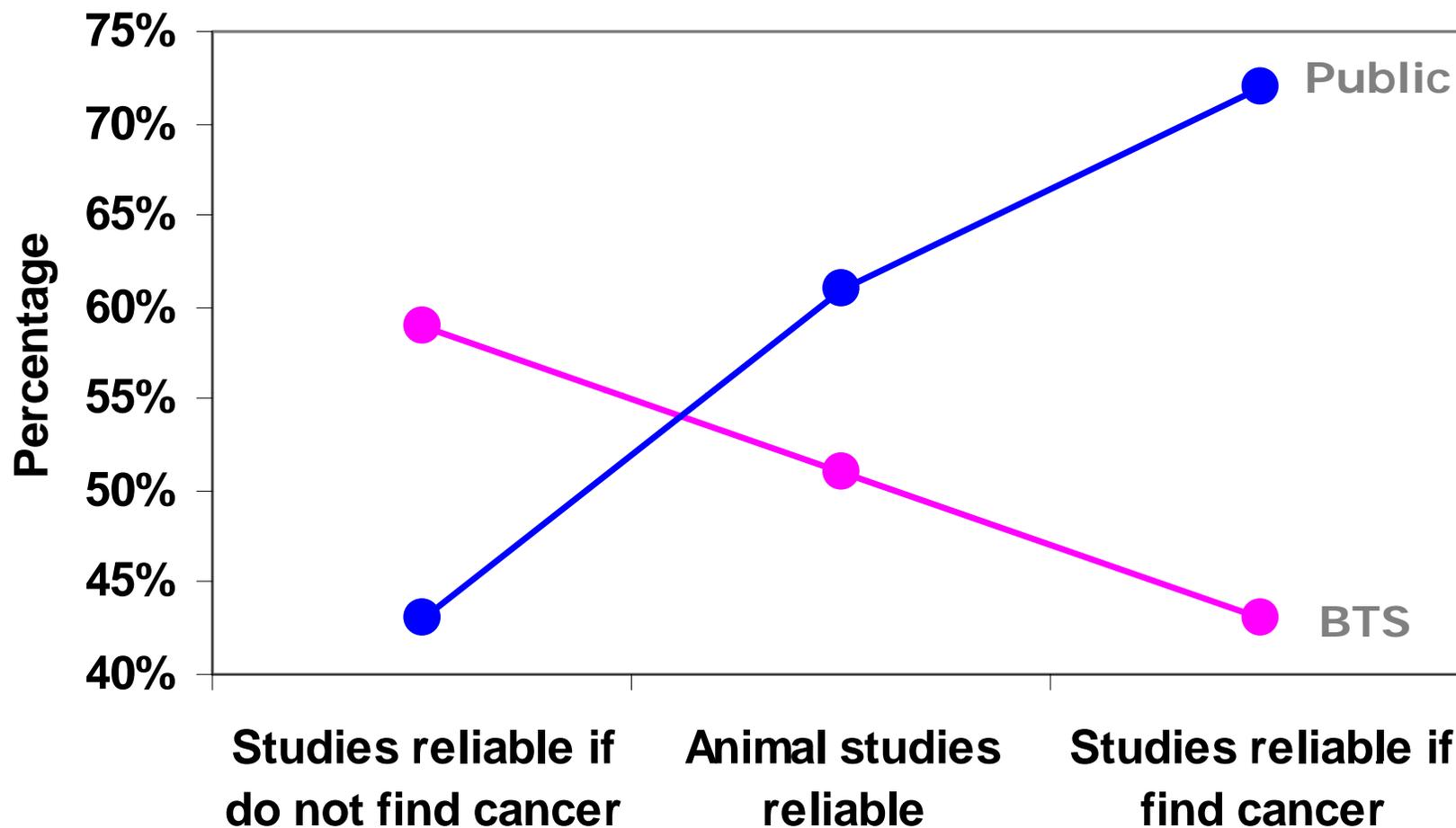
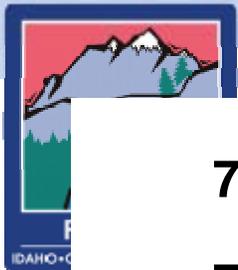
**–Albert Einstein**



# The public and toxicologists see things through different lenses

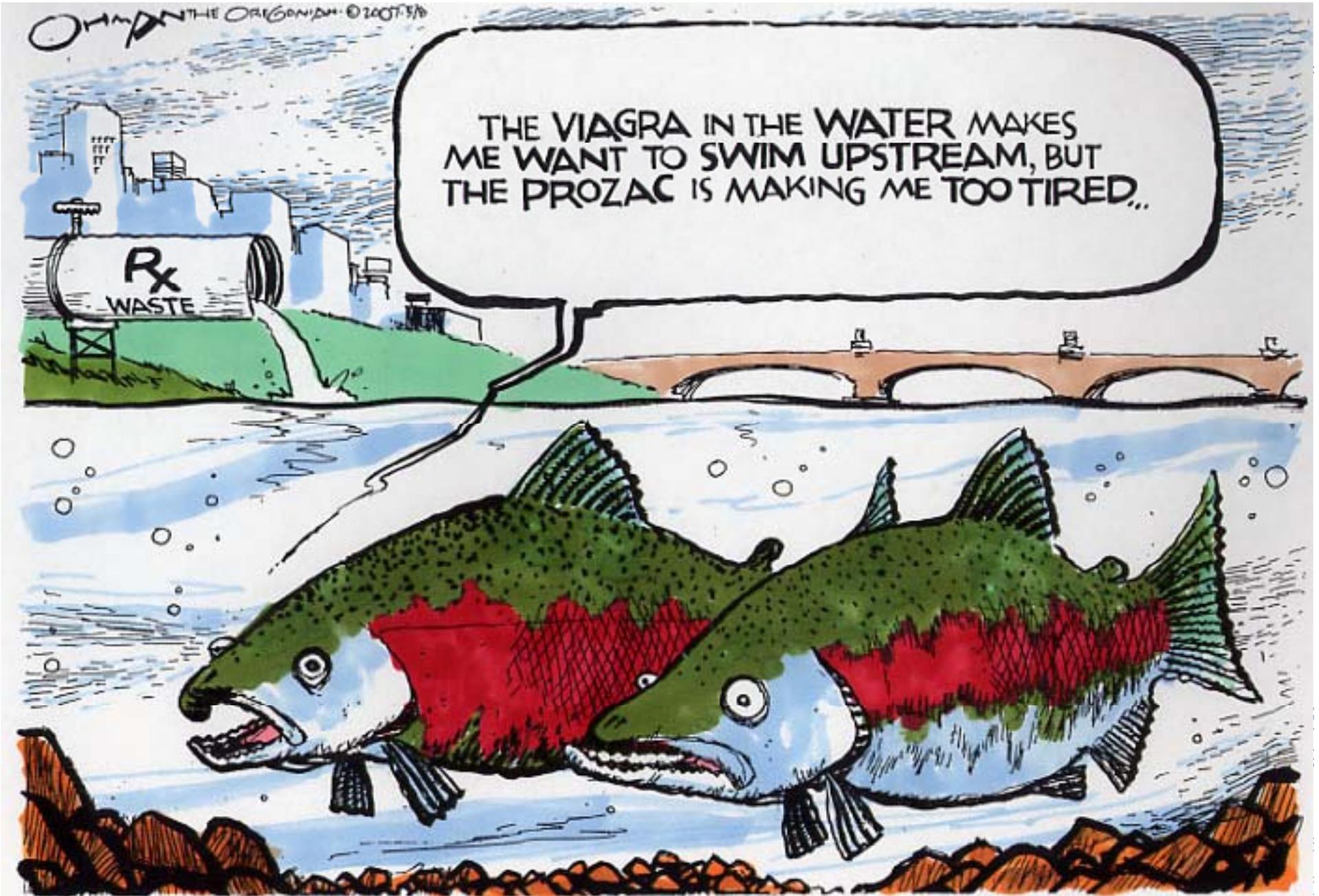
- The General Public draws far firmer and often erroneous conclusions from animal studies than do Toxicologists and are likely to inappropriately infer that risks to any species equals the same risk to humans.
- This isn't to suggest reactions in aquatic species should be dismissed in any way it is just to say that we often leap to unjustified conclusions about implications of a chemical for humans.

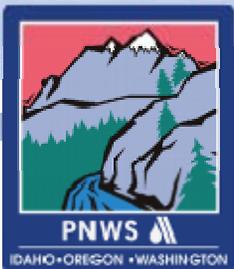




\*BTS = British Toxicology Society





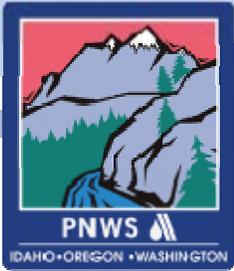


# Aquatic and human impacts are not the same

**“Endocrine Disruptors: What Are They Doing to You?”**

On Tap - Winter 2003

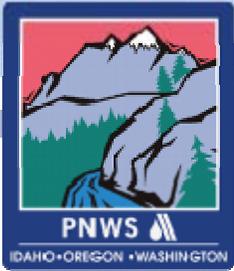




## EPA guidance on human health impacts

“There are no known human health effects from such low-level exposures in drinking water, but special scenarios (one example being fetal exposure to low levels of medications that a mother would ordinarily be avoiding) require more investigation.”

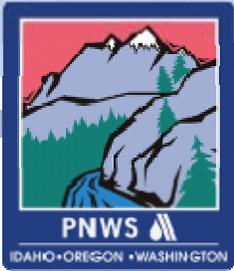




# Our capacity to detect ever smaller concentrations of substances in water has outpaced our ability to interpret such findings

- The nature of the compounds and exposure is as important as mere detection
- Concentration, dose, and duration are receiving less attention than detection in media accounts creating a cascading sense of alarm





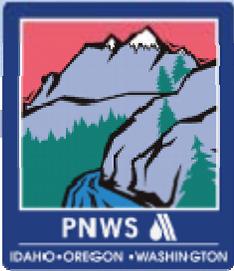
# **Fear rather than scientific conclusions, logic or reason could drive demands for higher, unsustainable levels of treatment**

- Energy costs are going up at an unsustainable rate
- A climate of fear can influence global warming
- Our economy and environment require a truly thoughtful deliberation



# Messaging Challenges

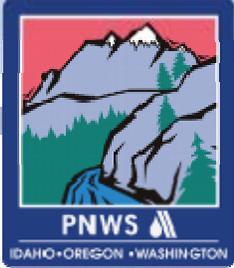




## Ideas

- Seek to use terms that neither understate the risk we know to exist or create a perception of a higher level of risk than we understand to exist
- Work with social psychologists to better understand how the public perceives the issue of constituents in water
- Help the public develop a better understanding of how things are added to water (and removed) and how everyone contributes through individual actions

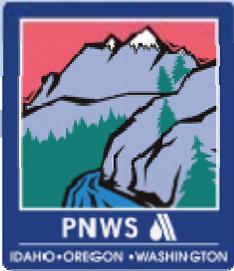




# Some Key Messages & Approaches

- The water industry is committed to sharing consistent and factual information
- Advancing understanding of the water industry is important — not all water treatment plants are the same and not all wastewater plants are the same
- Pursuing sound, sustainable solutions is an imperative

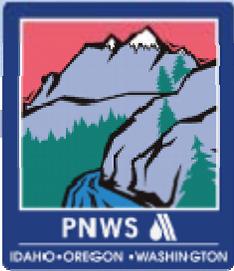




# Conveying these messages requires:

- Working with diverse stakeholders to help advance understanding about the water environment:
  - Society of Environmental Journalists
  - The American Medical Association (AMA)
  - Local media
  - Public interest groups, others
- Partnering with drug manufacturers could yield dividends

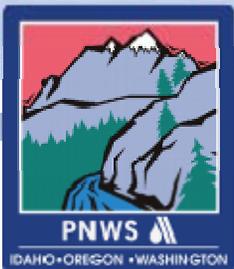




# What can we suggest for the public do?

- Support continued funding for research
- Think about product choices
- Don't unnecessarily add pharmaceuticals and personal care products to the environment — in general we should all strive to minimize the amount of material we introduce into the water environment

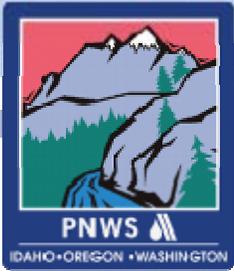




## Thinking about your choices

- The choices you make at point of purchase and in the home matter to the water environment
- Work with manufacturers of pharmaceuticals and personal care products to discuss proper disposal instructions

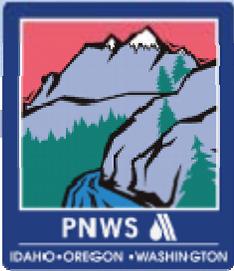




# Encourage the public to take responsibility

- Encourage development of unused product return policies working with such groups as Hospice
- Encourage a dialog about product stewardship initiatives
- Consider drug take back days to avoid poisoning





# Conclusions

- A public that is educated about compounds in water is more likely to make informed decisions
- An informed public can put issues in perspective and can avoid misdirecting investment of scarce resources
- An informed public will support the right research
- We all have a stake in the outcome!



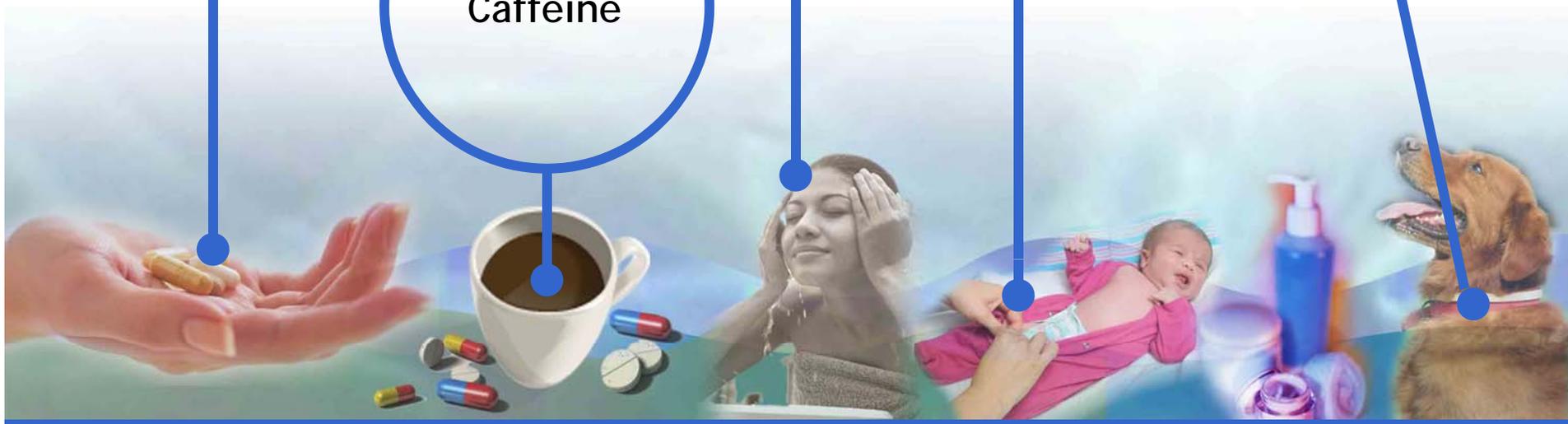
Prescription  
medicine

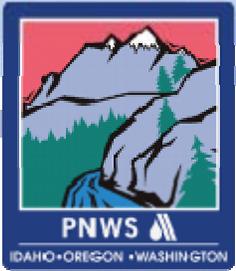
Caffeine

Soap,  
shampoo,  
cosmetics

Fire-  
retardant  
clothing

Flea collars  
and pet  
shampoo





# Questions?

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