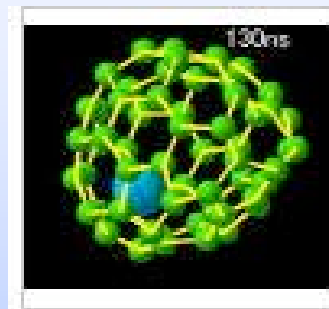
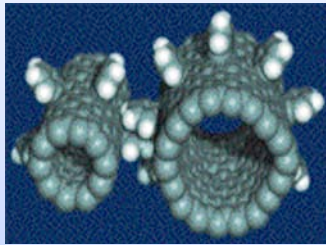


# Evaluating Environmental and Human Health Risks from Nanomaterials



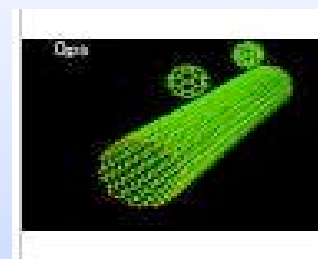
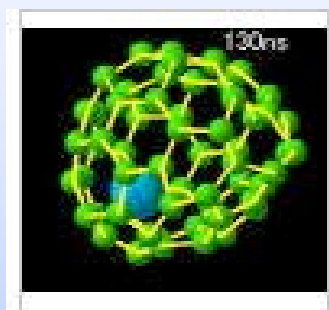
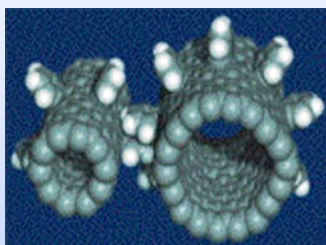
**A Congressional Science Briefing**

**Organized by the SOT**

**September 7, 2006**



# Welcome and Introduction to Nanotoxicology



**Michael P. Holsapple, Ph.D., A.T.S.**  
**Executive Director**  
**ILSI Health and Environmental Sciences Institute**  
**Washington, D.C.**  
**SOT Councilor**



# Goals of Today's Science Briefing

- ✓ **Illustrate how science can be used for better decision making in order to promote and protect public health.**
- ✓ **Highlight current applications for nanomaterials in today's society and approaches to evaluate human health risks from nanomaterials.**
- ✓ **Increase awareness that the SOT is a leading scientific resource available to Members and staff.**



# Outline for Today's Science Briefing

- ✓ **10 minutes:** Welcome and “Introduction to Nanotoxicology”.
- ✓ **20 minutes:** Presentation #1 – “Nanotechnology: Balancing Benefits and Risks”.
- ✓ **20 minutes:** Presentation #2 – “Evaluating Human Health Risks from Nanomaterials”.
- ✓ **40 minutes:** Question and Answer Session and Wrap-Up.



# Outline for Introduction

- ✓ **What is the SOT?**
- ✓ **What is “toxicology”?**
- ✓ **What is RALA?**
- ✓ **Why are nanomaterials important to the SOT and RALA?**



# Society of Toxicology

The SOT is the world's largest professional Society (~5800 members) dedicated to supporting the use of sound scientific information in advancing the health of humans, animals and the environment by reducing uncertainties in the assessment of risk from exposure to chemicals.

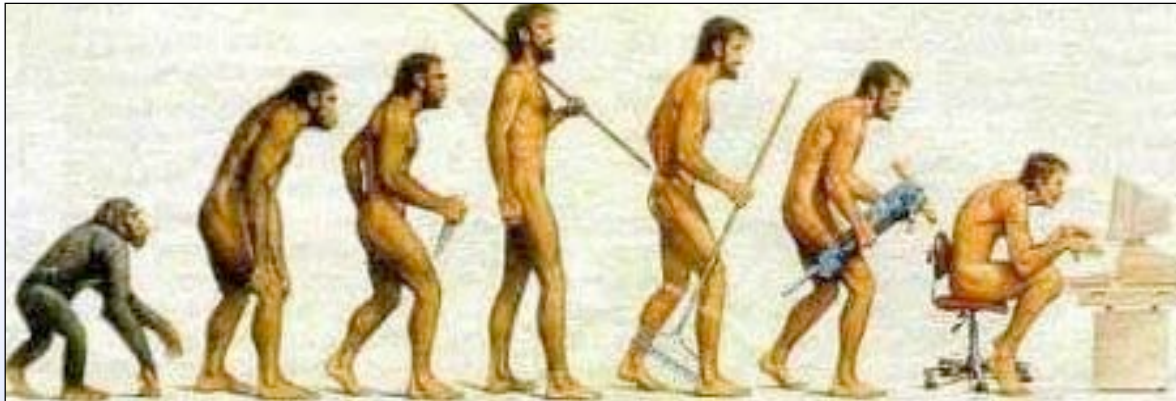


[www.toxicology.org](http://www.toxicology.org)

# What is Toxicology?

- Traditionally: The science of poisons.
- More accurate definition:  
The study of the adverse effects of chemical, physical or biological agents on living organisms and the ecosystem, including the prevention and amelioration of such adverse effects.
- Modern toxicology uses chemicals as tools to understand molecular/cellular biology



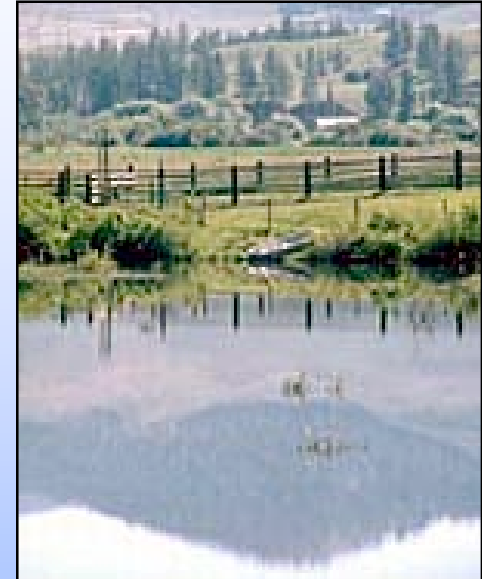


- Toxicology is arguably the oldest scientific discipline, as the earliest humans had to recognize which plants were safe to eat.
- Approximately **100,000** chemicals currently in use worldwide, **500** new chemicals enter the market- place annually.
- Humans are exposed to chemicals both deliberately and inadvertently. ***Most exposure of humans to chemicals is via naturally occurring compounds consumed in the diet from food plants.***



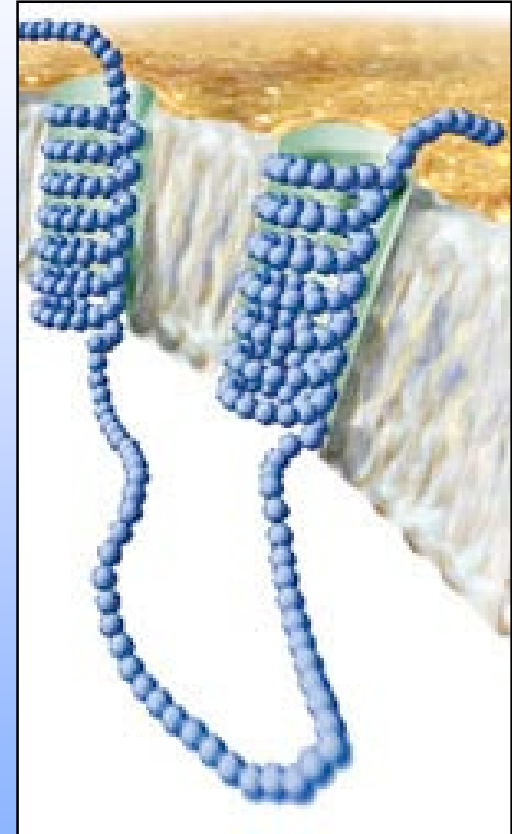
# Toxicity Testing

- Assesses the concentration-dependent hazard a chemical may present
  - Human health
  - Natural populations
- Results typically applied to
  - Approval of product use
  - Regulating allowable concentrations in the environment.



# Toxicity Testing

- Molecular and cellular studies in toxicology often supplement toxicity testing results to help ascertain chemical hazard. They often unravel complex processes that underlie an adverse response.
- Use of toxicants can help determine the function of proteins in complex networks.



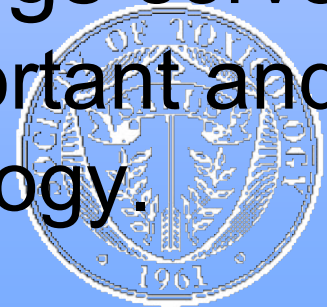
# What private and public sectors invest in toxicity testing that aims to protect human health?

- Chemical Manufacturers
- Pharmaceutical Industry
- US Federal Agencies
  - National Toxicology Program (NTP)
  - Environmental Protection Agency (EPA)
  - Food and Drug Administration (FDA)
- State and Local Governmental Bodies



# What is RALA?

- ✓ Regulatory Affairs and Legislative Assistance Committee.
- ✓ Program for providing information to congressional staff members on current topics of importance to public and environmental health.
- ✓ Congressional Science Briefings serve as an education resource on important and emerging issues related to toxicology.



# **SOT Council approves proposal for new Specialty Section on Nanotoxicology**

- 1) To address questions regarding the design of appropriate toxicological studies for evaluating the toxicity of nanomaterials.**
- 2) To develop the most appropriate dosimetrics for evaluating nanomaterials *in vitro* and *in vivo*.**
- 3) To develop batteries of screening studies for evaluating the toxicity of nanomaterials and for extrapolating the findings from *in vitro* assays to the *in vivo* situation.**

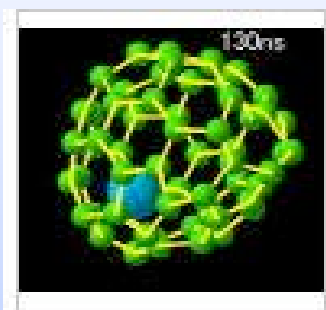
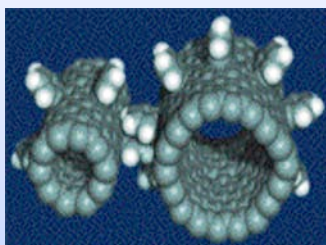


# **SOT Council approves proposal for new Specialty Section on Nanotoxicology**

- 4) To communicate what information is necessary and the types of research that will provide the most comprehensive information for conducting risk assessments of nanomaterials in the future.**
- 5) To conduct programs and educational activities which emphasize current developments and issues in nanotoxicology.**
- 6) To relate the developments in nanotoxicology to the activities of the SOT to stimulate interest and growth in nanotoxicology as it relates to the general science of toxicology.**



# Presentation #1: Nanotechnology: Balancing Benefits and Risks



**Dr. Kristen M. Kulinowski**

**Department of Chemistry**

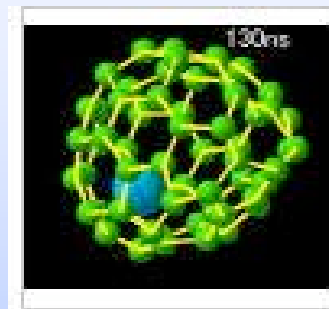
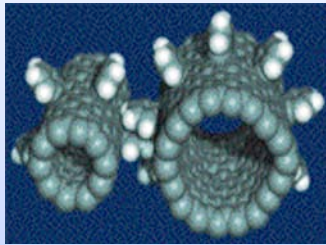
**Center for Biological & Environmental Nanotechnology**

**Director, International Council on Nanotechnology**

**Rice University, Houston, TX**



# Presentation #2: Evaluating Human Health Risks from Nanomaterials



**Dr. John Bucher**  
**Deputy Director**  
**Environmental Toxicology Program**  
**National Institute of Environmental Health Sciences**  
**Research Triangle Park, NC**

