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## **Perceived Risks and Hazards of Nanotechnology Development – Comparisons among Faculty at the University of Washington Affiliated with Nanotechnology/Nanoscience and Environmental Health Science**

A study of University of Washington faculty conducted March – April 2006  
for the UW's Center for Workforce Development.  
Study conducted by Caroline Hughes

Background, results and discussion to be used with permission.

### **Executive Summary**

#### **Background**

Nanotechnology is the study or application of any matter at the 1-100 nanometer scale. Nano-development could benefit human health, environmental remediation methods, technology and many other fields. However, concern for nanotechnology's implications on human health and the environment exist. Because the emerging, cross-disciplinary field of nanotechnology incorporates chemistry, biology, materials and physical sciences, medicine and engineering, one identified issue of nano-development is the challenge of successful communication among researchers of diverse disciplinary backgrounds.

#### **Methodology**

This study surveyed University of Washington faculty associated with the Center for Nanotechnology or the Department of Occupational and Environmental Health Sciences. 116 faculty members were invited to participate in an online or phone survey; 52 responded. The study objectives were to measure and evaluate differences between nanotechnologists/nanoscientists and environmental health scientists in behavior, knowledge, beliefs and attitudes relating to nano-development. The hypotheses were that 1) environmental health scientists would perceive greater risk and greater need for nano-development regulation and public awareness than would nanotechnologists/nanoscientists and that 2)

nanotechnologists/nanoscientists would perceive greater benefit to nano-development than would environmental health scientists. Variances in knowledge, communication, and attitudes including trust, regulation and perceived benefits and risks were examined so as to better understand cross-disciplinary differences.

## **Results**

*Lack of Definition of Nanotechnology:* Three true/false questions were asked to gauge subject's knowledge of nanotechnology. These questions were taken from a 2004 (Cobb and Macoubrie) study of public perceptions of nanotechnology. In this study, nanotechnologists were more likely to respond "true" to the question "Nanotechnology involves materials that are barely visible to the naked eye." Nanotechnology is most commonly defined as the manipulation of any matter at the 1-100 nanometer scale, which is not visible to the naked eye.

*Lack of Communication about Risks:* Neither nanotechnologists nor environmental health scientists were likely to discuss social and ethical implications of nano-development nor risks of exposure to nanomaterials. Both groups by majority reported discussing these issues rarely or never.

*Lack of Trust:* Results found that neither nanotechnologists nor environmental health scientists trusted regulatory agencies to minimize risks of scientific development. Nanotechnologists and environmental health scientists also tended to not trust business leaders within the nanotechnology industry to minimize risks associated with nano-development.

*Need for More Regulation:* Neither discipline thought current regulation for nano-development was sufficient to protect against hazardous exposure from nano-development, though environmental health scientists were statistically significantly more likely to believe that current regulations were insufficient. On the whole, both groups tended to think the precautionary principle is an appropriate strategy for reducing risks associated with nano-development.

*Benefits vs. Risks of Nano-development:* Nanotechnologists were more likely to think the benefits of nano-development would outweigh the risks, though the majority of environmental health scientists also thought benefits would outweigh the risks.

## **Discussion and Implications**

The results of this study mirrored previous findings (2004 Cobb and Macoubrie study and 2005 Macoubrie study) including that people with more knowledge of nanotechnology are more likely to think the benefits of nano-development will outweigh the risks, that there is a general lack of definition of nanotechnology among the field's own community, and that there is lack of trust in regulatory agencies to prevent hazards from nano-development.

Results of this study also confirm findings from preliminary interviews that there is a lack of definition for nanotechnology and that researchers are reluctant to identify themselves primarily with nanotechnology or nanoscience.

These results can be used by the Center for Workforce Development to improve cross-disciplinary and public communication about nano-development, including a clear definition of nanotechnology, nanotechnology's potential benefits and hazards and appropriate levels and methods of nano-regulation.