NANOTECHNOLOGY SAFETY CONCERNS

What are some of the occupational health and safety concerns associated with nanotechnology?

Some studies indicate that because of their small size, nanoparticles:

- Are more likely to deposit in the respiratory tract
- Can penetrate across cell membranes
- May be biologically active
- Can persist in tissue, leading to delayed toxicity

What tasks are associated with the highest risk?

Any process that creates the potential for airborne nanoparticles is a possible health risk, including: pouring and/or mixing nanoparticles, cleaning up spills, performing maintenance on equipment, using nanoparticles in powder or liquid form, and aerosolizing nanoparticles through vortexing or other procedures.

How can exposure to nanoparticles affect my health?

The effects of nanoparticles are highly variable and depend on the product type, concentration used, and route of exposure. Always read the labels and MSDS/SDS sheets of the specific products used to identify their hazards and effects.

ADDITIONAL RESOURCES

I work with nanoparticles here at the NIH. Who can I contact about concerns?

The Division of Occupational Health and Safety (DOHS) has a written nanotechnology safety and health program. It includes general guidance on the topic as well as information and resources. The program description can be found online (see the link below) or by contacting your IC safety specialist.

DOHS can perform exposure assessments and monitoring for nanoparticles. Please call the Technical Assistance Branch (TAB) at (301) 496-3353 for this service.

Are additional resources available?

NIH Nanotechnology Program Guide:
http://go.usa.gov/AqSP

OSHA Safety and Health Topics - Nanotechnology:
http://go.usa.gov/HBa9

CDC NIOSH Workplace Safety and Health Topics - Nanotechnology:
http://go.usa.gov/HBCY

National Nanotechnology Initiative (NNI):
http://www.nano.gov

CDC Guide for Research Labs:
http://go.usa.gov/AqhR

IC Safety and Health Specialists:
http://go.usa.gov/HBa3

SAFE WORK PRACTICES IN NANOTECHNOLOGY

At the National Institutes of Health

The Division of Occupational Health and Safety
Office of Research Services
Building 13, Room 3K04, (301) 496-2346

NIH Na ional Ins itutes of Health

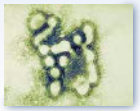
NANOTECHNOLOGY AT A GLANCE

What is nanotechnology?

Nanotechnology involves work with nanoparticles. A nanoparticle has dimensions between 1 and 100 nanometers (nm). For a size comparison, consider:

- *DNA* = 2-3 nm

- *Influenza* = 75-100 nm



- *Tuberculosis bacteria* = 2,000 nm

- *Red blood cells* = 7,000-8,000 nm

- *Human hair* = 60,000-120,000 nm

What applications use nanotechnology at the NIH?

Nanotechnology applications at the NIH may include:

- Medical imaging (e.g., MRI)
- Diagnostic and treatment technologies
- Therapeutics
- Drug delivery systems

WORKING SAFELY WITH NANOTECHNOLOGY

How can I reduce my risk?

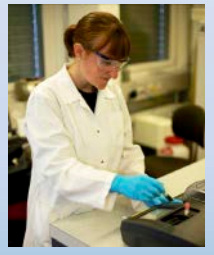
Controls can be put into place that can help reduce your risk when performing procedures. Two types of controls are engineering and administrative controls.

Examples of engineering controls:

- Chemical Fume Hood
- Biological Safety Cabinet
- Local Exhaust Ventilation

Examples of administrative controls:

- Keep doors closed
- Maintain equipment
- Wear the proper Personal Protective Equipment (PPE). Examples include: gloves, lab coats, respirators, etc.
- Handle, store and transport nanoparticles in sealed, labeled, and closed containers
- Train personnel on the proper handling of nanoparticles
- Decontaminate the area after working with nanoparticles



SPILL RESPONSE

How should I clean a spill involving nanoparticles?

There are several steps to take when cleaning up a spill involving nanoparticles. When dealing with procedures that involve nanoparticle hazards, PPE must be worn. At a minimum, two layers of gloves should be used. If the material is a powder, avoid generating aerosols by using wet wiping methods instead of sweeping. If the material is a liquid, place absorbent pads over the spill. For large spills, call 911 on campus to alert the NIH Fire Department.

DISPOSAL

How do I dispose of nanoparticle waste?

Waste containing nanoparticles should be held in secure containers and dealt with as a chemical waste. Contaminated gloves, bench paper, and clean up materials should be double-bagged, closed tightly and labeled as “nanoparticle waste.”

The chemical waste tag should also be labeled with the names and approximate concentrations of components in the container. Waste pickup can be scheduled by calling (301) 496 - 4710. Classification of EPA-regulated “hazardous waste” is based on current regulations for macro-sized forms of the same chemical.