

TEXAS TECH UNIVERSITY HEALTH SCIENCES CENTER

Potential Hazards in Research Laboratories

Scientific research involves exposure to various hazards. When deciding to allow your child to participate in research projects conducted in TTUHSC laboratories or animal facilities, you need to be aware of the potential hazards he or she may encounter. The following information provides the most common potential hazards, but is not intended to be a complete list of all potential hazards. Questions may be addressed to the minor's specific sponsor. If you have any further questions or concerns regarding this information, please contact the TTUHSC Director of Safety Services or the TTUHSC Biological Safety Officer at 806-743-2597.

Definitions:

Allergens – substances capable of producing an allergic reaction.

Asphyxiants – substances such as gases or toxins that cause a decrease in oxygen concentration or an increase of carbon dioxide concentration within the body.

Carcinogens – substances capable of producing cancer.

Mutagenics – agents (chemical or physical) capable of inducing genetic mutation.

Pathogens – bacteria, viruses, prions, fungi, and parasites capable of causing diseases.

Recombinant materials – DNA that has been genetically engineered (altered), usually incorporating DNA from more than one species of organism.

Transgenics – organisms that have had genes from another organism inserted into their genes.

Toxins – poisonous substances produced by living organisms, plants, and animals.

Zoonotic diseases – diseases that can be passed from animals to humans.

Potential Hazards

Your child's research project may involve one or more of the following potential hazards. A table is included with examples.

Chemicals – can be unstable, making them reactive and prone to explosion. Potential injuries include skin and eye burns, respiratory problems, allergic reactions, skin, eye, and mucous membrane irritation, and illnesses.

Pathogens – found in human, animal and plant tissue can cause infections and acute or chronic illnesses.

Recombinant materials/technology – can interact with the human body and its cells and produce potentially hazardous results.

Mechanical/electrical equipment and instrumentation – can cause electrocution, burns, cuts, scrapes, and injuries from pinch points. High noise levels can cause hearing loss.

Radiation/irradiation – can cause skin and eye damage, cellular damage, and long-term health problems.

Animals – can bite, scratch, transmit zoonotic diseases such as rabies, toxoplasmosis, pox virus, cat bite fever, rat bite fever, and various parasitic infections, or release allergens.

Gas cylinders/compressed gasses – gas cylinders with compressed gasses can explode, causing injury from high speed projectiles. Released gasses can cause eye and skin irritations, respiratory problems, light-headedness, fainting, and asphyxiation.

Hazard Table

Definition	Hazards		Examples
Chemicals	Refined compounds that could be in the form of a solid, liquid, or gas. These may or may not be hazardous. Some compounds may have numerous hazard classifications (flammable, toxin, and carcinogen)	Carcinogens: may cause some form of cancer with long-term exposure - usually many years in the future.	Benzene, acrylamide
		Teratogens: shown to affect the reproductive system of males and females. May cause birth defects in the developing fetus.	Alcohol, thalidomide, X-rays, acrylamide
		Neurotoxins: may affect the nervous system.	Ethidium Bromide, snake venom
		Flammables: will burn or explode.	Alcohol, Acetone, Xylene
		Reactives: will react explosively.	Peroxides, acrylamide
		Corrosives: will cause tissue damage with contact through inhalation, ingestion, eye exposure, skin absorption, etc.	Acids and bases
		Toxins: May cause illness or death on exposure.	Cyanide
Compressed Gases	High-pressure cylinders that hold gases. These are usually large and heavy. Gas may be harmless, toxic, corrosive, or flammable	Physical hazard: Explosion hazard if they rupture. Asphyxiant hazard if they vent the gas to the workplace and it displaces oxygen.	Asphyxiants: Nitrogen, helium, any other non-oxygen gas Flammable: Hydrogen Toxic: Ammonia
Radiation/Radioactive Material	High energy particles (alpha and beta) or electromagnetic waves (X-rays and gamma rays).	Tissue & organ damage with high doses.	Uranium, Phosphorus32, Sodium 35, Iodine 125, X-rays
Physical hazards	Hazards from noise, machinery, heat, cold, etc.	Tissue damage and hearing loss.	Scrapes, cuts Cold injuries: liquid nitrogen, dry ice Heat injuries: burners
Biological Agents	Living organisms or products of living organisms such as Viruses, Bacteria, Fungi, Prions & Parasites. Hazards from infection with these agents are organism dependent & can range from	Level 1 - No hazard.	Baker's Yeast and E. coli K12

Definition	Hazards		Examples
	mild and treatable to severe and untreatable. Classification of hazard in four groups called biological safety levels with level 1 as the least hazard & level 4 as the extreme hazard.	Level 2 - Mild to severe illness.	Influenza, Polio and Salmonella
		Level 3 - Severe illness & possible death.	Tuberculosis and AIDS
		Level 4 - Not allowed at TTUHSC.	Haemorrhagic fever
Recombinant DNA	Genetically modified organisms with variations in genes within the organism.	Often unknown consequences once introduced to the human body.	Viral vectors like Adeno and Adeno-associated viruses used to transfect or express genes.
Toxins - Microbial, Plant, Animal	Poisons produced by plants, living organisms or animals.	Tissue and organ damage or death.	Plant - Ricin Animal - Fish and Snake venom Microbial - Staph, Tetanus

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Rules for Minors Working in Laboratories and Animal Facilities

1. Never work alone in any laboratory environment without direct, immediate adult supervision from the sponsor or someone designated by the sponsor.
2. Always follow the instructions of the sponsor or laboratory supervisor.
3. Always report any accident (regardless of severity or “near misses”) immediately to the sponsor or laboratory supervisor.
4. Always wear appropriate personal protective equipment as directed and dispose of it appropriately. Personal protective equipment includes, but is not limited to, safety glasses/goggles, gloves, lab coats/gowns/aprons, and other face/body protection as dictated by the subject hazards.
5. Always keep your hands away from your face and wash them well with soap and water prior to leaving any laboratory area.
6. Never eat, drink, chew gum, apply makeup or lip balm, or touch contact lenses while in any laboratory environment.
7. Always wear closed-toe shoes while in any laboratory.
8. Always tie long hair back to keep it from laboratory hazards.
9. Always wear clothing that reduces the amount of exposed skin. Shorts and sandals are prohibited in the laboratory.
10. Always ask questions if you don’t understand the safety requirements.