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SAFETY SPOTLIGHT:

Eye Protection

By Peter Nagle

In all U.S. industries combined, approximately 2,000 work-related eye injuries requiring medical attention happen every day. It is estimated that 90 percent of all eye injuries are avoidable. Two major reasons that workers experience eye injuries on the job are because they were:

1. Not wearing eye protection, or
2. Wearing the wrong kind of eye protection for the job they were doing

The majority of eye injuries result from small particles or objects striking or scraping the eye, such as: dust, cement chips, metal slivers, and wood chips. In lab settings, the most common type of eye injuries come from blood splashes, aerosols or touching the eye with a contaminated finger or a gloved finger and the sources are most commonly infectious or chemical.

Below are general guidelines to follow when assessing potential hazards to the eye in the lab and choosing and utilizing the proper eyewear.

How can we avoid eye injuries?

1. Know the eye hazards in your lab
2. See if you can eliminate the hazards before starting your work by using guards or other engineering controls
3. Use proper eye protection if hazards cannot be eliminated
4. Keep eye protection gear clean and in good condition

When should eye protection be worn?

1. When using chemicals
2. When working with heat sources
3. When working with materials or equipment under stress, pressure or force that may cause fragmentation or flying particles
4. When engaging in an activity that could generate projectiles, (i.e. uses elastic materials under stress like springs and rubber)

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5. When dust, fumes or aerosols are present
 6. When working with biological specimens
 7. When using sharp cutting tools
 8. When working with infectious materials
 9. When working with Class 3b and Class 4 lasers or laser systems.
- Ordinary safety glasses or goggles do not provide protection against lasers. Specific eyewear is required.

Which eye protection should be used?

All safety glasses/goggles must be ANSI Z87.1-2015 rated. ANSI stands for American National Standards Institute. There are several markings that are used to indicate the type of eye protection that the goggles and/or glasses are designed for:

- Z87 basic impact protection
- Z87+ high velocity impact rating
- D3 Splash and droplet protection
- D4 Dust protection
- D5 Fine dust protection
- W Welding, accompanied by a scale number between 1.3 and 14
- R Infrared light with a scale between 1.3 and 10
- L Visible light with a scale between 1.3 and 10
- U Ultraviolet with a scale between 2 and 6

What is the best eye protection for most lab activities?

Indirectly vented chemical splash goggles rated Z87.1-2015 + D3 are the best option when using laboratory hazards such as, but not limited to, hazardous chemicals, infectious material, heating sources, preserved specimens or dust/solid particles. These goggles must fit snugly on the face surrounding the eyes. The soft, pliable flange seals should extend around the eyes.

When should I use a face shield?

Face shields are used to protect the wearer's entire face from flying fragments, splashes, droplets and sprays from chemicals and molten metals. Face shields are not a substitute for indirectly vented chemical splash goggles which must be worn with the face shield. Face shields are marked with ANSI/ISEA Z87 for basic-impact and ANSI/ISEA Z87+ for high-impact use.

What are the current recommendations for contact lenses?

Contact lenses may be worn in the laboratory, provided appropriate eye protection is worn over the contact lenses. Contact lenses are not eye protection devices. Wearing contact lenses does not reduce or alter the requirements for eye and face protection necessary for the assigned task. Also, never handle contact lenses in the laboratory. Contact lenses must be removed or inserted in a clean environment outside the lab.

How often should eye protection be cleaned and sanitized?

Protective eyewear should be cleaned after each use. Cleaning is necessary after exposure to chemicals and physical materials (dirt and grime). Eyewear that has been exposed to biological materials must be sanitized or disinfected.

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What is required for protection when working with lasers?

When the eye is exposed to a laser beam, the lens in the eye focuses the beam into a tiny spot. This can actually burn the retina of the eye. OSHA requires that laser safety glasses or goggles be worn when operating or being around lasers that are Class 3b and Class 4. Class 3b lasers are lasers that are powered from 5 to 500 milliwatts and Class 4 lasers have output powers of more than 500 milliwatts. Laser safety eyewear is available for different wavelength ranges and for specific types of lasers. You need to determine the class of the laser you are working with as well as the appropriate wavelength range before purchasing laser protective eyewear.

How can you protect your eyes from x-rays?

Lead glasses can greatly reduce the risk of x-ray radiation exposure to only 2-3%. When purchasing lead safety glasses, it is important to purchase lead safety glasses with a glass lens instead of a plastic lens. Glass lenses are 10 times more effective at preventing exposure to x-ray radiation than plastic lenses.

What should be done in case of an eye injury?

Seek medical attention as soon as possible following an injury, particularly if you have pain in the eye, blurred vision, loss of vision or loss of field of vision. There are several simple first aid steps that can and should be taken until medical assistance is obtained.

Chemicals in the eye

- Immediately flush the eye with water for at least 15 minutes.
- If you are wearing contact lenses, do not wait to remove the lense. Begin flushing the eye immediately. This may wash the lens out of the eye.
- Do not try to neutralize the chemical with other substances.
- Do not bandage the eye.
- Seek immediate medical attention after flushing.

Particles in the eye

- Do not rub the eye.
- Try to let your tears wash the speck out or irrigate the eye with an artificial tear solution.
- Try lifting the upper eyelid outward and down over the lower eyelid to remove the particle.
- If the particle does not wash out, keep the eye closed, bandage it lightly and seek medical care.

Blows to the eye

- Gently apply a cold compress without putting pressure on the eye. Crushed ice in a plastic bag can be placed gently on the injured eye to reduce pain and swelling.
- In cases of severe pain or reduced vision, seek immediate medical care.

Sources: Alabama Optometric Association, National Science Teaching Association.



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Seasonal Safety: Winter

By Jesse Millen-Johnson

New Englanders have more experience with winter weather than residents of some other states and countries. Yet those of us who grew up here still forget the basics of cold season safety too often. Along with the excitement of fresh snow for skiing and frozen lakes and ponds for skating and ice fishing, winter brings unique risks.

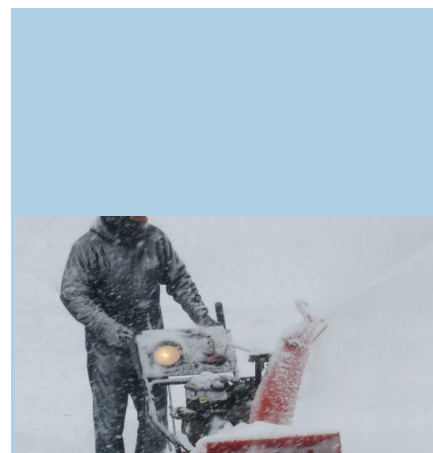
Every year, without fail, the first snow or ice events cause an unreasonably high number of vehicles to slide off roadways or crash into each other. Drivers forget that all-wheel drive doesn't stop you any faster and that most all-season tires are significantly less effective than snow tires in winter. Even with quality snow tires, stopping distances greatly increase on slippery surfaces. Uphill traction also suffers, which is readily apparent watching dozens of vehicles attempting certain local hills during snowstorms, then sliding helplessly back down or sideways into the curb.

With its warming climate, Maine is seeing less snowfall and more mixed precipitation, freeze/thaw cycles, and rain. This is especially true in coastal areas where both UNE campuses are located. Temperatures can rapidly drop below freezing after a rain or melt event, leading to almost invisible black ice on roads and walkways. Traveling in low-light or darkness during the short days of winter reduces visibility and can affect reaction times. And for the hardy souls that cycle year-round, slippery conditions and reduced daylight increase the risk of crashing or being struck by a vehicle.

Although UNE diligently works to clear snow and ice and improve traction on campus, those using sidewalks, parking lots, and stairs are still at higher risk for accidents and falls during winter. And in many area towns and cities, whether or not to clear sidewalks of snow and ice is ultimately up to the adjacent property owner, resulting in a patchwork of safe, marginal, and unsafe zones for walkers.



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Those are just a few of the risks. Frigid weather also increases chances for frostbite and hypothermia and straining to shovel heavy snow can cause back injuries and even heart attacks. EHS asks readers to review the following winter safety tips and be mindful of them during the colder months:

- “Walk like a penguin” in slippery conditions. Widen your stance and arms, lower your center of gravity, and take short steps.
- Use warm footwear with an aggressive tread and consider using traction devices like micro spikes on especially slick terrain.
- Hold on to handrails and other objects to support yourself when using stairs and walkways.
- Stay hydrated. Dehydration is less noticeable during winter but still hazardous.
- Use dedicated snow tires during winter. If this isn’t practical or financially feasible, at least use an all-season tire that is rated highly for snow and ice and has adequate tread depth remaining.
- Have a blanket, hat, gloves, jacket, and flashlight or headlamp available in your vehicle at all times.
- An ice scraper/brush is a must for clearing ice and snow from windshields. A small snow shovel is also handy if you find yourself stuck in a snowbank.
- A set of chains is helpful to have on hand, especially for vehicles without all-wheel drive.
- Always use reflective materials and lights when cycling, running, or walking during low light periods.
- If you (even slightly) hurt yourself on campus by falling, etc., immediately report the incident to UNE Security.
- Report any potentially unsafe areas on campus to Security.
- Significantly reduce driving speed in snowy, icy, or wet conditions.
- Increase your following distance behind the car ahead of you.
- If you start to slide while driving, take your foot OFF the brake and gas and avoid sudden/dramatic steering movements.
- If skidding in one direction, such as toward the edge of the road, briefly turn INTO (towards) the skid. This may seem counterintuitive but it allows the wheels to straighten out and send the car in the correct forward direction.
- It can be helpful to practice winter steering and braking (at a safe speed) in a snowy, empty parking lot from time to time.



SAFER AND MORE EFFECTIVE?

Possible substitutes for ethidium bromide

A potentially safer and more effective alternative to ethidium bromide is SYBR Safe DNA Gel Stain by ThermoFisher Scientific. Researchers at UNE have been using this and similar products recently, including the SYBR Green product line. They have informed EHS of positive results when used in place of ethidium bromide.

Ethidium bromide is a mutagen and is moderately toxic after an exposure. It can be absorbed directly through the skin.

ThermoFisher describes Invitrogen SYBR Safe DNA Gel Stain as "A highly sensitive stain for visualization of DNA in agarose or acrylamide gels." The company also states that it "Can be used with either blue-light or UV excitation." The stain can be utilized for staining RNA in gels and is available in a concentrate or a ready-to-use solution that can be used just like ethidium bromide solution.



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Chemical Exposures

By Jesse Millen-Johnson

An accidental chemical exposure can be highly stressful, making the correct next steps difficult to remember and carry out. That's why a periodic refresher on proper procedures after chemical inhalation or contact with eyes or skin is especially important. Please review the following on a regular basis:

Chemicals on Skin or Clothing

1. Immediately flush with water for no less than 15 minutes (except for hydrofluoric acid, flammable solids or >10% phenol – see below). For larger exposures, use a safety shower.

For flammable solids on skin, first brush off as much of the solid as possible, then proceed to step 2.

For hydrofluoric acid, rinse with water for five minutes and apply calcium gluconate gel, then call UNE Security or 911. If no gel is available, rinse for 15 minutes and call Security or 911.

For phenol concentrations more than 10%, immediately irrigate or swab the affected area with polyethylene glycol (PEG). If PEG is not available, rinse with large volumes of water for 15 minutes. Do not use ethanol. Proceed to step 2.

2. While rinsing, quickly remove all contaminated clothing or jewelry. Seconds count. Do not waste time because of modesty. Use caution when removing pullover shirts or sweaters to prevent contamination of the eyes.

3. Call UNE Security and/or 911 as appropriate.

4. Check the Safety Data Sheet (SDS) to determine whether to expect delayed effects.

5. Discard contaminated clothing or launder them separately from other clothing. Leather garments or accessories cannot be decontaminated and should be discarded.

6. Do not use solvents to wash skin. They remove the natural protective oils from the skin and can cause irritation and inflammation. In some cases, washing with a solvent may facilitate absorption of a toxic chemical.

Chemicals in Eyes

1. Immediately flush eyes with water for at least fifteen minutes.

2. Hold eyelids away from your eyeball and rotate your eyes so that all surfaces may be washed thoroughly.

3. Use an eye wash when possible so that hands are free to hold the eyes open.

If an eyewash is not available, pour water on the eye, rinsing from the nose outward to avoid contamination of the unaffected eye.

4. Remove contact lenses while rinsing. Do not lose time removing contact lenses before rinsing. Do not attempt to rinse and reinsert contact lenses.

5. Seek medical attention regardless of the severity or apparent lack of severity. Call UNE Security and/or 911 as appropriate. Explain carefully what chemicals were involved.

Chemical Inhalation

1. Close containers, open windows or otherwise increase ventilation, and move to fresh air.

2. Call UNE Security and/or 911 as appropriate. Explain carefully what chemicals were involved.

3. Review SDS(s) to determine what health effects are expected, including delayed effects. If symptoms, such as headaches, nose or throat irritation, dizziness, or drowsiness persist, seek medical attention.

Sources: Princeton University EHS and OSHA.



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