

# Lightning Safety

## Summary Fact Sheet (OSHA - DTSEM FS-3863 and NOAA)

Lightning is a dangerous natural force. Annually over 300 people are struck by lightning. During the past 30 years, about 50 people, on average, have been killed by lightning strikes every year, and many more suffer permanent disabilities. Lightning is unpredictable and can strike outside the heaviest rainfall areas or even up to 10 miles from any rainfall.

**When thunder roars, go indoors!** Thunderstorms always include lightning. NOAA advises that nowhere outside is safe when thunderstorms are in your area. **Check NOAA Weather Reports:** (weather.gov). Continuously monitor weather conditions and watch for darkening clouds and increasing wind speeds. When possible seek shelter in buildings. Remain in the shelter for at least **30 minutes** after hearing the last sound of thunder. Use **Vehicles as Shelter**. Remain in the vehicle with windows rolled up for at least **30 minutes** after hearing the last sound of thunder. Cell phones and cordless phones may be used safely.

**What is lightning?** Lightning is a giant spark of electricity in the atmosphere between clouds or between a cloud and the ground. Lightning can occur:

- Between the cloud and the ground (cloud-to-ground lightning)
- Within and between thunderstorm clouds (intra- and inter-cloud lightning)

For more information, see: <http://www.nssl.noaa.gov/education/svrwx101/lightning/faq/>

### If Caught Outside in a Thunderstorm

If you find yourself caught outside during a thunderstorm, there may be nothing you can do to prevent being struck by lightning. There simply is no safe place outside in a thunderstorm. If you are caught outside follow NOAA's recommendations to decrease the risk of being struck.

- Lightning is likely to strike the tallest objects in a given area—you should not be the tallest object.
- Avoid isolated tall trees, hilltops, utility poles, cell phone towers, cranes, large equipment, ladders, scaffolding, or rooftops.
- Avoid open areas, such as fields. **Never lie flat on the ground.**
- Retreat to dense areas of smaller trees that are surrounded by larger trees, or retreat to low-lying areas (e.g., valleys, ditches) but watch for flooding.
- Avoid water, and immediately get out of and away from bodies of water (e.g., pools, lakes).

Water does not attract lightning, but it is an excellent conductor of electricity.

Do not shelter in sheds, pavilions, tents, or covered porches as they do not provide adequate protection from lightning.

## Five Ways Lightning Strikes People (NOAA – National Weather Service)

1. **Direct Strike** - Most often, direct strikes occur to victims who are in open areas. Direct strikes are not as common as the other ways people are struck by lightning, but they are potentially the most deadly.
2. **Side Flash** - A side flash occurs when lightning strikes a taller object near the victim and a portion of the current jumps from taller object to the victim. Side flashes generally occur when the victim is within a foot or two of the object that is struck. Most often, side flash victims have taken shelter under a tree to avoid rain or hail.
3. **Ground Current** - When lightning strikes a tree or other object, much of the energy travels outward from the strike in and along the ground surface. This is known as the ground current. Anyone outside near a lightning strike is potentially a victim of ground current. In addition, ground current can travel in garage floors with conductive materials. Because the ground current affects a much larger area than the other causes of lightning casualties, the ground current causes the most lightning deaths and injuries. Ground current also kills many farm animals.
4. **Conduction** - Lightning can travel long distances in wires or other metal surfaces. Metal does not attract lightning, but it provides a path for the lightning to follow. Most indoor lightning casualties and some outdoor casualties are due to conduction. Whether inside or outside, anyone in contact with anything connected to metal wires, plumbing, or metal surfaces that extend outside is at risk. This includes anything that plugs into an electrical outlet, water faucets, showers, corded phones, and windows and doors.
5. **Streamers** - While not as common as the other types of lightning injuries, people caught in “streamers” are at risk of being killed or injured by lightning. Streamers develop as the downward-moving leader approaches the ground. Typically, only one of the streamers makes contact with the leader as it approaches the ground and provides the path for the bright return stroke; however, when the main channel discharges, so do all the other streamers in the area. If a person is part of one of these streamers, they could be killed or injured during the streamer discharge even though the lightning channel was not completed between the cloud and the upward streamer.

# Lightning Safety for You and Your Family

## (National Weather Service, NOAA)

### ➤ Don't Get Caught Outside

- ✓ Avoid open areas. Don't be the tallest object in the area.
- ✓ Stay away from isolated tall trees, towers or utility poles. Lightning tends to strike the taller objects in an area.
- ✓ Stay away from metal conductors such as wires or fences. Metal does not attract lightning, but lightning can travel long distances through it.
- ✓ If you are with a group of people, spread out. While this actually increases the chance that someone might get struck, it tends to prevent multiple casualties, and increases the chances that someone could help if a person is struck.

### ➤ If Someone Is Struck

Cardiac arrest is the immediate cause of death for those who die. Lightning victims do not carry an electrical charge and may need first aid immediately.

- ✓ Call for help. Call 9-1-1.
- ✓ Give first aid. Begin CPR if you are trained.
- ✓ Use an Automatic External Defibrillator if one is available. These units are lifesavers!
- ✓ Don't be a victim. If possible, move the victim to a safer place. Lightning CAN strike twice.

### ➤ What You Might Not Know About Lightning

- ✓ **All thunderstorms produce lightning and are dangerous.** Fortunately, people can be safe if they follow some simple guidelines when thunderstorms are forecast.
- ✓ **Lightning often strikes outside the area of heavy rain and may strike as far as 10 miles from any rainfall.** Many lightning deaths occur ahead of storms before any rain arrives or after storms have seemingly passed and the rain has ended.
- ✓ **If you can hear thunder, you are in danger.** Don't be fooled by blue skies. If you hear thunder, lightning is close enough to pose an immediate threat.
- ✓ **Lightning leaves many victims with permanent disabilities.** While only about 10% of lightning victims die, many survivors must live the rest of their lives with intense pain, neurological disabilities, depression, and other health problems.

## ➤ **Avoid The Lightning Threat**

- ✓ **Have a lightning safety plan.** Know where you'll go for safety and ensure you'll have enough time to get there.
- ✓ **Postpone activities.** Consider postponing activities if thunderstorms are forecast.
- ✓ **Monitor the weather.** Once outside, look for signs of a developing or approaching thunderstorm such as towering clouds, darkening skies, or flashes of lightning.
- ✓ **Get to a safe place.** If you hear thunder, even a distant rumble, seek safety immediately. Fully enclosed buildings with wiring and plumbing are best. A hard-topped metal vehicle with the windows closed is also safe. Stay inside until 30 minutes after the last rumble of thunder. Sheds, picnic shelters, tents or covered porches do NOT protect you from lightning.
- ✓ **If you hear thunder, don't use a corded phone except in an emergency.** Cordless phones and cell phones are safe to use.
- ✓ **Keep away from electrical equipment and plumbing.** Lightning will travel through the wiring and plumbing if your building is struck. Don't take a bath or shower, or wash dishes during a storm.

## ➤ **Last Resort Outdoor Risk Reduction Tips**

If you are caught outside with no safe shelter anywhere nearby the following actions may reduce your risk:

- ✓ Immediately get off elevated areas such as hills, mountain ridges or peaks
- ✓ Never lie flat on the ground
- ✓ Never shelter under an isolated tree
- ✓ Never use a cliff or rocky overhang for shelter
- ✓ Immediately get out and away from ponds, lakes and other bodies of water
- ✓ Stay away from objects that conduct electricity (barbed wire fences, power lines, windmills, etc.)

## **Lightning Myths and Facts**

### **(National Weather Service, NOAA)**

**Myth:** If you're caught outside during a thunderstorm, you should crouch down to reduce your risk of being struck.

**Fact:** Crouching doesn't make you any safer outdoors. Run to a substantial building or hard topped vehicle. If you are too far to run to one of these options, you have no good alternative. You are NOT safe anywhere outdoors.

**Myth:** Lightning never strikes the same place twice.

**Fact:** Lightning often strikes the same place repeatedly, especially if it's a tall, pointy, isolated object. The Empire State Building is hit an average of 23 times a year

**Myth:** If it's not raining or there aren't clouds overhead, you're safe from lightning.

**Fact:** Lightning often strikes more than three miles from the center of the thunderstorm, far outside the rain or thunderstorm cloud. "Bolts from the blue" can strike 10-15 miles from the thunderstorm.

**Myth:** Rubber tires on a car protect you from lightning by insulating you from the ground.

**Fact:** Most cars are safe from lightning, but it is the metal roof and metal sides that protect you, NOT the rubber tires. Remember, convertibles, motorcycles, bicycles, open-shelled outdoor recreational vehicles and cars with fiberglass shells offer no protection from lightning. When lightning strikes a vehicle, it goes through the metal frame into the ground. Don't lean on doors during a thunderstorm.

**Myth:** A lightning victim is electrified. If you touch them, you'll be electrocuted.

**Fact:** The human body does not store electricity. It is perfectly safe to touch a lightning victim to give them first aid. This is the most chilling of lightning Myths. Imagine if someone died because people were afraid to give CPR!

**Myth:** If outside in a thunderstorm, you should seek shelter under a tree to stay dry.

**Fact:** Being underneath a tree is the second leading cause of lightning casualties. Better to get wet than fried!

**Myth:** If you are in a house, you are 100% safe from lightning.

**Fact:** A house is a safe place to be during a thunderstorm as long as you avoid anything that conducts electricity. This means staying off corded phones, electrical appliances, wires, TV cables, computers, plumbing, metal doors and windows. Windows are hazardous for two reasons: wind generated during a thunderstorm can blow objects into the window, breaking it and causing glass to shatter and second, in older homes, in rare instances, lightning can come in cracks in the sides of windows.

**Myth:** If thunderstorms threaten while you are outside playing a game, it is okay to finish it before seeking shelter.

**Fact:** Many lightning casualties occur because people do not seek shelter soon enough. No game is worth death or life-long injuries. Seek proper shelter immediately if you hear thunder. Adults are responsible for the safety of children.

**Myth:** Structures with metal, or metal on the body (jewelry, cell phones, Mp3 players, watches, etc), attract lightning.

**Fact:** Height, pointy shape, and isolation are the dominant factors controlling where a lightning bolt will strike. The presence of metal makes absolutely no difference on where lightning strikes. Mountains are made of stone but get struck by lightning many times a year. When lightning threatens, take proper protective action immediately by seeking a safe shelter and don't waste time removing metal. While metal does not attract lightning, it does conduct it so stay away from metal fences, railing, bleachers, etc.

**Myth:** If trapped outside and lightning is about to strike, I should lie flat on the ground.

**Fact:** Lying flat increases your chance of being affected by potentially deadly ground current. If you are caught outside in a thunderstorm, you keep moving toward a safe shelter.

**Myth:** lightning flashes are 3-4 km apart

**Fact:** Old data said successive flashes were on the order of 3-4 km apart. New data shows half the flashes are about 9 km apart. The National Severe Storms Laboratory report concludes: "It appears the safety rules need to be modified to increase the distance from a previous flash which can be considered to be relatively safe, to at least 10 to 13 km (6 to 8 miles). In the past, 3 to 5 km (2-3 miles) was as used in lightning safety education." Source: Separation Between Successive Lightning Flashes in Different Storms Systems: 1998, Lopez & Holle, from Proceedings 1998 Intl Lightning Detection Conference, Tucson AZ, November 1998.