



Safety Brief

JCFPD Training Division

October 2005

2005-1



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Carbon Monoxide

Carbon monoxide is a colorless, odorless, and tasteless gas that is produced by the chemical process of decomposition or combustion. Carbon monoxide may also be identified by its chemical symbol, CO (pronounced *see-oh*).

Firefighter Exposure

Firefighters may be exposed to carbon monoxide in the following ways:

- During the overhaul phase of firefighting,
- When responding to people trapped in confined spaces, such as tanks, septic tanks, and grain silos,
- During the response to CO alarms in residences,
- When in fire stations equipped with gas-fired appliances, such as water heaters, dryers, and heaters, and
- Operating small gasoline-powered engines or vehicle engines in a closed fire station.

Health Effects

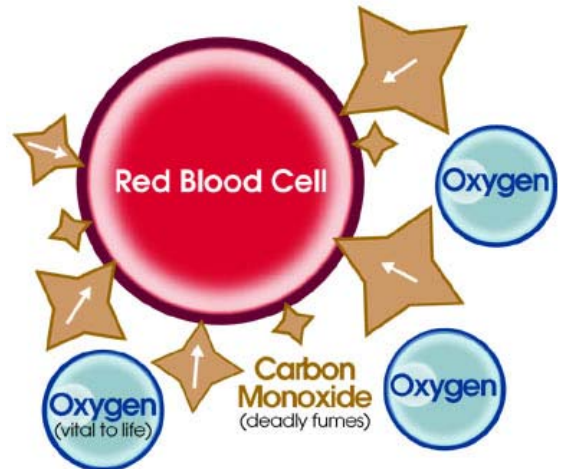
According to the Centers for Disease Control and Prevention, CO can cause headaches, dizziness, weakness, nausea, vomiting, chest pain, and confusion. At high levels, CO can cause loss of consciousness and death! People with heart disease, anemia, or respiratory disease are at increased risk.

How Carbon Monoxide Poisons

The lungs are designed to exchange gases as we breathe. Each inhalation brings in oxygen and each exhalation disposes of carbon dioxide. (Carbon dioxide is a waste product of cellular activity in the body.) Gases pass from the lungs to the blood

stream and from the blood stream to the lungs.

When firefighters are exposed to CO, the CO molecules attach to red blood cells in the lungs more easily than oxygen molecules. As a result, even short exposures can cause health effects. After leaving the CO-contaminated environment, CO molecules take a long time to detach from the blood stream and exit the body.



(Graphic from Centers for Disease Control and Prevention)

Protect Yourself

Firefighters must protect themselves from carbon monoxide during emergency responses and at the fire station. During emergency responses:

- Wear your SCBA during overhaul operations until a district-provided CO monitor confirms that CO levels have returned to safe levels.
- Don't enter confined spaces until CO levels are identified.
- Wear your SCBA when entering homes with operating CO alarms. Don't remove your SCBA until CO levels are determined by district-provided CO monitors.
- Ventilate fire stations when operating internal combustion engines indoors.
- Check station gas-fired appliances regularly.



Safety Brief

JCFPD Training Division

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2005-2



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Firefighters and Heart Attacks



In 2004, 103 firefighters died as a result of their official duties. As in previous years, a significant number of these deaths

were a result of sudden cardiac arrests. The information below is provided to give you a better understanding of how heart attacks kill firefighters.

Firefighter Activities

In 2004, firefighters who died of heart attacks were engaged in the following activities:

- 14 of 35 deaths (40%) responding to or returning from alarms were due to sudden cardiac death.
- 10 of 29 deaths (35%) at the scene of an emergency were due to sudden cardiac death.
- 8 of 18 deaths (45%) during non-emergency on-duty activities were due to sudden cardiac death.
- 7 of 12 deaths (58%) during training were a result of sudden cardiac death.
- 5 of 9 deaths (55%) at non-fire emergencies were a result of sudden cardiac death.

Signs of a Heart Attack

Recognizing the signs of a heart attack is the first step to increasing the survivability of firefighters. Most heart attacks are the result of stress, and the first signs are mild discomfort or pain. According to the American Heart Association, the following signs also suggest that a heart attack could be occurring:

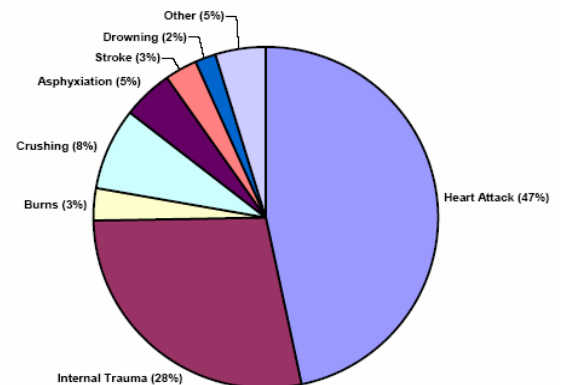
- Chest discomfort—pressure, squeezing, or pain in the center of the chest;
- Discomfort in the upper body—pain in one or both arms, the back, neck, jaw, or stomach;
- Shortness of breath—with or without chest discomfort;
- Other signs—cold sweat, nausea, or lightheadedness.

Women may be less likely to have chest pain than men, so the other symptoms may be the first clue.

The Role of Age

In 2004, for firefighters over age 40 at the time of death, 60% died from heart attacks. No career firefighters over the age of 60 died from a heart attack, but 12 volunteer firefighters over the age of 60 died from sudden cardiac death.

Figure 4
Firefighter Deaths by Nature of Injury -- 2004



(Graphic from NFPA's Firefighter Fatalities in the United States--2004)

Protect Yourself

JCFPD sponsors annual training in cardiopulmonary resuscitation (CPR) and the use of an artificial external defibrillation (AED). Firefighters should be prepared to recognize the signs of a heart attack, contact EMS immediately, and be prepared to use their CPR and AED skills to assist their fellow firefighters.



Safety Brief

JCFPD Training Division

December 2005

2005-3



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Ventilation Operations



Ventilation activities can be among the most dangerous tasks in the fire service. Ventilation tasks put firefighters into close contact with fire by-products,

and firefighters must be alert to avoid injuries. Ventilation is a complex undertaking and requires many firefighting skills. These skills include ladder climbing, proper use of safety equipment, hand tool use, mechanical tool use, and hose line operations.

What is Ventilation?

Ventilation is the systematic removal of smoke, heat, and combustible gases from a fire building. All of these elements are capable of producing injuries or death. Additionally, ventilation activities often take place on roofs or working off of ladders, using tools that can cut firefighters just as easily as they cut roofing materials. Even the simple task of breaking out a window can send glass shards flying and requires safety precautions.

Tools Used for Ventilation

All firefighters assigned to ventilation tasks must wear full protective clothing. This includes helmets with faceshields, bunker gear, boots, and gloves. Firefighters who may be exposed to fire by-products must also wear SCBA.

Firefighters assigned to horizontal ventilation often use ladders, pike poles, and axes to remove glass from window openings. Before breaking glass, firefighters should know where the glass will fall, remove unprotected people (both civilians and firefighters not wearing personal protective equipment) from the area, and warn others in the area.

Firefighters assigned to vertical ventilation often use ladders to access the roof, axes or chain saws to cut the roof decking, pike poles to open the ceiling below the attic space, and a hose line for protection against rapid fire development.

Positive pressure ventilation uses exhaust fans to pressurize a building to push out smoke. Position the exhaust fan so firefighters can still use the entrance safely. At all times, use caution when re-fueling gasoline-powered equipment such as chain saws or exhaust fans.

Avoiding Injury

Some safety tips for ventilation activities include:

- Always wear all personal protective equipment and SCBAs;
- Operate within the Incident Command System;
- Raise ladders above the roof line so they can be found quickly in an emergency;
- Take a hoseline and radio to the roof every time!
- Use roof ladders to distribute the weight;
- Use caution around roof edges or when openings have been cut in the roof;
- Keep firefighters out of the cutting zone;
- Start chain saws on the ground to make sure they will start, but turn them off before carrying them to the roof;
- Watch for overhead wires and obstructions;
- Sound the roof with an axe when operating off the roof ladder;
- Always stand upwind when cutting holes in roofs or when knocking out window glass;
- Remove all glass from openings; and
- Always work in pairs—never work alone!



Protect Yourself

Remember to take your common sense with you when you engage in ventilation activities. When you think about your safety and the safety of your crew, you will select the proper tools, wear your protective clothing, and be alert for unexpected danger. By following these simple procedures, ventilation activities can be conducted efficiently and safely.