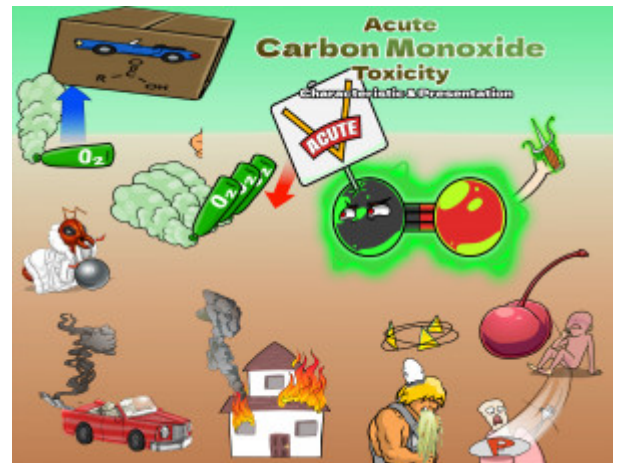


Acute Carbon Monoxide Toxicity Characteristics and Presentation

Acute carbon monoxide toxicity is characterized by the presence of carboxyhemoglobin, resulting in a decrease in Hemoglobin's Oxygen Carrying Capacity and an Increase in Hemoglobin's Oxygen Affinity. Anaerobic metabolism is induced due to an oxygen deficiency. Exposure can occur due to vehicle exhaust and house fires. Patients can experience altered mental status, headache, nausea, vomiting, dyspnea, and "cherry red" skin. Patients can sometimes also present with cyanide toxicity, especially in fire victims.



PLAY PICMONIC

Characteristics

Carboxyhemoglobin

[Car-box-he-man-globe](#)

Carbon monoxide in the bloodstream will bind hemoglobin and form carboxyhemoglobin. Patients are commonly found unconscious, which makes history taking challenging. For this reason, emergency medical services are provided with the ability to measure environmental CO levels. A history of exposure plus a confirmatory test confirms carbon monoxide toxicity.

Decreases Hemoglobin's Oxygen Carrying Capacity

[Down-arrow He-man-globe cannot carry Oxygen-tank](#)

Carbon monoxide (CO) binds very strongly to hemoglobin (>200 times stronger than oxygen), resulting in competition between CO and oxygen. A decrease in hemoglobin's oxygen-carrying capacity occurs due to the strong affinity of CO to hemoglobin over oxygen.

Increases Hemoglobin's Oxygen Affinity

[Up-arrow He-man-globe holding tight Oxygen-tank](#)

Carbon monoxide binds hemoglobin >200 times more strongly than oxygen does. The presence of carbon monoxide causes hemoglobin to try to hold tightly onto oxygen due to low oxygen levels in red blood cells. This increase in hemoglobin's oxygen affinity will cause less oxygen delivery to the tissues. As a result, the Hb-oxygen dissociation curve is shifted to the left.

Anaerobic Metabolism

[Ant-robe Metal-ball](#)

Carbon monoxide binds to cytochrome C oxidase and interferes with complex IV of the electron transport chain. This will result in an inhibition of aerobic metabolism, causing hypoxia and the induction of anaerobic metabolism.

Etiologies

Vehicle Exhaust

[Vehicle with Exhaust-fumes](#)

Carbon monoxide can be produced by motor vehicle exhaust. It is one of the most common causes of fatal poisonings besides ethyl alcohol and drug intoxication.

House Fires

[House Fires](#)

All house fires release carbon monoxide, carbon dioxide, and particulate matter (PM or soot). They can also contain many different chemicals. Gas heaters can also produce carbon monoxide, especially unvented gas heaters at home during winter. It vents the gases into the room rather than outdoors.

Clinical Features

Altered Mental Status

Delta-halos

Carbon monoxide toxicity can cause altered mental status. Coma can occur if the CO-Hb levels are $>50\%$ in the blood. Other clinical features include convulsion, respiratory depression, and death.

Headache

Headache-egg-lump

The most common symptom found in patients with carbon monoxide toxicity is a headache. It may be seen in the CO-Hb levels around 20-30%.

Nausea and Vomiting

Vomiting

Nausea and vomiting are some of the most common symptoms seen in carbon monoxide toxicity.

Dyspnea

Disc-P-lungs

Carbon monoxide toxicity will cause less oxygen in the blood and low delivery of oxygen to tissues. This will induce the respiratory system to work harder, resulting in shortness of breath (dyspnea).

"Cherry Red" Skin

Skin-suit guy with cherries

There is no pathognomonic feature that is usually seen in patients with carbon monoxide toxicity. However, cherry red appearance of the skin will help distinguish the condition from other disorders, but it is a rare finding among patients.

Associations

Cyanide Toxicity

Sais with Toxic-green-glow

Patients with carbon monoxide toxicity sometimes can also present with cyanide toxicity. This is common in patients exposed to house fires.