

# CARBON MONOXIDE

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# Carbon monoxide - CO

colourless and odourless gas

little bit lighter than air

rise due to incomplet combustion of organic materials

Toxicity are due to its great affinity to haemoglobin and rise carboxy haemoglobinu (COHb), affinity is 200-300 times greater than oxygen, CO can displace oxygen from the red blood cells and progressively diminish the ability of the blood to transport oxygen to the tissues and begin inner hypoxia



# Sources of CO

in the past: CO was constituent of „coal gas“


gas appliances and heating systems (heaters, boilers, cookers)

- blocked chimneys

incomplete combustion  inadequate oxygen supply

fire in a house or building

industry

car exhaust  suicide: sit in the car in closed garage with running engine or lead a pipe from the exhaust through the window inside

# ZDROJE CO

## V DOMÁCNOSTI



# CO poisoning

Lethal dose is perhaps 700 ml of pure CO, or concentration in atmosphere is 0,5 - 1%<sub>vol</sub>

If you breathe pure air biological half life of COHb is 2-3 hours

Cigarette smokers could have in blood 6 –10% COHb

The sensitivity is individual – old peoples (pulmonary or cardiac diseases) kill much lower levels of CO

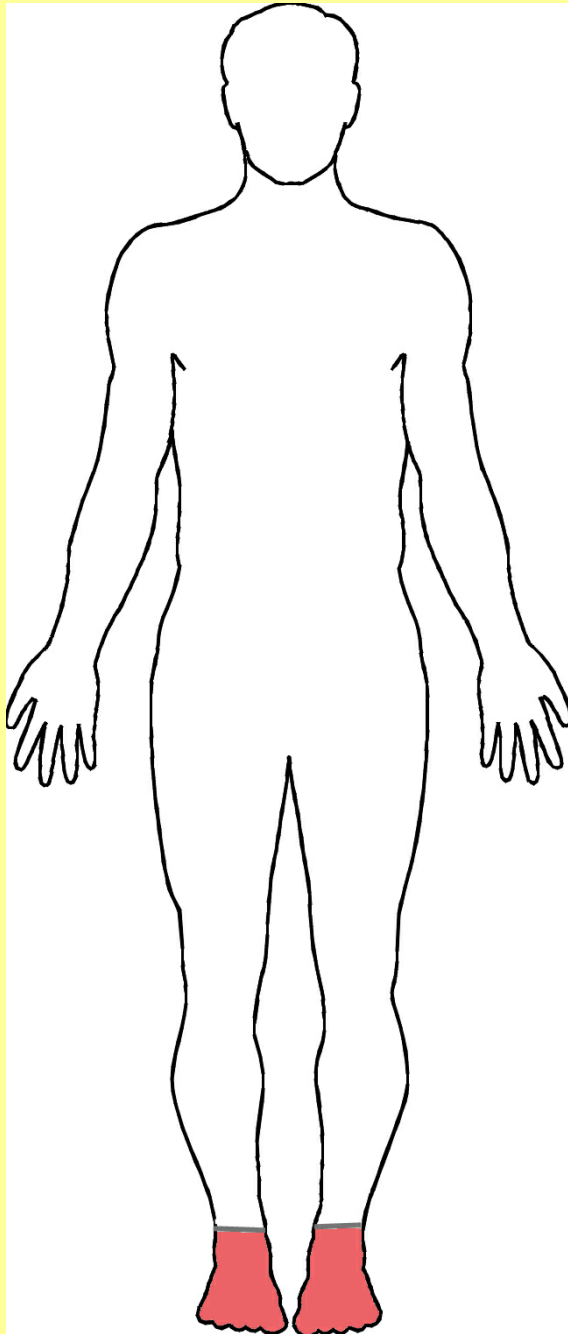


# CO poisoning

## Autopsy signs:

- ✓ Pink coloration of the skin („cherry pink“)
- ✓ Pink coloration of the brain tissue, congestion and oedema
- ✓ Pink coloration of the skeletal muscles
- ✓ Liquid and pink coloration of blood
- ✓ Ekchymosis(petechiae) in the serous membranes, in conjunctiva
- ✓ Pulmonary oedema

To chemical investigation (spectroscope, chromatography): blood

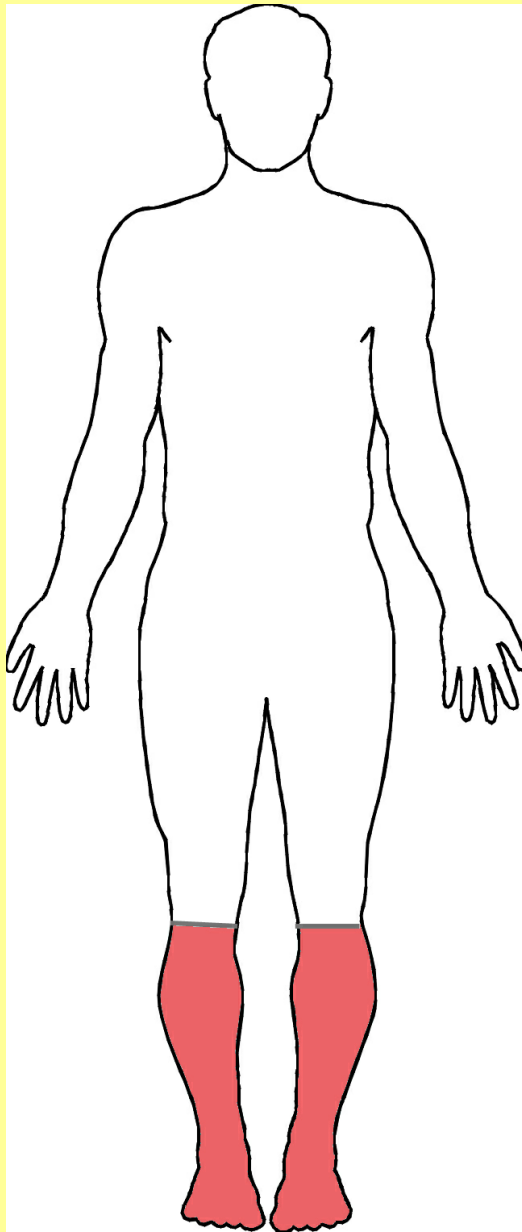


# COHb

**till 10 %**

**no symptoms**

**8 – 10 % cigarette smokers**



# COHb

**15 - 30 %**

**headache**

**little disorders of vision**

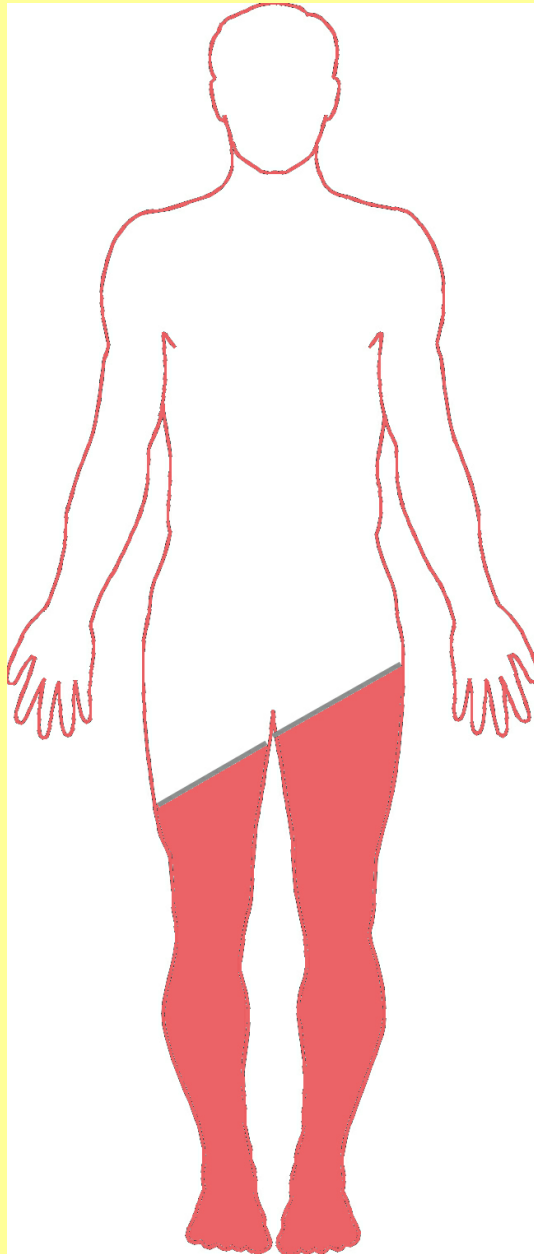
**dizziness**

**nausea**

**sleepiness**



# COHb



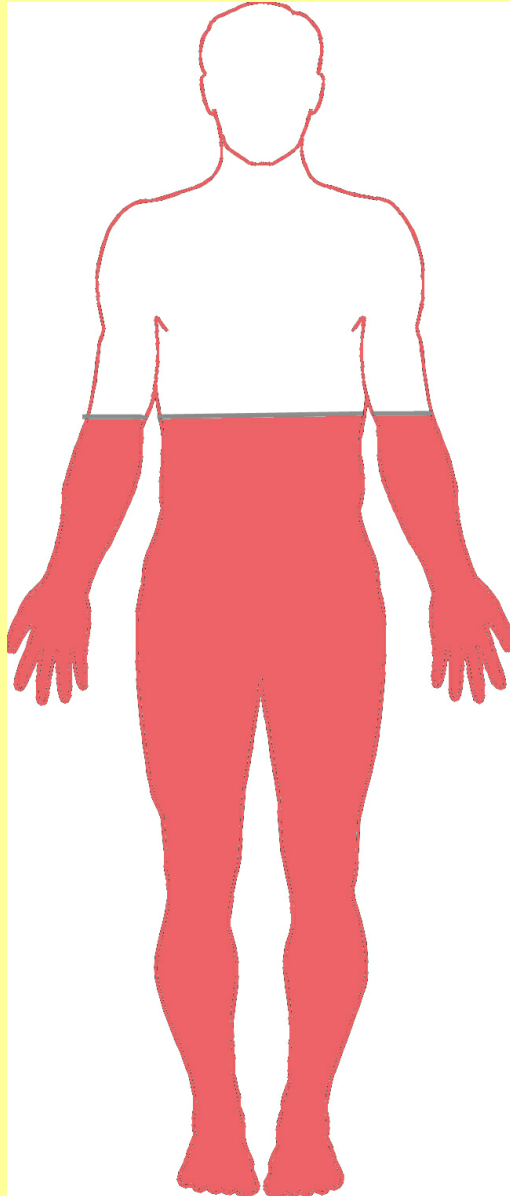
**30 – 40 %**

**pink coloured skin**

**loss of resoluteness and consciousness**

**stay on the place !!!**

**coordination and breath disorders**



# COHb

**50 – 60 %**

**unconsciousness**

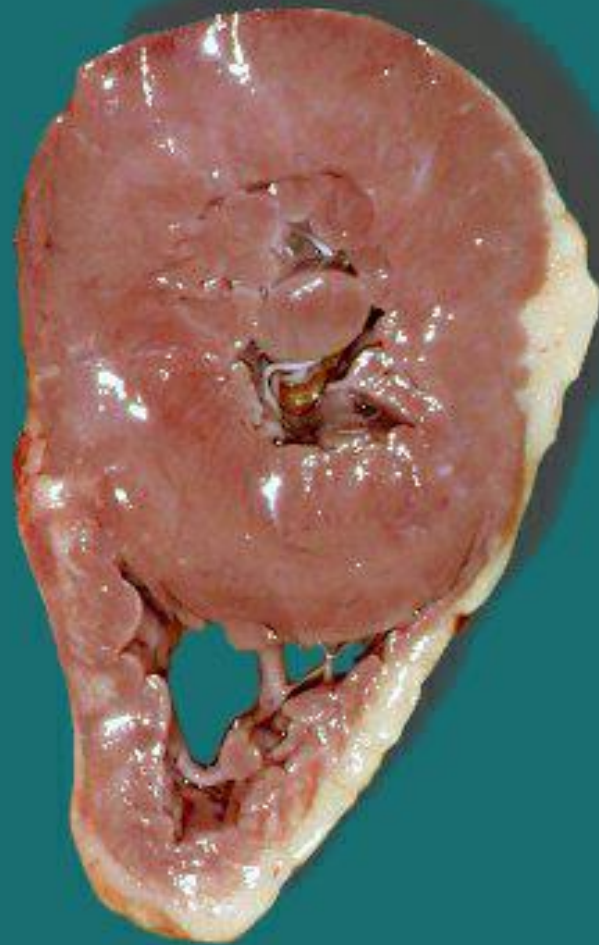
**convulsions**

**breathing depressed**

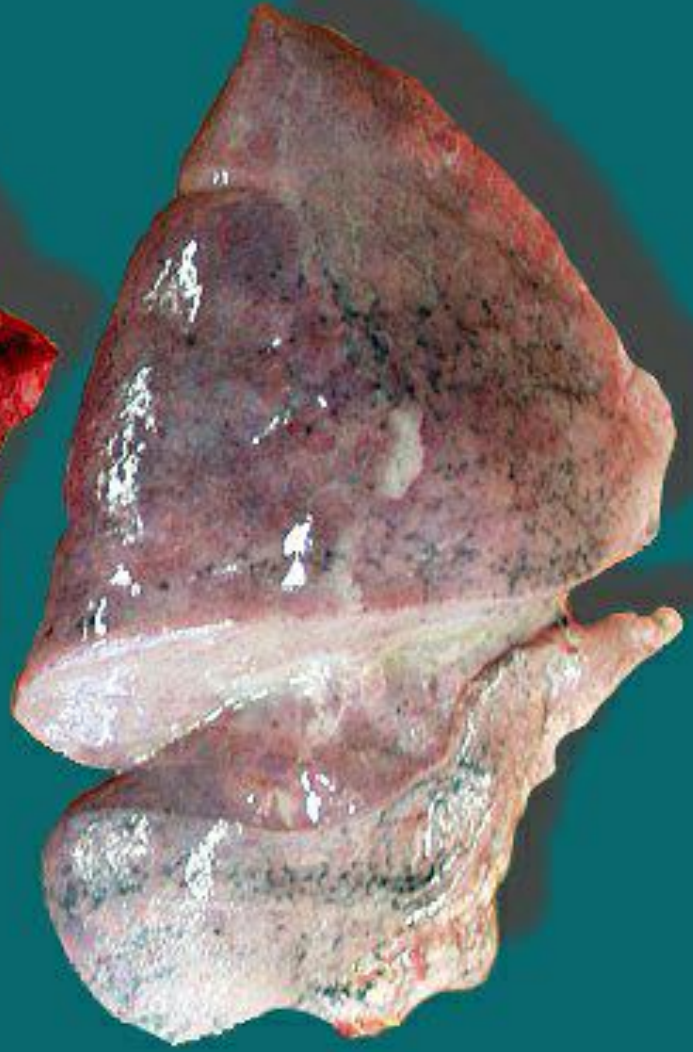
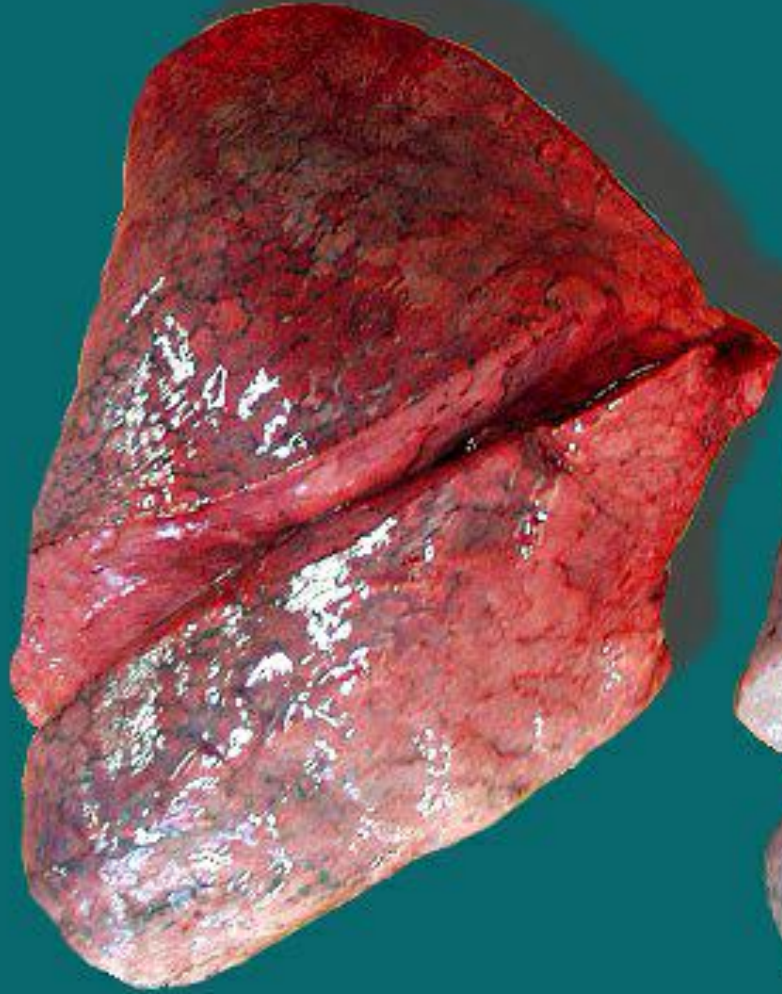
**heart failure**

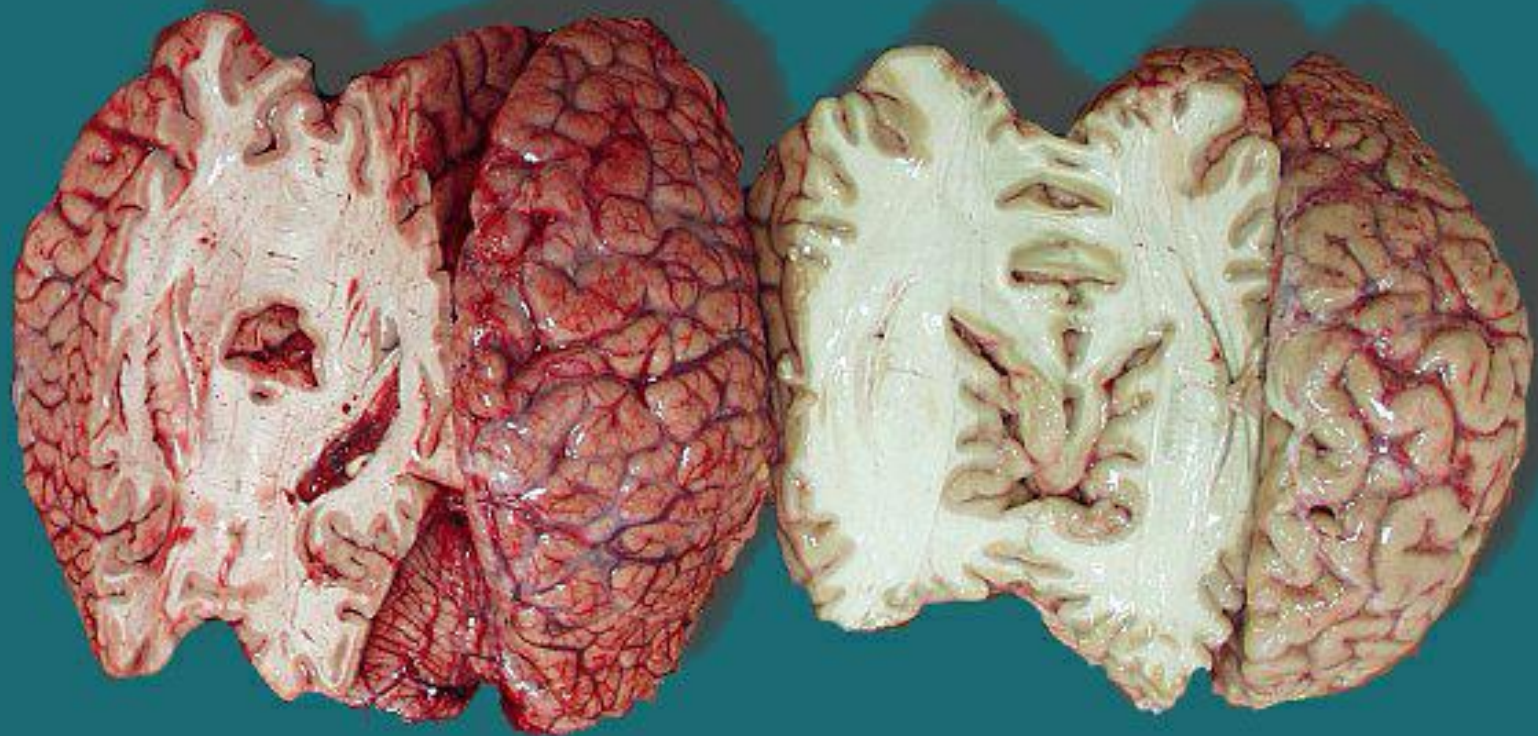
**brain oedema**



















# CO poisoning

COHb 54%



Woman in the place, where was a lot of smoke from heater, obturate chimney, carbon black (smut) on the face.



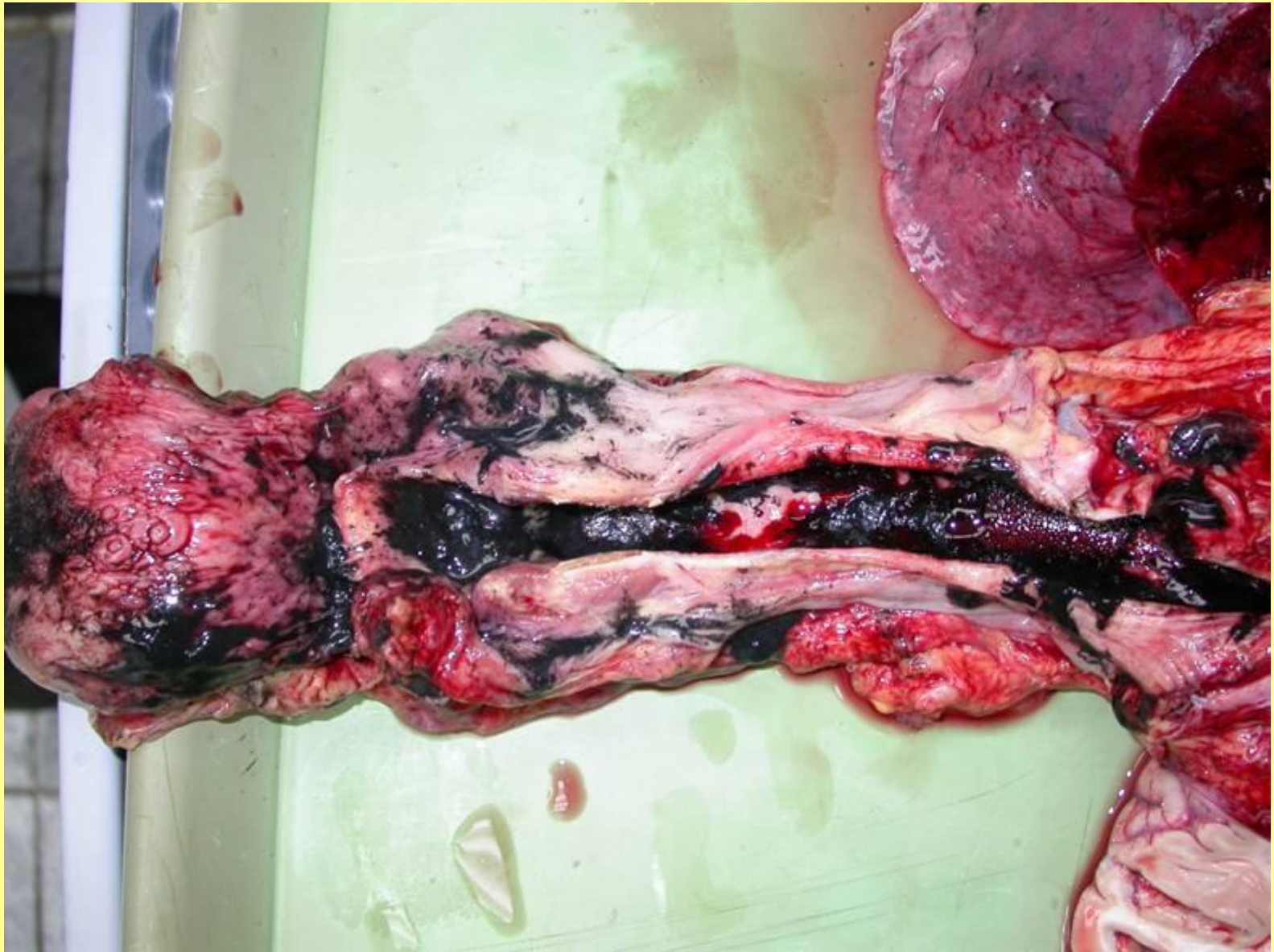


Carbon black (smut) is on the not covered places of body.



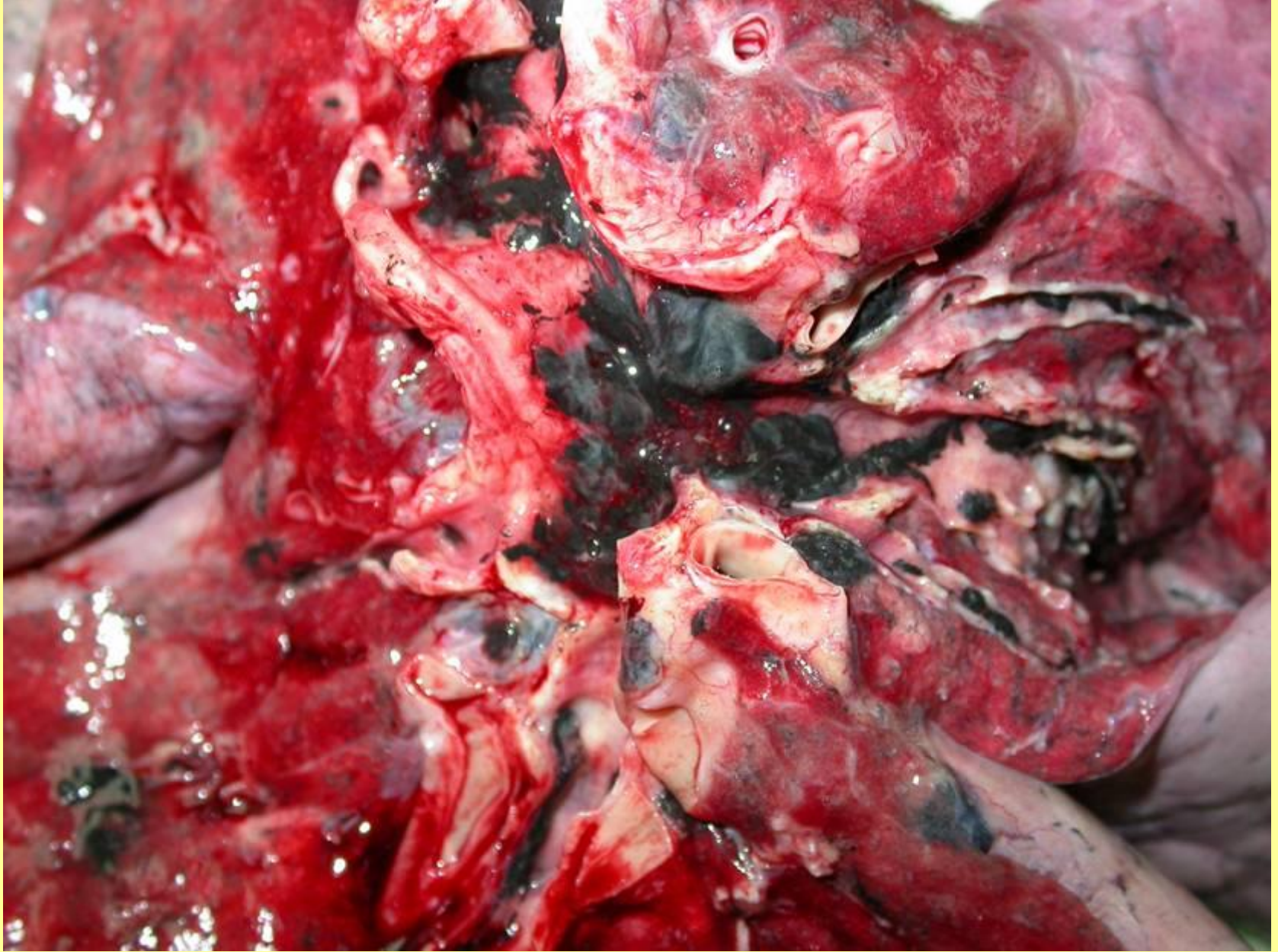
Pink cherry post mortem hypostasis.





Smut on the tongue, oesophagus, larynx and in the trachea.





Pink cherry lung and smut in the bronchial tree, congestion in tissue.



<b>% COHb</b>	<b>Symptoms</b>
0-10	no symptoms
10-20	tightness across forehead, possibly slight headache, dilatation of cutaneous blood vessels
20-30	headache and throbbing in temples
30-40	severe headache, weakness, dizziness, dimness of vision, nausea, vomiting, and collapse
40-50	same as previous item with more possibility of collapse and syncope, and increase respiration and pulse
50-60	syncope, increase respiration and pulse, coma with intermittent convulsions, and Cheyne-Stokes respiration
60-70	coma with intermittent convulsions, depressed heart action and respiration, and possibly death
70 <	weak pulse and slow respiration, respiratory failure, death

# Survive CO poisoning

- Necrosis or cavitation of the pallidum or putamen (Parkinsonian sy)
- Necrosis in the cortex and white matter
- Ring hemorrhages in the white matter

## Treatment

Pure oxygen

# Cyanogen gas (HCN)

- Cyanogen gas: lethal dose is 0,05 g = 25 bitter almonds
- Salts of cyanide: sodium and potassium
- Extremely poisonous → inhibition of the respiratory enzyme cytochrome oxidase, which prevents the uptake of oxygen by tissue cells
- Blood is light red and can't give off oxygen to tissues
- There is tissue anoxia
- Symptoms and death are often very rapid

# Sources

- Industry
- Vermin killers (rats)
- Chemists and laboratory
- Fumigation of fruit and ships
  
- Cyanide only acts as free cyanide, salts need to encounter with gastric acid before liberating HCN

# Post mortem finding

- Blood is pink or light red
- Post mortem hypostasis are light red
- Characteristic smell, odour from bitter almonds
- Congestion of organs and light red colour
- Erosions or haemorrhages of oesophagus and stomach, corrosion due to cyanide salt

# Little dose of HCN

- Headache
- Bitter taste in mouth
- Salivation
- Vomiting
- Dizziness
- Astmatic problems
- Convulsions
- Paralysis
- Low pulse
- Cold skin

NaCN poisoning























