

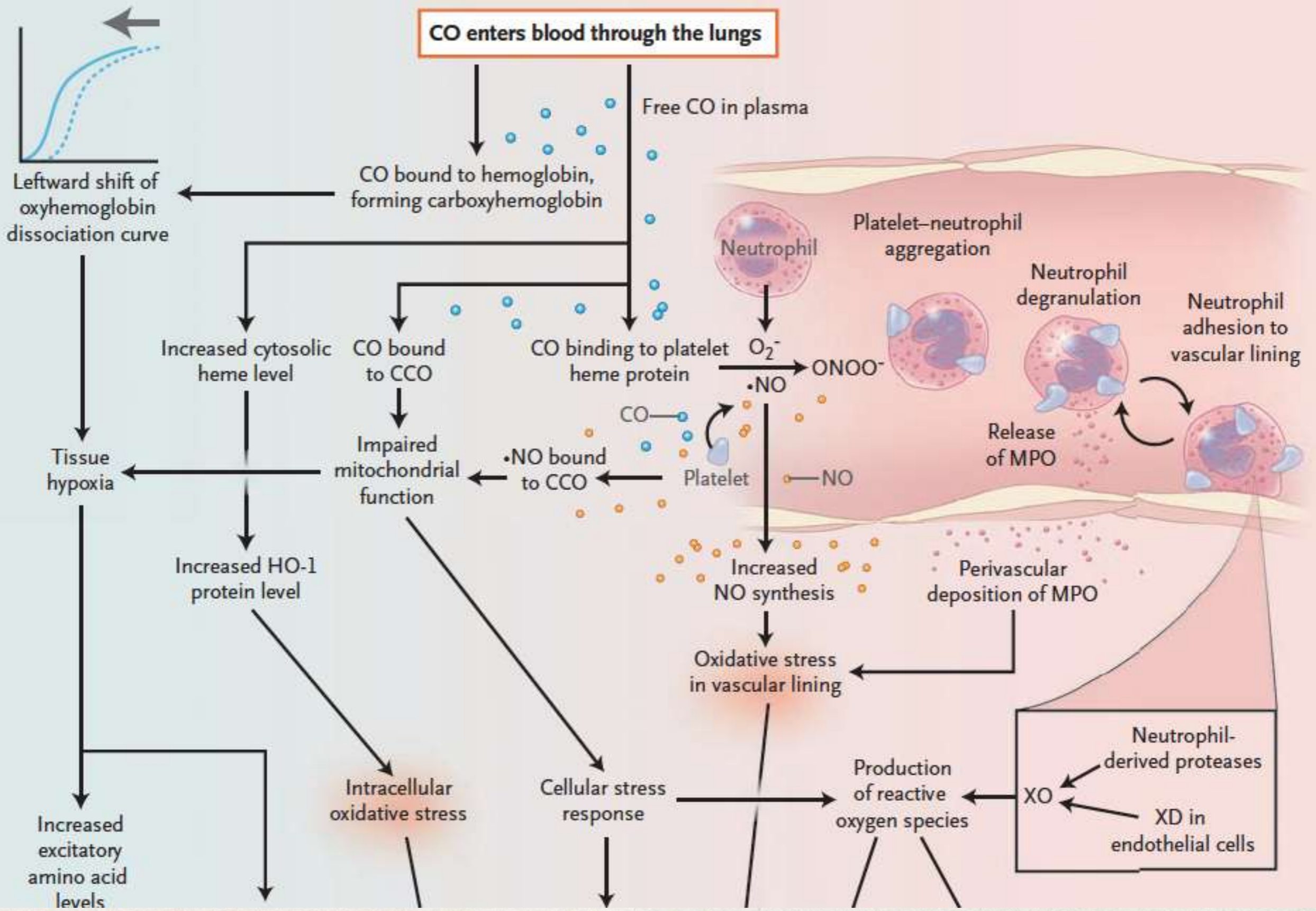
Carbon monoxide poisoning

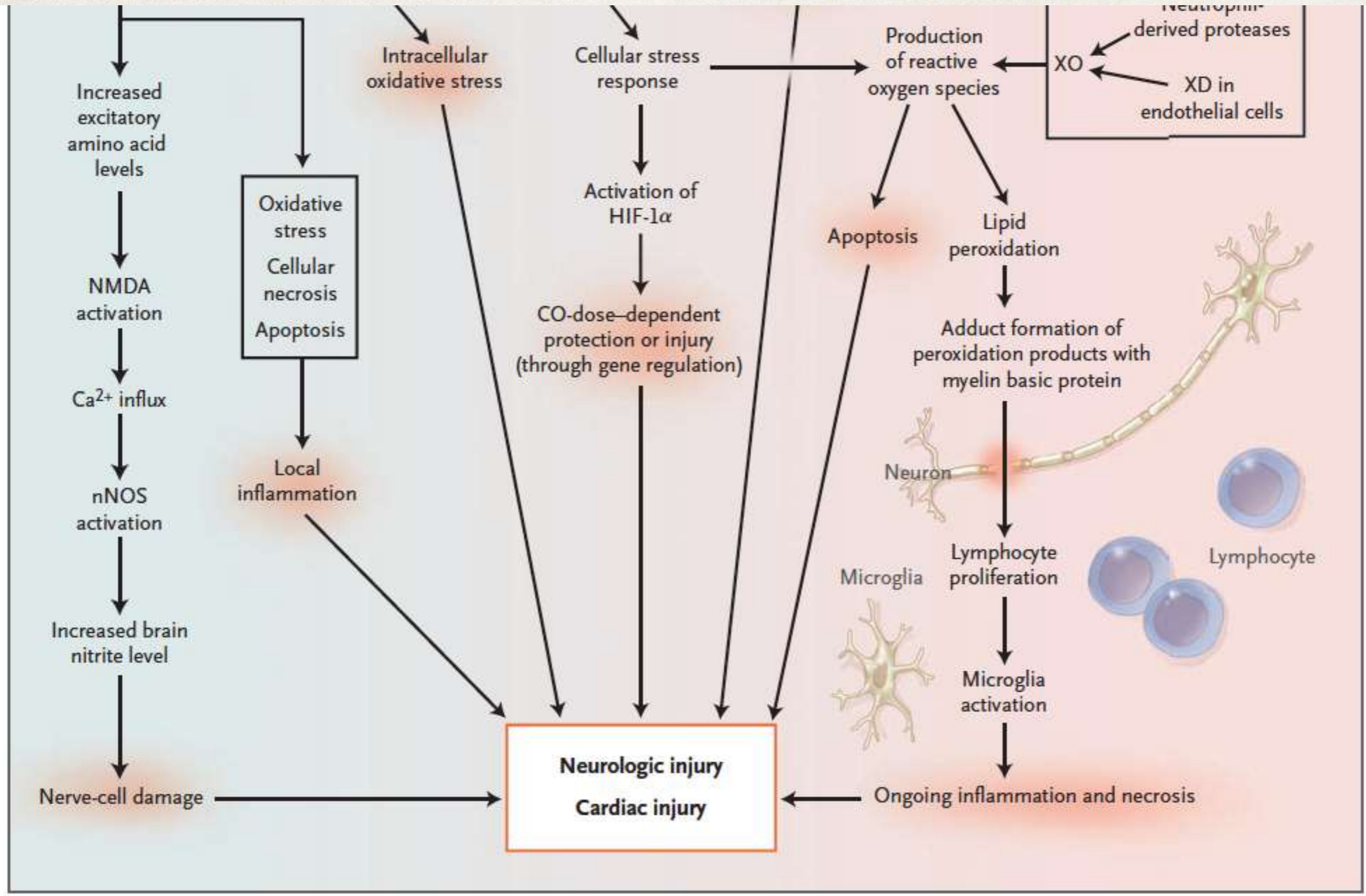
Background

- ❖ Source
 - ❖ Incomplete combustion of fossil fuels
 - ❖ charcoal burning, fire, engine exhaust, home heating, stoves...
 - ❖ enclosed spaces
- ❖ CO affinity for Hb ~250 times that of O₂
- ❖ COHb in normal 1-2%, smokers 5-10%
- ❖ Fetal COHb 10-15% higher than maternal level

Hypoxic mechanisms

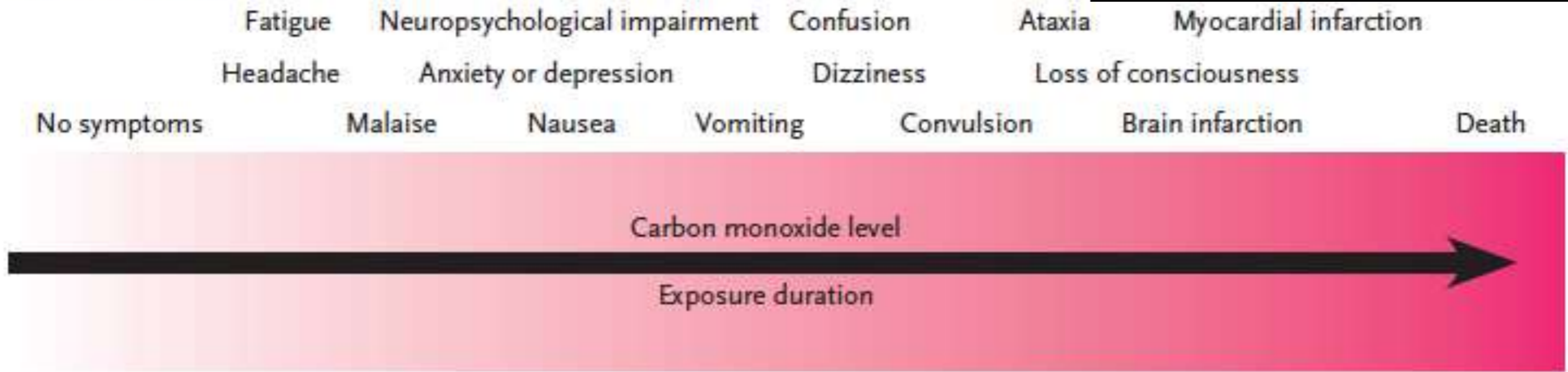
Inflammatory mechanisms





Neurologic & Cardiac

Signs and Symptoms



Physiological Effects

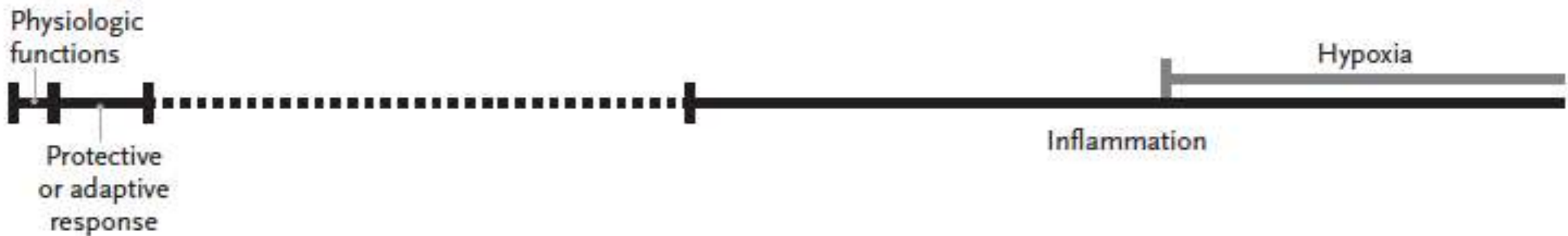


Figure 1. Spectrum of Symptoms and Effects of Exposure to Carbon Monoxide, According to the Level and Duration of Exposure.

N Engl J Med 2009;360:1217-25.

- ❖ Other systems: respiratory, renal, MSK, eye, skin
- ❖ Delayed neurological sequelae

Carbon Monoxide Poisoning

Cardiovascular Manifestations of Moderate to Severe Carbon Monoxide Poisoning

Daniel Satran, MD,* Christopher R. Henry, BS,† Cheryl Adkinson, MD,‡ Caren I. Nicholson, RN,‡
Yiscah Bracha, MS,‡ Timothy D. Henry, MD†

Minneapolis, Minnesota

-
- OBJECTIVES** We describe the cardiovascular manifestations of carbon monoxide (CO) poisoning.
- BACKGROUND** Carbon monoxide poisoning is a common cause of toxicologic morbidity and mortality. Although the neurologic sequelae of CO poisoning have been well described, the cardiovascular consequences are limited to isolated case reports.
- METHODS** We reviewed the cardiovascular manifestations of 230 consecutive patients treated for moderate to severe CO poisoning in the hyperbaric oxygen chamber at Hennepin County Medical Center (HCMC), a regional center for treatment of CO poisoning.
- RESULTS** The mean age was 47.2 years with 72% men. Ischemic electrocardiogram (ECG) changes were present in 30% of patients, whereas only 16% had a normal ECG. Cardiac biomarkers (creatinine kinase-MB fraction or troponin I) were elevated in 35% of patients. In-hospital mortality was 5%.
- CONCLUSIONS** Cardiovascular sequelae of CO poisoning are frequent, with myocardial injury assessed by biomarkers or ECG in 37% of patients. Patients admitted to the hospital with CO poisoning should have a baseline ECG and serial cardiac biomarkers. (J Am Coll Cardiol 2005;45:1513-6) © 2005 by the American College of Cardiology Foundation

Patients with persistent LV dysfunction, underlying CAD, or risk factors for CAD may benefit from further evaluation e.g. angiography/revascularization

Management

- ❖ Remove from exposure
- ❖ Supportive
- ❖ 100% O₂ mask
- ❖ COHb level, blood gas
- ❖ Assess neurology
- ❖ ECG, cardiac markers
- ❖ Consider hyperbaric oxygen

Hyperbaric oxygen therapy

❖ Mechanism

❖ ↓ half life of COHb

❖ displaces CO

❖ ↑ O₂ content, ↑ O₂ delivery

❖ ↓ oxidative stress & inflammation

O ₂	COHb Half-life
Room air	4 hours
100% O ₂ at 1 ATM	90 mins
100% O ₂ at 3 ATM	30 mins

❖ Indications

❖ End-organ damage

- ❖ LOC, neurologic deficit, mental status change
- ❖ Myocardial ischaemia, metabolic acidosis
- ❖ COHb level $>25\%$; or $>15\%$ in pregnant women

❖ Evidence conflicting

❖ Cochrane review:

- ❖ HBO cannot be routinely recommended



HBO CHAMBER

Discussion

- ❖ Use of hyperbaric oxygen in this patient?
- ❖ Management of his raised troponin?