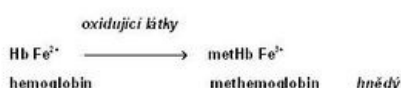


Methemoglobin

Methemoglobin (metHb; also *hemiglobin* or *ferihemoglobin*^[1]) is characterized by the presence of **trivalent iron**, which is formed by the oxidation of divalent iron in hemoglobin^[2]. Methemoglobin loses its ability to reversibly bind oxygen. In its place, $\text{Fe}^{\text{III}+}$ binds a water molecule with a sixth coordination bond. The color of methemoglobin is chocolate brown.

Methemoglobin is also present physiologically in small amounts in erythrocytes (about 1–3% of the total concentration of hemoglobin^[3]). This is mainly due to the effect of nitrites, which arise from nitrates contained in food. The reverse reduction of methemoglobin to hemoglobin is primarily ensured by the NADH-dependent cytochrome-b₅ reductase (also methemoglobin reductase). A minor role is played by NADPH-dependent methemoglobin reductase, which is dependent on the supply of NADPH from the pentose cycle and on the presence of another electron carrier (e.g. flavin).^[4] Non-enzymatic mechanisms include the action of glutathione and ascorbic acids.

1. vznik methemoglobinu



An increased concentration of methemoglobin in the blood is referred to as

2. redukce methemoglobinu na hemoglobin



'*methemoglobinemia*. The causes are various:

- **Hereditary methemoglobinemia** is usually caused by a congenital defect in NADH-dependent methemoglobin reductase or the presence of abnormal hemoglobin M.
- **Acquired methemoglobinemia** is the most common form of methemoglobinemia. It can be caused by the action of oxidizing substances^[5]:
 - poisoning by certain substances (nitrobenzene, aniline and its derivatives - e.g. some dyes),
 - under the influence of certain drugs (local anesthetics – benzocaine, also phenacetin, sulfonamides),
 - increased content of nitrates and nitrites in water and food.

Newborns are especially sensitive to the increased content of these substances due to the immaturity of the reduction systems and the increased proportion of fetal hemoglobin, which is more easily oxidized. Methemoglobinemia manifests as cyanosis with a characteristic gray-brown hue and hypoxia.

Symptoms of methemoglobinemia

Methemoglobin values	Symptoms
0-2%	normal value
< 10%	cyanosis
< 35%	cyanosis and other symptoms (headache, shortness of breath)
70%	lethal concentration

Part of the therapy of acquired methemoglobinemia is the administration of some reducing agents - methylene blue or ascorbic acid.

Links

External links

- Methemoglobin (Czech Wikipedia)
- Methemoglobin (English Wikipedia)

Source

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3. RICHARD, Alyce M, James H DIAZ, and Alan David KAYE. Reexamining the risks of drinking-water nitrates on public health. *Ochsner J* [online]. 2014, vol. 14, no. 3, pp. 392-8, also available from <<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4171798/?tool=pubmed>>. ISSN 1524-5012.
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5. CORTAZZO, Jessica A, and Adam D LICHTMAN. Methemoglobinemia: a review and recommendations for management. *J Cardiothorac Vasc Anesth* [online]. 2014, vol. 28, no. 4, pp. 1043-7, also available from <<https://www.ncbi.nlm.nih.gov/pubmed/23953868>>. ISSN 1053-0770 (print), 1532-8422.