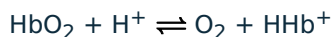


# Bohr effect

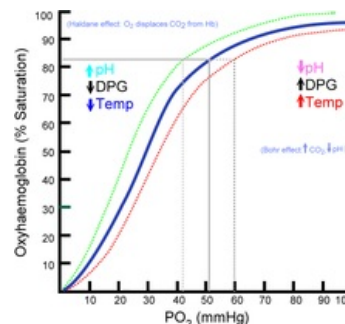
The **Bohr effect** describes the dependence of the saturation of hemoglobin on changes in **CO<sub>2</sub> concentration, pH, and temperature** in tissues. The tissues produce higher amount of carbon dioxide at work than under resting conditions. In the blood, CO<sub>2</sub> is converted to bicarbonate anion and hydrogen cation. This leads to a **decrease of pH** in tissues and to **an increase in the desaturation of hemoglobin** (the release of oxygen from binding with Hb). This is due to the fact that **deoxygenated Hb is a stronger base than an oxygenated one** and therefore better accepting of H<sup>+</sup>.



Carbonate dehydratase in erythrocytes catalyzes the reaction:  $\text{CO}_2 + \text{H}_2\text{O} \rightleftharpoons \text{H}_2\text{CO}_3 \rightleftharpoons \text{H}^+ + \text{HCO}_3^-$ . The resulting proton binds to the "less acidic" deoxygenated Hb. Bicarbonate anion **escapes along the concentration gradient** from erythrocytes.

The charge compensation is provided by **antiport Cl<sup>-</sup>/HCO<sub>3</sub><sup>-</sup>** (Hamburgerův efekt).

This mechanism ensures that tissues with high metabolic activity receive a preferential supply of oxygen, while allowing the removal of the acidic proton.



A more acidic environment shifts the oxyhaemoglobin dissociation curve to the right

## References

### Related articles

- Binding of oxygen to hemoglobin
- Hemoglobin and its derivatives
- Transport of O<sub>2</sub> and CO<sub>2</sub> in the blood
- 2,3-bisphosphoglycerate

### External references

- Bohr effect [1] ([http://147.33.74.135/knihy/uid\\_es-002/figures/efekt\\_bohruv.01.jpg](http://147.33.74.135/knihy/uid_es-002/figures/efekt_bohruv.01.jpg))

### Bibliography

- LEDVINA, M, et al. *Biochemie pro studující medicíny II*. 2. edition. Praha : Nakladatelství Karolinum, 2005. 275 pp. ISBN 978-80-246-1415-1.
- KITTNAR, Otomar, et al. *Lékařská fyziologie*. 1. edition. Praha : Grada, 2003. 790 pp. ISBN 978-80-247-3068-4.