Intracellular oxygen transport

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Introduction

Reactome is open-source, open access, manually curated and peer-reviewed pathway database. Pathway annotations are authored by expert biologists, in collaboration with Reactome editorial staff and cross-referenced to many bioinformatics databases. A system of evidence tracking ensures that all assertions are backed up by the primary literature. Reactome is used by clinicians, geneticists, genomics researchers, and molecular biologists to interpret the results of high-throughput experimental studies, by bioinformaticians seeking to develop novel algorithms for mining knowledge from genomic studies, and by systems biologists building predictive models of normal and disease variant pathways.

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Literature references


Reactome database release: 79

This document contains 1 pathway and 6 reactions (see Table of Contents)
Intracellular oxygen transport

Stable identifier: R-HSA-8981607

Compartments: cytosol

Globins are heme-containing proteins that reversibly bind molecular oxygen. Humans contain at least 5 types of globins: hemoglobins, myoglobin, cytoglobin, neuroglobin, and androglobin (reviewed in Burmester et al. 2014). Myoglobin, neuroglobin, and cytoglobin are cytosolic globins with similar affinities for oxygen (reviewed in Hankeln et al. 2005). Androglobin is a more distantly related globin of uncertain function that is expressed in testes (Hoogewijs et al. 2012). Myoglobin is predominantly expressed in muscle tissue (reviewed in Helbo et al. 2013), neuroglobin is expressed in neurons, and cytoglobin is expressed in connective tissue fibroblasts and smooth muscle cells (reviewed in Pesce et al. 2002, Hankeln et al. 2004, Ascenzi et al. 2016). Whereas myoglobin contains pentacoordinated heme iron, neuroglobin and cytoglobin contain hexacoordinated heme iron: the iron atom is bound by 4 nitrogen atoms of heme and 2 histidine residues of the globin. Binding by one of the histidines is reversible, which allows the iron atom to bind various ligands such as molecular oxygen, carbon monoxide, and nitric oxide (reviewed in Kakar et al. 2010). Neuroglobin may function in oxygen homeostasis, however the importance of its oxygen-binding activity is unclear (reviewed in Pesce et al. 2002, Hankeln et al. 2005). Cytoglobin may function in nitric oxide metabolism (Thuy et al. 2016, Liu et al. 2017). Globins can also regulate oxygen homeostasis via reactions with nitric oxide (NO), a vasodilator. Oxygenated globins scavenge NO by oxidation while deoxygenated globins can act as a nitrite reductase to produce NO (reviewed in Hendgen-Cotta et al. 2014, Tejero and Gladwin 2014).

Literature references


**Editions**

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Myoglobin binds oxygen

Location: Intracellular oxygen transport

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