

# CYGB binds O2

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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

- Fabregat, A., Sidiropoulos, K., Viteri, G., Forner, O., Marin-Garcia, P., Arnau, V. et al. (2017). Reactome pathway analysis: a high-performance in-memory approach. *BMC bioinformatics*, 18, 142. [↗](#)
- Sidiropoulos, K., Viteri, G., Sevilla, C., Jupe, S., Webber, M., Orlic-Milacic, M. et al. (2017). Reactome enhanced pathway visualization. *Bioinformatics*, 33, 3461-3467. [↗](#)
- Fabregat, A., Jupe, S., Matthews, L., Sidiropoulos, K., Gillespie, M., Garapati, P. et al. (2018). The Reactome Pathway Knowledgebase. *Nucleic Acids Res*, 46, D649-D655. [↗](#)
- Fabregat, A., Korninger, F., Viteri, G., Sidiropoulos, K., Marin-Garcia, P., Ping, P. et al. (2018). Reactome graph database: Efficient access to complex pathway data. *PLoS computational biology*, 14, e1005968. [↗](#)

Reactome database release: 88

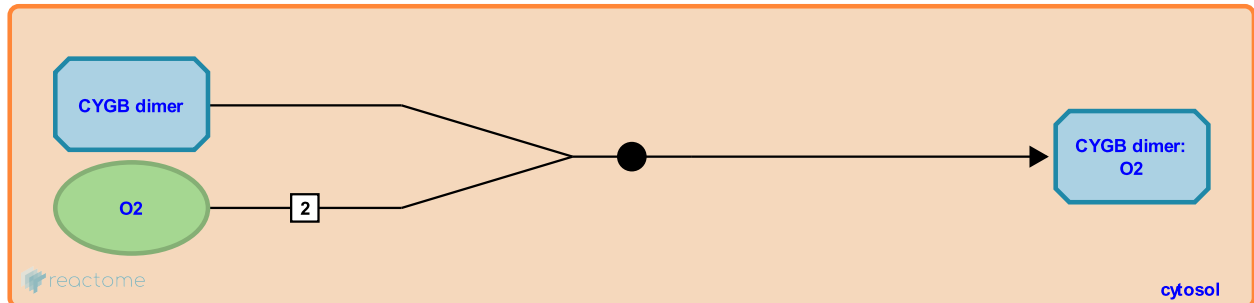
This document contains 1 reaction ([see Table of Contents](#))

## CYGB binds O2 [↗](#)

**Stable identifier:** R-HSA-5340214

**Type:** binding

**Compartments:** cytosol



Vertebrates possess multiple respiratory globins that differ in structure, function, and tissue distribution. Three different globins have been described so far: hemoglobin facilitates oxygen transport in blood, myoglobin mediates oxygen transport and storage in the muscle and neuroglobin has a yet unidentified function in nerve cells. A fourth globin has been identified in mouse, human and zebrafish. It is ubiquitously expressed in human tissue and therefore called cytoglobin (CYGB) (Burmester et al. 2002, Trent & Hargrove 2002). Unlike the specific expression patterns of Hb and Mb, CYGB is found in vascular smooth muscle, fibroblasts and cardiomyocytes. CYGB functions as a homodimer (Hamdane et al. 2003) and is localised to the cytosol of these cells where its O<sub>2</sub> loading and unloading ability within a narrow O<sub>2</sub> tension range makes it an ideal protein for O<sub>2</sub> storage, especially during hypoxia (Fago et al. 2004).

### Literature references

- Hankeln, T., Burmester, T., Pesce, A., Hamdane, D., Bolognesi, M., Kiger, L. et al. (2003). The redox state of the cell regulates the ligand binding affinity of human neuroglobin and cytoglobin. *J. Biol. Chem.*, 278, 51713-21. [↗](#)
- Hargrove, MS., Trent, JT. (2002). A ubiquitously expressed human hexacoordinate hemoglobin. *J. Biol. Chem.*, 277, 19538-45. [↗](#)
- Gilany, K., Hundahl, C., Dewilde, S., Moens, L., Fago, A., Weber, RE. (2004). Allosteric regulation and temperature dependence of oxygen binding in human neuroglobin and cytoglobin. Molecular mechanisms and physiological significance. *J. Biol. Chem.*, 279, 44417-26. [↗](#)
- Hankeln, T., Burmester, T., Ebner, B., Weich, B. (2002). Cytoglobin: a novel globin type ubiquitously expressed in vertebrate tissues. *Mol. Biol. Evol.*, 19, 416-21. [↗](#)

### Editions

|            |                  |                 |
|------------|------------------|-----------------|
| 2014-03-12 | Authored, Edited | Jassal, B.      |
| 2015-02-11 | Reviewed         | D'Eustachio, P. |
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