Tyrosinase oxidises tyrosine to dopa-quinone

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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

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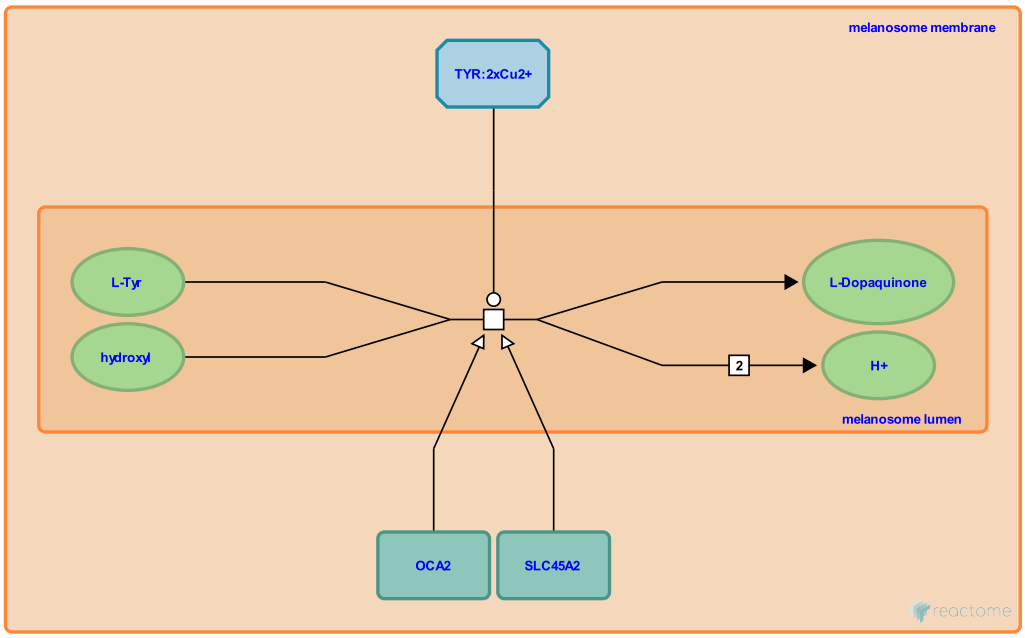
Stable identifier: R-HSA-5662662

Type: transition

Compartments: melanosome membrane, melanosome lumen



Melanogenesis is initiated with the first step of tyrosine oxidation to dopaquinone, catalyzed by tyrosinase (Mason 1948, Hearing et al. 1980). This first step is the rate-limiting step in melanin synthesis; the remainder of the reaction sequence can proceed spontaneously at a physiological pH value (Halaban et al. 2002, Land et al. 2003).

The melanocyte-specific transporter protein (OCA2, aka P protein, pink-eyed dilution protein homolog) is postulated to play a role in the processing and intracellular trafficking of tyrosinase (TYR) in the melanosome (Potterf et al. 1998, Toyofuku et al. 2002). It is a 110-kDa integral melanosomal protein with 12 predicted transmembrane domains, suggesting a transport function but its exact physiological role is still unknown. In humans, mutations in the OCA2 gene result in oculocutaneous albinism type 2, a disorder of pigmentation characterised by reduced biosynthesis of melanin in the skin, hair and eyes. This disorder is analogous to the pink-eyed dilution phenotype seen in mice with defective Oca2 (Toyofuku et al. 2002). A single SNP in the OCA2 gene is the major determinant of brown and/or blue eye colour (Sturm 2009).

The membrane-associated transporter protein SLC45A2 (melanoma antigen AIM1, MATP) shows sequence and structural similarity to sucrose transport proteins yet its actual physiological substrate and role is still unclear. Mutations in SLC45A2 cause misrouting of tyrosinase similar to the cellular phenotype of OCA2 and cause oculocutaneous albinism type 4 (OCA4) (Cullinane et al. 2011).

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Editions

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