PYCR1 gene

pyrroline-5-carboxylate reductase 1

Normal Function

The *PYCR1* gene provides instructions for making a protein that is located in the energy-producing structures of cells, called mitochondria. The PYCR1 protein appears to be important for the function of mitochondria and it helps in the formation (synthesis) of the protein building block (amino acid) proline.

The formation of proline is a multi-step process that converts the amino acid glutamate to the amino acid proline. The PYCR1 protein carries out the last step in this process by turning pyrroline-5-carboxylate into proline. The conversion between proline and glutamate is important in maintaining a supply of the amino acids needed for protein production, and for energy transfer within the cell.

Health Conditions Related to Genetic Changes

Cutis laxa

PYCR1 gene variants (also known as mutations) have been identified in people with cutis laxa. Variants in this gene cause a form of the disorder called autosomal recessive cutis laxa type 2B (ARCL2B), which is characterized by loose, wrinkled, sagging skin that is often described as parchment-like; prominant veins; distinctive facial features; and larger than normal spaces (fontanelles) between the skull bones that close later than usual. Some affected individuals also have delayed development, intellectual disability, or bone abnormalities. Some researchers suggest all cases of cutis laxa caused by *PYCR1* gene variants are considered ARCL2B, while others consider the most severe cases to be another form of the disorder called autosomal recessive cutis laxa type 3B (ARCL3B, which is also known as de Barsy syndrome).

PYCR1 gene variants prevent the production of functional PYCR1 protein. A shortage of this protein impairs mitochondrial function, which leads to increased cell death, particularly when cells are under stress. Excessive death of skin and nerve cells is thought to underlie the characteristic features of ARCL2B and ARCL3B. Although the PYCR1 protein is involved in the formation of proline, levels of this amino acid are normal in individuals with ARCL2B and ARCL3B. It is unclear if disruption of proline formation plays a role in the development of cutis laxa.

Other Names for This Gene

- P5C

Additional Information & Resources

Tests Listed in the Genetic Testing Registry

- Tests of PYCR1 (https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=5831[geneid])

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=PYCR1)

Catalog of Genes and Diseases from OMIM

- PYRROLINE-5-CARBOXYLATE REDUCTASE 1; PYCR1 (https://omim.org/entry/179035)

Gene and Variant Databases

- NCBI Gene (https://www.ncbi.nlm.nih.gov/gene/5831)
- ClinVar (https://www.ncbi.nlm.nih.gov/clinvar?term=PYCR1[gene])

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