Chromosome 21 Open Reading Frame 2

Alternative Names
C21orf2

Record Category
Gene locus

WHO-ICD
N.B.: Classification not applicable to gene loci.

Incidence per 100,000 Live Births
N/A to gene loci

OMIM Number
603191

Mode of Inheritance

Gene Map Locus
21q22.3

Description
C21orf2 (Chromosome 21 Open Reading Frame 2) is a gene that codes for the protein with the same name. This protein is suggested to have a role in the formation and maintenance of cilia, in addition to ciliary cargo transport. It has also been hypothesized to have a role in the regulation of cell morphology, and cytoskeletal organization, particularly in the retina.

Defects in C21orf2 have been shown to be associated with retinitis pigmentosa with skeletal defects, as in the case of Spondylometaphyseal Dysplasia Axial (Axial SMD), as well as with non-syndromic cone rod dystrophy. In addition, mutations in this gene have also been associated with Jeune Syndrome, a form of short-rib thoracic dysplasia characterized by a constricted thoracic cage, short ribs, shortened tubular bones, and a 'trident' appearance of the acetabular roof.

Molecular Genetics
The C21orf2 gene is located on the long arm of chromosome 21, where it spans a length of 10.5 kb. It contains seven exons, and codes for a protein with a molecular mass of 28 KDa with 256 amino acid residues.

The protein consists of a leucine rich repeat (LRR) domain, marking it as a member of the LRR family of proteins. Mutations with the gene have been found to cluster in the LRR, the C-terminal region, and the LRRCT, a capping motif downstream of the last LRR. There are four different splice transcripts for this gene.

Epidemiology in the Arab World

Saudi Arabia
Wang et al., (2016) described 13 patients from nine families with Axial Spodylometaphyseal Dysplasia (SMD). Three of these patients belonged to two Saudi families. Exome sequencing identified the same novel bi-allelic mutation in C21orf2 in both the families. This was an intronic mutation, c.643-23A>T (p.N215Vfs*259) which was confirmed by Sanger sequencing. The latter mutation is a branch-point one, and it resulted in lack of splicing for intron 6 and an elongated reading frame. The authors concluded that C21orf2 was a causative gene for axial SMD and suggested further studies to clarify the role of this gene on skeletal development and retinal function.

References
Wang Z, Iida A, Miyake N, Nishiguchi KM, Fujita K, Nakazawa T, Alswaid A, Albalwi MA, Kim OH, Cho TJ, Lim GY, Isidor B, David A, Rustad CF, Merckoll E, Westvik J, Stattin EL, Grigelioniene G, Kou I, Nakajima M, Ohashi H, Smithson S, Matsumoto N, Nishimura G, Ikegawa S. Axial Spondylometaphyseal Dysplasia Is Caused by C21orf2 Mutations. PLoS One. 2016; 11(3):e0150555. PMID: 26974433

Related CTGA Records
Axial Spondylometaphyseal Dysplasia

External Links
https://www.genecards.org/cgi-bin/carddisp.pl?gene=C21orf2

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