TBC1D24 Gene

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TBC1 domain family member 24: The TBC1D24 gene provides instructions for making a protein whose specific function in the cell is unclear.

Keywords: genes

1. Normal Function

The *TBC1D24* gene provides instructions for making a protein whose specific function in the cell is unclear. Studies suggest the protein may have several roles in cells. The TBC1D24 protein belongs to a group of proteins that are involved in the movement (transport) of vesicles, which are small sac-like structures that transport proteins and other materials within cells. Research suggests that the TBC1D24 protein may also help cells respond to oxidative stress. Oxidative stress occurs when unstable molecules called free radicals accumulate to levels that can damage or kill cells. Studies indicate that the TBC1D24 protein is active in a variety of organs and tissues; it is particularly active in the brain and likely plays an important role in normal brain development. The TBC1D24 protein is also active in specialized structures called stereocilia. In the inner ear, stereocilia project from certain cells called hair cells. The stereocilia bend in response to sound waves, which is critical for converting sound waves to nerve impulses.

2. Health Conditions Related to Genetic Changes

2.1. DOORS syndrome

At least 10 mutations in the *TBC1D24* gene have been identified in people with DOORS syndrome, a disorder involving multiple abnormalities that are present from birth (congenital). "DOORS" is an abbreviation for the major features of the disorder including deafness; short or absent nails (onychodystrophy); short fingers and toes (osteodystrophy); developmental delay and intellectual disability (previously called mental retardation); and seizures. Some people with DOORS syndrome do not have all of these features.

Most of the *TBC1D24* gene mutations that cause DOORS syndrome change single protein building blocks (amino acids) in the TBC1D24 protein sequence. These mutations are thought to reduce or eliminate the function of the TBC1D24 protein, but the specific mechanism by which loss of TBC1D24 function leads to the signs and symptoms of DOORS syndrome is not well understood.

2.2. Other disorders

TBC1D24 gene mutations have also been identified in people with other seizure disorders, including familial infantile myoclonic epilepsy (FIME), progressive myoclonus epilepsy (PME), and a form of early-infantile epileptic encephalopathy (EIEE16; also called malignant migrating partial seizures of infancy 16). These mutations likely result in impairment of TBC1D24 protein functions related to the development of the brain, but the specific connection between the mutations and these disorders is unclear.

Malignant migrating partial seizures of infancy

Nonsyndromic hearing loss

3. Other Names for This Gene

- DFNA65

- KIAA1171
- skywalker homolog
- TBC/LysM-associated domain containing 6
- TBC1 domain family member 24 isoform 1
- TBC1 domain family member 24 isoform 2
- TLDC6

References

1. Azaiez H, Booth KT, Bu F, Huygen P, Shibata SB, Shearer AE, Kolbe D, Meyer N, Black-Ziegelbein EA, Smith RJ. TBC 1D24 mutation causes autosomal-dominantnonsyndromic hearing loss. Hum Mutat. 2014 Jul;35(7):819-23. doi:10.100 2/humu.22557.
2. Campeau PM, Hennekam RC; DOORS syndrome collaborative group. DOORS syndrome:phenotype, genotype and co mparison with Coffin-Siris syndrome. Am J Med Genet CSemin Med Genet. 2014 Sep;166C(3):327-32. doi: 10.1002/aj mg.c.31412.
3. Campeau PM, Kasperaviciute D, Lu JT, Burrage LC, Kim C, Hori M, Powell BR,Stewart F, Félix TM, van den Ende J, W isniewska M, Kayserili H, Rump P,Nampoothiri S, Aftimos S, Mey A, Nair LD, Begleiter ML, De Bie I, Meenakshi G,Murr ay ML, Repetto GM, Golabi M, Blair E, Male A, Giuliano F, Kariminejad A,Newman WG, Bhaskar SS, Dickerson JE, Ker r B, Banka S, Giltay JC, Wieczorek D,Tostevin A, Wiszniewska J, Cheung SW, Hennekam RC, Gibbs RA, Lee BH, Siso diya SM.The genetic basis of DOORS syndrome: an exome-sequencing study. Lancet Neurol.2014 Jan;13(1):44-58. do i: 10.1016/S1474-4422(13)70265-5.
4. Rehman AU, Santos-Cortez RL, Morell RJ, Drummond MC, Ito T, Lee K, Khan AA,Basra MA, Wasif N, Ayub M, Ali RA, Raza SI; University of Washington Center forMendelian Genomics, Nickerson DA, Shendure J, Bamshad M, Riazuddin S, Billington N, Khan SN, Friedman PL, Griffith AJ, Ahmad W, Riazuddin S, Leal SM, Friedman TB.Mutations in TBC1D 24, a gene associated with epilepsy, also cause nonsyndromicdeafness DFNB86. Am J Hum Genet. 2014 Jan 2;94(1): 144-52. doi:10.1016/j.ajhg.2013.12.004.
5. Zhang L, Hu L, Chai Y, Pang X, Yang T, Wu H. A dominant mutation in thestereocilia-expressing gene TBC1D24 is a pr obable cause for nonsyndromic hearing impairment. Hum Mutat. 2014 Jul;35(7):814-8. doi: 10.1002/humu.22558.