Atlas of Genetics and Cytogenetics in Oncology and Haematology

OPEN ACCESS JOURNAL AT INIST-CNRS

Gene Section
Mini Review

MYH9 (myosin, heavy polypeptide 9, non-muscle)

Jean-Loup Huret

Genetics, Dept Medical Information, UMR 8125 CNRS, University of Poitiers, CHU Poitiers Hospital, F-86021 Poitiers, France (JLH)

Published in Atlas Database: August 2003

Online updated version: http://AtlasGeneticsOncology.org/Genes/MYH9ID481.html
DOI: 10.4267/2042/38010

Identity

Other names: Myosin heavy chain, nonmuscle type A; Nonmuscle myosin heavy chain-A (NMMHC-A)

HGNC (Hugo): MYH9

Location: 22q12

Location (base pair): 33320

DNA/RNA

Description

Spans 107 kb; 40 exons

Transcription

Alternate splicing; transcripts of 4.4, 5.3 and 5.9 kb.

Protein

Description

1960 amino acids; 227 kDa (and 1752 aa, 202 kDa, and 1486 aa, 172 kDa; globular head in N-term and a coiled-coil tail in C-term; actin binding site and light chains binding site are present in the globular domain. Myosin forms hexamers with 2 heavy chains, 2 essential (alkali) light chains, and 2 regulatory light chains.

Expression

In platelets; upregulated during granulocyte differentiation (see below); also expressed in thy-mus, spleen, kidney, intestine, cochlea.

Function

Binds actin; protein of the cytoskeleton; role in cell shape and motility, and in cell division.

Mutations

Germinal

In autosomal dominant giant-platelet disorders.

Somatic

In non Hodgkin lymphomas.

Implicated in

Disease

The autosomal dominant giant-platelet disorders, May-Hegglin anomaly (MHA), Fechtner syndrome (FTNS), and Sebastian syndrome (SBS), which share a triad of thrombocytopenia, large platelets (macrothrombocytopenia (MTCP)) and characteri-stic leukocyte inclusions (Dohle-like bodies), Epstein syndrome, which associates additional Alport-like clinical features (inherited sensorineural deafness, cataracts, nephritis), and MTCP without leukocyte inclusions, as well as a nonsyndromic hereditary hearing impairment are all caused by (germinal) mutations in MYH9. These disorders appear to represent a class of allelic disorders with variable phenotypic diversity. No clear no geno-type-phenotype correlation was identified.

Anaplasic large cell lymphoma (ALCL) with t(2;22)(p23;q12) --> ALK- CLTC

Disease

ALCL are high grade non Hodgkin lymphomas; ALK+ ALCL are ALCL where ALK is involved in a fusion gene; ALK+ ALCL represent 50 to 60 % of ALCL cases (they are CD30+, ALK+); belong to the "cytoplasmic ALK+" subset.

Prognosis

Althouth presenting as a high grade tumour, a 80% five yr survival is associated with this anomaly.

Hybrid/Mutated gene

5' MYH9 - 3' ALK

Abnormal protein

NH2 MYH9 - COOH ALK

References

Kelley MJ, Jawien W, Ortel TL, Korczak JF. Mutation of MYH9, encoding non-muscle myosin heavy chain A, in May-Hegglin anomaly. Nat Genet. 2000 Sep;26(1):106-8

Lalwani AK, Goldstein JA, Kelley MJ, Luxford W, Castelein CM, Mhatre AN. Human nonsyndromic hereditary deafness DFNA17 is due to a mutation in nonmuscle myosin MYH9. Am J Hum Genet. 2000 Nov;67(5):1121-8

Seri M, Cusano R, Gangarossa S, Caridi G, Bordo D, Lo Nigro C, Ghiggeri GM, Ravazzolo R, Savino M, Del Vecchio M, d'Apolito M, Iolascon A, Zelante LL, Savoia A, Balduini CL, Noris P, Magrini U, Belletti S, Heath KE, Babcock M, Glucksman MJ, Aliprandis E, Bizzaro N, Desnick RJ, Martignetti JA. Mutations in MYH9 result in the May-Hegglin anomaly, and Fechtner and Sebastian syndromes. The May-Hegglin/Fechtner Syndrome Consortium. Nat Genet. 2000 Sep;26(1):103-5

Kunishima S, Matsushita T, Kojima T, Amemiya N, Choi YM, Hosaka N, Inoue M, Jung Y, Mamiya S, Matsumoto K, Miyajima Y, Zhang G, Ruan C, Saito K, Song KS, Yoon HJ, Kamiya T, Saito H. Identification of six novel MYH9 mutations and genotype-phenotype relationships in autosomal dominant macrothrombocytopenia with leukocyte inclusions. J Hum Genet. 2001;46(12):722-9

Martignetti J. Five (un)easy pieces: the MYH9-related giant platelet syndromes. Haematologica. 2002 Sep;87(9):897-8

Lamant L, Gascoyne RD, Duplantier MM, Armstrong F, Raghab A, Chhanabhai M, Rajcan-Separovic E, Raghab J, Delsol G, Espinos E. Non-muscle myosin heavy chain (MYH9): a new partner fused to ALK in anaplastic large cell lymphoma. Genes Chromosomes Cancer. 2003 Aug;37(4):427-32

Seri M, Pecci A, Di Bari F, Cusano R, Savino M, Panza E, Nigro A, Noris P, Gangarossa S, Rocca B, Gresele P, Bizzaro N, Malatesta P, Koivisto PA, Longo I, Musso R, Pecoraro C, Iolascon A, Magrini U, Rodriguez Soriano J, Renieri A, Ghiggeri GM, Ravazzolo R, Balduini CL, Savoia A. MYH9-related disease: May-Hegglin anomaly, Sebastian syndrome, Fechtner syndrome, and Epstein syndrome are not distinct entities but represent a variable expression of a single illness. Medicine (Baltimore). 2003 May;82(3):203-15

This article should be referenced as such:

Huret JL. MYH9 (myosin, heavy polypeptide 9, non-muscle). Atlas Genet Cytogenet Oncol Haematol. 2003; 7(4):228-229.