Atlas of Genetics and Cytogenetics in Oncology and Haematology

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Gene Section

Mini Review

TPM3 (tropomyosin 3)

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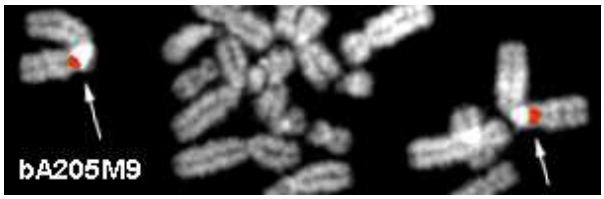
Identity

Other names: NEM1

HGNC (Hugo): TPM3

Location: 1q21



Probe(s) - Courtesy Mariano Rocchi, Resources for Molecular Cytogenetics.

DNA/RNA

Description

Spans at least 42 kb; 13 exons.

Protein

Description

By tissue-specific alternate splincing are produced 2 proteins: the tropomyosin alpha chain, skeletal muscle type, made of 284 amino acids (32 kDa), and the cytosqueletal type, made of 248 amino acids (29 kDa). Coiled-coil structure.

Function

Tropomyosins are actin-binding proteins; component of cytoskeletal microfilaments; tropomyosins mediate the effect of Ca2+ on the myosin-actin interaction In skeletal muscles, but their function in smooth muscles and other tissues is yet unknown.

Homology

Other tropomyosins: TPM1 (alpha) located in 15q22, TPM2 (beta), located in 9q13, and TPM4 located in 19p13.1.

Implicated in

Rare cases of ALK+ anaplasic large cell lymphoma (ALCL) with t(1;2)(q25;p23)

Disease

ALCL presents as an aggressive lymphoma with systemic signs.

Prognosis

Nonetheless, have a favourable prognosis.

Hybrid/Mutated gene

5' CLTC - 3' ALK.

Abnormal protein

104 kDa; 221 N-term amino acids from TPM3 fused to the 562 C-term amino acids from ALK (i.e. the entire cytoplasmic portion of ALK with the tyrosine kinase domain); homodimerization of the fusion protein.

Oncogenesis

TPM3-ALK is contitutively activated.

Cases of Inflammatory myofibroblastic tumors with t(1;2)(q25;p23)

Disease

Rare soft tissue tumour found in children and young adults.

Prognosis

Good prognosis.

Hybrid/Mutated gene

5' CLTC - 3' ALK.

Abnormal protein
104 kDa ; 221 N-term amino acids from TPM3 fused to the 562 C-term amino acids from ALK (i.e. the entire cytoplasmic portion of ALK with the tyrosine kinase domain); homodimerization of the fusion protein.

Oncogenesis
TPM3-ALK is contitutively activated.

Papillary thyroid carcinoma

Disease
Represents about 60% of thyroid cancers; small, undetectable, chromosome 1q inversions have shown to produce a TPM3-NTRK1 hybrid gene in a very few cases of papillary thyroid carcinoma.

Prognosis
Prognosis of papillary thyroid carcinoma is excellent.

Hybrid/Mutated gene
5' TPM3 - 3' NTRK1

Abnormal protein
221 N-term amino acids from PM3 fused to the C-term of NTRK1, including its tyrosine kinase domain.

To be noted

Note
ALK and TPM3 are therefore implicated in both anaplasic large cell lymphoma and inflammatory myofibroblastic tumours; this is a new concept, that 2 different types of tumour may result from the same chromosomal and genes rearrangement.

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