

MAPRE1 (Microtubule-associated protein, RP/EB family, member 1)

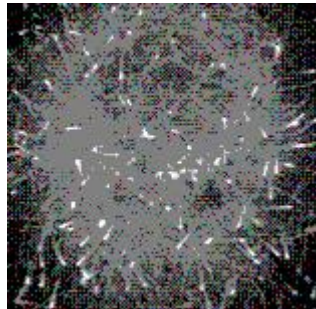
Identity

Note The original name EB1 came from a yeast two hybrid screen "End Binding 1" is a nickname that was later applied when the protein was found to target to microtubule plus ends.

Other names **EB1**

Hugo **MAPRE1**

Location 20q11.1-11.23



EB1-GFP fluorescence on polymerizing microtubule plus ends in a living PtK1 cell.

DNA/RNA

Description 22 Kb genomic locus, 5 introns

Transcription 2540 bp open reading frame

Protein



Description 268 amino acids; 35 kDa; EB1 was cloned in yeast two-hybrid screen as binding partner for the tumor suppressor [APC](#) (Adenomatous Polyposis Coli); EB1 is a microtubule plus end tracking protein (+tip). It contains a calponin homology domain and a leucine zipper

Expression EB1 is ubiquitously expressed. Protein levels remain similar throughout the cell cycle.

Localisation EB1 targets to the plus ends of microtubules when they are polymerizing, producing a "comet tail" pattern. (Figure 1). The mechanism is treadmilling, in which new subunits are continually added at the tip. EB1 also shows additional weak binding to the microtubule lattice (along the length of the microtubule). EB1 targets to kinetochores moving anti-poleward. This is suspected to be due to binding to kinetochore microtubule plus ends rather than the kinetochore itself. Through its carboxyl terminus, EB1 localizes to centrosomes and spindle poles.

Function The primary function identified to date is regulation of microtubule dynamic instability. Microtubules dynamically convert between growth (polymerization) and shrinkage (depolymerization). The transition from growth to shrinkage is called catastrophe, while the conversion from shrinkage to growth is called rescue. Microtubules also pause in their polymerization. EB1 reduces these pauses and reduces the frequency of catastrophes. EB1 increases the frequency of rescues. The net result is more stable, longer microtubules. This effect is predominantly seen during mitosis.

EB1 is important in maintaining the structure of the mitotic spindle. This is thought to be mediated by its effects on spindle microtubule dynamic instability.

EB1 is important in spindle positioning within the cell. This is thought to be due to its effects on astral microtubule dynamic instability. In budding yeast, EB1 also plays a role in positioning the mitotic spindle through the bud neck. In this case, it is through microtubule dynamics as well direct binding to a protein at the bud tip, creating a physical link between the microtubule end and the cell cortex.

EB1 plays a role in linking kinetochores to kinetochore microtubules, which is important for chromosome stability. It is not known whether it regulates kinetochore microtubule dynamics or end-on attachment.

EB1 also has an independent role in anchoring microtubule minus ends to centrosomes

Protein-protein interactions: Adenomatous Polyposis Coli (APC) tumor suppressor, polymerized tubulin (microtubules), p150glued/dynactin, CLIP-170, mDia, Pin2/TRF1, RhoGEF2 (drosophila), shortstop (drosophila)

Homology MAPRE2, MAPRE3

Mutations

Note none known

Implicated in

Entity [Colon cancer](#)

Disease Truncation of the Adenomatous Polyposis Coli (APC) protein is seen in [Familial Adenomatous Polyposis \(FAP\)](#) as well as most sporadic colon cancers. EB1 binds to the APC C-terminus, so its binding is lost in most truncations. Also lost are other APC binding partners including the transcription factor [beta-catenin](#). The role of APC as a tumor suppressor is thought to be through the beta-catenin pathway. Some evidence in

the mouse suggests that this is true. However, there is increasing evidence that connections between APC and the cytoskeleton are important in cell migration, which could have an important role in colon cancer. One Italian FAP family has been reported in which APC is truncated distal to the beta-catenin binding site but including the EB1 binding site. There is no direct evidence of EB1 mutation in colon cancer, and a single report found no evidence of somatic mutations by reverse transcriptase single-strand conformational polymorphism (SSCP) analysis in 21 sporadic colorectal cancers and seven colorectal adenomas.

Entity	Meduloblastoma
Disease	A single report showed that EB1 is transcriptionally elevated in pediatric meduloblastoma. There is no direct evidence of EB1 mutation in meduloblastoma.

Breakpoints

Note none known

External links

	Nomenclature
Hugo	MAPRE1
GDB	MAPRE1
Entrez_Gene	MAPRE1_22919 microtubule-associated protein, RP/EB family, member 1
	Cards
Atlas	MAPRE1ID455ch20q11
GeneCards	MAPRE1
Ensembl	MAPRE1
Genatlas	MAPRE1
GeneLynx	MAPRE1
eGenome	MAPRE1
euGene	22919
	Genomic and cartography
GoldenPath	MAPRE1 - chr20:30871435-30901865 + 20q11.21 (hg17-May_2004)
Ensembl	MAPRE1 - 20q11.21 [CytoView]
NCBI	Genes Cyto Gene Seq <small>[Map View - NCBI]</small>
OMIM	Disease map [OMIM]
HomoloGene	MAPRE1
	Gene and transcription

Genbank	AL035071 [SRS] AL035071 [ENTREZ]
Genbank	U24166 [SRS] U24166 [ENTREZ]
RefSeq	NM_012325 [SRS] NM_012325 [ENTREZ]
RefSeq	NT_086910 [SRS] NT_086910 [ENTREZ]
AceView	MAPRE1 AceView - NCBI
TRASER	MAPRE1 Traser - Stanford
Unigene	Hs.472437 [SRS] Hs.472437 [NCBI] HS472437 [spliceNest]
Protein : pattern, domain, 3D structure	
SwissProt	Q15691 [SRS] Q15691 [EXPASY] Q15691 [INTERPRO]
Prosite	PS50021 CH [SRS] PS50021 CH [Expasy]
Interpro	IPR001715 Calponin-like [SRS] IPR001715 Calponin-like [EBI]
Interpro	IPR004953 EB1 [SRS] IPR004953 EB1 [EBI]
CluSTr	Q15691
Pfam	PF00307 CH [SRS] PF00307 CH [Sanger] pfam00307 [NCBI-CDD]
Pfam	PF03271 EB1 [SRS] PF03271 EB1 [Sanger] pfam03271 [NCBI-CDD]
Blocks	Q15691
PDB	1PA7 [SRS] 1PA7 [PdbSum], 1PA7 [IMB]
PDB	1UEG [SRS] 1UEG [PdbSum], 1UEG [IMB]
Polymorphism : SNP, mutations, diseases	
OMIM	603108 [map]
GENECLINICS	603108
SNP	MAPRE1 [dbSNP-NCBI]
SNP	NM_012325 [SNP-NCI]
SNP	MAPRE1 [GeneSNPs - Utah] MAPRE1 [SNP - CSHL] MAPRE1 [HGBASE - SRS]
General knowledge	
Family Browser	MAPRE1 [UCSC Family Browser]
SOURCE	NM_012325
SMD	Hs.472437
SAGE	Hs.472437
Amigo	process cell proliferation
Amigo	function microtubule binding
Amigo	function protein C-terminus binding
Amigo	process regulation of cell cycle
PubGene	MAPRE1
Other databases	
Probes	
Probe	MAPRE1 Related clones (RZPD - Berlin)

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 2004

Citation

This paper should be referenced as such :

Tirnauer JS . MAPRE1 (Microtubule-associated protein, RP/EB family, member 1). Atlas Genet Cytogenet Oncol Haematol. November 2004 .

URL :

<http://www.infobiogen.fr/services/chromcancer/Genes/MAPRE1ID455ch20q11.html>

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