

## Gene Section

### Mini Review

# PTPRG (protein tyrosine phosphatase, receptor type, G)

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## Identity

**Hugo:** PTPRG

**Other names:** HPTPG; PTPG; R-PTP-GAMMA; RPTPG

**Location:** 3p14.2

## DNA/RNA

### Description

The PTPRG gene is composed of 30 exons and is approximately 780 kb in size.

### Transcription

The transcript length is 4338 bp. An alternatively spliced variant has been reported with a transcript length of 5655 bp.

### Pseudogene

No pseudogenes have been reported.

## Protein

### Description

Amino acids: 1445. Molecular weight: 162058 Daltons. The PTPRG gene belongs to the receptor class 5 subfamily of the protein-tyrosine phosphatase family.

### Expression

PTPRG is expressed in several tissues.

### Localisation

Membrane. Single-pass type I membrane protein.

### Function

Involved in regulating signaling through ligand-controlled protein tyrosine dephosphorylation. The

protein contains an extracellular carbonic anhydrase-like and fibronectin type III-like domain, a single transmembrane domain, and a cytoplasmic region with 2 tandem catalytic tyrosine phosphatase domains. Y2H, animal models.

### Homology

PTPRG shares a PTP domain, involved in dephosphorylating phosphorylated tyrosine residues, with the other receptor-like protein tyrosine phosphatases. The PTPRG gene is conserved in vertebrates. The human and mouse (1442-amino acid) sequences share 95% identity at the amino acid level.

## Mutations

### Germinal

No germline mutations have been reported.

### Somatic

8 different missense mutations in the PTPRG gene have been identified in colon carcinomas: C1082T (T361M), C1385T (A462V), C1541T (T514M), C1777T (R593W), A2864G (E955G), A2918G (Y973C), C3934T (R1312W) A3976G (I1326V).

Loss of heterozygosity (LOH) of a region which includes the PTPRG locus has been shown in clear renal cell carcinoma, lung carcinoma and colon carcinoma.

## Implicated in

**Note:** PTPRG has been considered a potential tumor suppressor gene based on its function, antagonizing activity of protein tyrosine kinases that often function as oncoproteins. Secondly, because it maps to a region of human chromosome 3, 3p21, that is frequently

deleted in renal cell carcinoma and Lung carcinoma. Thirdly, because PTPRG has been shown to harbor point mutations in a subset of colon carcinomas. Fourthly, because the PTPRG gene shows promoter hypermethylation in cutaneous T-cell lymphoma and melanoma. Finally, lower expression levels of PTPRG have been reported for a number of cancerous tissues including gastric cancer.

## References

- LaForgia S, Morse B, Levy J, Barnea G, Cannizzaro LA, Li F, Nowell PC, Boghosian-Sell L, Glick J, Weston A, et al. Receptor protein-tyrosine phosphatase gamma is a candidate tumor suppressor gene at human chromosome region 3p21. *Proc Natl Acad Sci USA* 1991;88(11):5036-5040.
- Wang Z, Shen D, Parsons DW, Bardelli A, Sager J, Szabo S, Ptak J, Silliman N, Peters BA, van der Heijden MS, Parmigiani G, Yan H, Wang TL, Riggins G, Powell SM, Willson JK, Markowitz S, Kinzler KW, Vogelstein B, Velculescu VE. Mutational analysis of the tyrosine phosphatome in colorectal cancers. *Science* 2004;304(5674):1164-1166.
- van Doorn R, Zoutman WH, Dijkman R, de Menezes RX, Commandeur S, Mulder AA, van der Velden PA, Vermeer MH, Willemze R, Yan PS, Huang TH, Tensen CP. Epigenetic profiling of cutaneous T-cell lymphoma: promoter hypermethylation of multiple tumor suppressor genes including BCL7a, PTPRG, and p73. *J Clin Oncol* 2005;23(17):3886-3896.
- Furuta J, Nobeyama Y, Umebayashi Y, Otsuka F, Kikuchi K, Ushijima T. Silencing of Peroxiredoxin 2 and aberrant methylation of 33 CpG islands in putative promoter regions in human malignant melanomas. *Cancer Res* 2006;66(12):6080-6.
- Wu CW, Kao HL, Li AF, Chi CW, Lin WC. Protein tyrosine-phosphatase expression profiling in gastric cancer tissues. *Cancer Lett* 2006;242(1):95-103.

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