Assignment of GRSF1 encoding a poly(A)⁺ mRNA binding protein to human chromosome 4q13

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Rationale and significance

A growing number of RNA binding proteins have been shown to play key roles in the post-transcriptional control of gene expression (Burd and Dreyfuss, 1994). We have recently isolated and characterized a novel cytoplasmic mRNA binding protein, GRSF1 (G-rich RNA sequence binding factor 1), which interacts in a sequence-specific manner with poly(A)⁺ cytoplasmic mRNA in living cells (Qian and Wilusz, 1993, 1994). GRSF1 protein contains three RNA binding domains and has a structural organization very similar to a subset of RNA binding proteins. In addition, similarities to the 14 base G-rich GRSF1 binding site are present in a significant number of mRNAs (Bagga et al., 1995), suggesting that GRSF1 may play a key role in mRNA metabolism. In this report, we have localized the GRSF1 gene to human chromosome band 4q13.

Fig. 1. Mapping of GRSF1 by FISH. Propidium iodide stained meta-phase showing specific fluorescent signal on both chromatids of each chromosome 4 obtained by using a CCD camera and computer enhancement. Arrows indicate signal on 4q13 based upon the DAPI stained image of the same metaphase (data not shown).

Materials and methods

Fluorescence in situ hybridization (FISH)

FISH was carried out essentially as described (Trask, 1992) using meta-phase preparations of normal peripheral blood lymphocytes. Fluorescent signals were detected using an Olympus fluorescent microscope and photographs were taken with a PM20 camera using ASA 400 Kodak film. Images were also captured with a cooled-CCD camera mounted on an Olympus fluorescent microscope.

Probe name: GRSF1

Insert size: 2.7 kb

Probe type: cDNA

Vector: pGEM4

Proof of authenticity: specific hybridization with cDNA and gene-specific PCR product.

Gene reference: Qian and Wilusz, 1993; 1994; GDBID: [GC00-696-354](#).

Polymerase chain reaction (PCR)

Genomic DNA (100 ng) of different origins (see legend of Fig. 2) was amplified with primers derived from the 3' untranslated region of the GRSF1 cDNA clone.

Amplicon: 197 bp

Conditions: 94°C 3 min; 35 cycles of 94°C 1 min, 57°C 1 min, 72°C 1 min, followed by 72°C 6 min.

Primer names Primer sequence

* To our knowledge this is the first time this gene has been mapped.

JW85 CTGGFAXGGTTTGGCAG

JW80 CCCCTTAAGTAGATAGG

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Results

Mapping data Location: 4q13 Number of cells examined: 88 Number of cells with specific signal: 1 (9), 2 (37), 3 (0), 4 (23) chromatids per cell Most precise assignment: 4q13

Location of background signals (sites with > 2 signals): No consistent hybridization signal was observed at any other site.

Fig. 2. Mapping of GRSF1 to chromosome 4 by PCR. Lane 1, Marker; lane 2, DNA from a human diploid fibroblast cell line (HS74); lane 3, Chinese hamster DNA; lane 4, DNA from a human/mouse hybrid containing human chromosome 8 (SCH8-1, Banga et al., 1994); lane 5, DNA from a human/hamster hybrid containing human chromosome 4 (NA 10115, NIGMS-Human Genetic Mutant Cell Repository, mapping panel number 2).

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