

Assignment¹ of DLK1 to human chromosome band 14q32 by in situ hybridization

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¹ To our knowledge this is first time this gene has been mapped.

Rationale and significance

DLK1 (delta [*Drosophila*]-like 1) encodes *dlk*, a transmembrane protein member of the EGF-like homeotic family. Members of this family participate in cell-to-cell interactions that control cell fate during differentiation. The *dlk* protein contains six EGF-like repeats in its extracellular domain that are highly homologous to similar domains of the *Drosophila* protein Delta (Laborda et al., 1993) and other EGF-like homeotic protein family members. *dlk* also contains a unique transmembrane domain and a short intracellular region.

pG2, FA-1 (Fetal Antigen 1), Pref-1 (Preadipocyte factor 1), and *dlk* have all been shown to be identical or polymorphic products of a single gene (Lee et al., 1995). *dlk* has also been called SCP-1 (stromal cell derived protein 1) and ZOG protein (Halder et al., 1998). The functional importance of *dlk* in the control of cellular differentiation has been shown in several cell types, including small cell lung cancer cell lines (Laborda et al., 1993), preadipocytes (Smas and Sul, 1993), immune stem cells (Moore et al., 1997) hematopoietic stromal cells and B lymphocytes (Bauer et al., 1998), and adrenal glomerulosa cells (Halder et al., 1998). Chromosome mapping of this gene may be important to explore whether gene deletion or duplication may be associated with diseases or defaults in embryonic development.

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Materials and methods

DLK1 clones from a human P1 genomic library (Genome Systems Inc., St. Louis MO) were selected by using a PCR primer pair that amplifies a fragment of exon V of DLK1. The sequence of the primers and the conditions of the PCR amplification have been previously published (Lee et al., 1995). The genomic clones identified were characterized as corresponding to DLK1 by sequencing, restriction enzyme digestions and Southern blot hybridization. Genomic fragments of around 50 kb in length were used for FISH mapping, performed by Genome Systems Inc. (St. Louis MO) according to standard procedures (Shi et al., 1997). DNA was labeled with digoxigenin dUTP by nick translation. Labeled probe was mixed with sheared human DNA and hybridized to normal metaphase chromosomes derived from PHA-stimulated peripheral blood lymphocytes. Specific hybridization signals were detected by means of antidigoxigenin antibodies followed by counterstaining with DAPI. Chromosome identity was confirmed in dual-labeling experiments using the DLK1 probe and probes specific for the centromeric region of the chromosomes (Fig. 1).

Probe name: 12216

Probe type: genomic DNA fragment

Insert size: 50 kb

Vector: P1 bacteriophage

Proof of authenticity: DNA sequencing, restriction enzyme mapping, Southern blot hybridization with cDNA probe.

Gene reference: Laborda et al. (1993), Genbank accession numbers Z12171, Z12172, U15979, U15980

Results

Mapping data of human DLK1

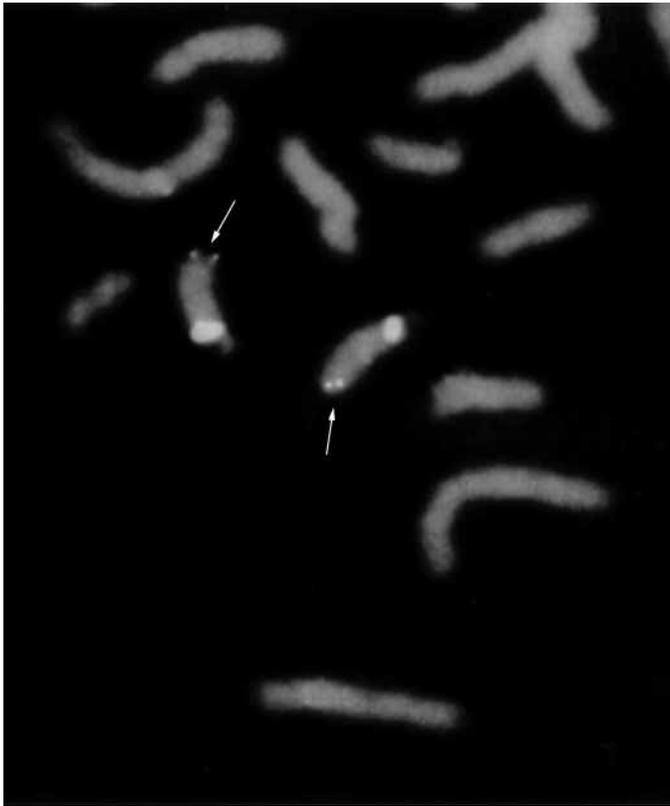
Location: 14q32

Number of cells examined: 80

Number of cells with specific signal: 1(0), 2(5), 3(4) 4(71).

Most precise assignment: 14q32.33.

Location of background signals (sites with > 2 signals): none observed



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Fig. 1. FISH mapping of human DLK1 with probe 12216. The specific signals detected on chromosome 14 are indicated by arrows. The specificity of the location was confirmed by co-hybridization with a biotin labeled probe specific for the centromere of chromosome 14 and 22. Observation of specifically labeled chromosomes 14 demonstrated that DLK1 is located at band 14q32. The picture was generated by Genome Systems Inc.

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