

5-3-93

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Alessandra Cecilia Rovescalli

Lab. Biochemical Genetics, NHLBI

NIH, 9000 Rockville Pike

Bldg. 36, room 1C06

Bethesda, MD 20892

Fax: ( 301 ) 402-0270

Office: ( 301 ) 496-3551 Home: ( 301 ) 718-6582

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NKx-1, A MOUSE HOMEBOX GENE EXPRESSED IN PART OF THE NERVOUS SYSTEM AND MESODERM. A. C. Rovescalli<sup>†</sup>, Y. Kim<sup>†</sup>, S. Kim<sup>†</sup>, J. Ferrante<sup>†</sup>, and M. Nirenberg<sup>†</sup>. Laboratory of Biochemical Genetics<sup>†</sup> and Laboratory of Molecular

Cardiology<sup>†</sup>, National Heart, Lung and Blood Institute, NIH, Bethesda, MD 20892

The Drosophila NK-1 homeobox gene (S59 is a synonym) is expressed during embryonic development in a subset of neurons in the CNS and a subset of founder muscle cells (Kim, Y. and Nirenberg, M., Proc. Natl. Acad. Sci. **86**, 7716 (1989), and Dohmann, C., Azpiazu, N., and Frasch, M., Genes and Develop. **4**, 2098 (1990)).

Oligodeoxynucleotides corresponding to sequences in the NK-1 homeobox were used as primers with honeybee, salmon, Xenopus, mouse, or rat genomic DNA to amplify homologs of the NK-1 homeobox by PCR. Amplified DNA fragments were cloned and sequenced and all were shown to encode part of an NK-1-like homeodomain. The rat NK-1 homeobox fragment was used as a probe to screen a mouse genomic DNA library at low stringency. A 15 kb genomic DNA clone was obtained, and 8 kb was sequenced. The deduced amino acid sequence of the mouse homeodomain differs from the Drosophila

NK-1 homeodomain by only 3 of 60 amino acid residues; therefore, the mouse gene was named NKx-1. Both NKx-1 and NK-1 proteins contain an acidic region before the homeodomain. Southern analysis showed that the mouse genome contains only one NKx-1 gene. NKx-1 poly A<sup>+</sup> RNA was detected by PCR and RNase protection in 10-18 day mouse embryos; the abundance of NKx-1 poly A<sup>+</sup> RNA is highest in 10 day embryos; then progressively decreases. Northern analysis of poly A<sup>+</sup> RNA from adults revealed a major band of NKx-1 poly A<sup>+</sup> RNA in brain RNA and trace bands in RNA from testes and spleen. Sections of 14 day mouse embryos were subjected to in situ hybridization and autoradiography. NKx-1 RNA was found in discrete regions of the mesencephalon and myelencephalon; NKx-1 RNA also was found in spinal cord, vertebrae, and ribs. These results show that the mouse NKx-1 gene encodes a homeodomain that is closely related that of Drosophila NK-1, and is expressed during embryonic development in part of the nervous system, in some mesodermal tissues, and in adult brain.