The hnRNP F protein: unique primary structure, nucleic acid-binding properties, and subcellular localization

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More than 20 different heterogeneous nuclear ribonucleoproteins (hnRNPs) are associated with pre-mRNAs in the nucleus of mammalian cells and these proteins appear to influence pre-mRNA processing and other aspects of mRNA metabolism and transport. The arrangement of hnRNP proteins on pre-mRNAs is likely to be unique for each RNA and may be determined by the different RNA-binding preferences of each of these proteins. hnRNP F (M(r) = 53 kD, pI = 6.1) and hnRNP H (M(r) = 56 kD, pI = 6.7-7.1) are abundant components of immunopurified hnRNP complexes and they have distinct nucleic acid binding properties. Unlike other hnRNP proteins which display a varying range of affinities for different ribonucleotide homopolymers and ssDNA, hnRNP F and hnRNP H bind only to poly(rG) in vitro. hnRNP F and hnRNP H were purified from HeLa cells by poly(rG) affinity chromatography and oligonucleotides derived from peptide sequences were used to isolate a cDNA encoding hnRNP F. The predicted amino acid sequence of hnRNP F revealed a novel protein with three repeated domains related to the RNP consensus sequence RNA-binding domain. Monoclonal antibodies produced against bacterially expressed hnRNP F were specific for both hnRNP F and hnRNP H and recognized related proteins in divergent organisms, including in the yeast Saccharomyces cerevisiae. hnRNP F and hnRNP H are thus highly related immunologically and they share identical peptides. Interestingly, immunofluorescence microscopy revealed that hnRNP F and hnRNP H are concentrated in discrete regions of the nucleoplasm, in contrast to the general nucleoplasmic distribution of previously characterized hnRNP proteins. The unique RNA-binding properties, amino acid sequence and distinct intranuclear localization of hnRNP F and hnRNP H make them novel hnRNP proteins that are likely to be important for the processing of RNAs containing guanosine-rich sequences.