FXR1, an autosomal homolog of the fragile X mental retardation gene

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Fragile X mental retardation syndrome, the most common cause of hereditary mental retardation, is directly associated with the FMR1 gene at Xq27.3. FMR1 encodes an RNA binding protein and the syndrome results from lack of expression of FMR1 or expression of a mutant protein that is impaired in RNA binding. We found a novel gene, FXR1, that is highly homologous to FMR1 and located on chromosome 12 at 12q13. FXR1 encodes a protein which, like FMR1, contains two KH domains and is highly conserved in vertebrates. The 3' untranslated regions (3'UTRs) of the human and Xenopus laevis FXR1 mRNAs are strikingly conserved (approximately 90% identity), suggesting conservation of an important function. The KH domains of FXR1 and FMR1 are almost identical, and the two proteins have similar RNA binding properties in vitro. However, FXR1 and FMR1 have very different carboxy-termini. FXR1 and FMR1 are expressed in many tissues, and both proteins, which are cytoplasmic, can be expressed in the same cells. Interestingly, cells from a fragile X patient that do not have any detectable FMR1 express normal levels of FXR1. These findings demonstrate that FMR1 and FXR1 are members of a gene family and suggest a biological role for FXR1 that is related to that of FMR1.