Making Sense of Duchenne Muscular Dystrophy: Exon Skipping Antisense Therapy

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What is Duchenne Muscular Dystrophy (DMD)?
DMD is caused by muscle structure breakdown, due to the lack of dystrophin protein.

What is exon skipping?
THE BAD LAD AND HIS BIG MAD OLD DOG RAN AND RAN AND DUG OUT AND ATE THE SAD FAT CAT END (= Normal gene)
The normal reading frame of the dystrophin gene makes sense and protein is produced

THE BAD LAD AND HIS BIG MAD OLD DOG RAN NDR ANA NDD UGO UTN TTA ATTA ADF ATC ATC ATE ND (= DMD gene)
The deletion of an ‘A’ in ‘AND’ causes a shift in the reading frame and the message cannot be read and no protein is produced

THE BAD LAD AND HIS BIG MAD OLD DOG RAN RAN TOO FAR AND DUG OUT AND ATE THE SAD FAT CAT END (= Skipped gene)
Skipping over the ‘ND’ in ‘AND’ restores the reading frame and although it’s not perfect it is readable and some protein will be produced and the person would have less severe disease.

Exon skipping offers a potential gene therapy for some DMD patients, and some dystrophin protein is produced.

“Encouraging results from exon skipping gene-based therapy study for DMD”
News-Medical.Net 4 Jan 2011
“Scientists at Royal Holloway, University of London have reported encouraging results in a new gene-based therapy for DMD…… Exon skipping is a gene therapy approach that is currently in clinical trial for DMD and involves short strands of synthetic DNA (with morpholino chemistry) known as ‘antisense oligonucleotides’ which can be considered a sort of ‘molecular patch’.
The treatment restores production of the protein dystrophin and works by masking the faulty part of the dystrophin gene, allowing a shortened but functional dystrophin protein to be produced.”