Structural studies of mRNA nuclear export and quality control

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Transport of mRNAs from the nucleus to the cytosol of eukaryotic cells is mediated by a dedicated transport factor and is linked to several quality control mechanisms that make sure that only correctly transcribed and processed mRNAs are exported and translated. In higher eukaryotes, a key player in this context is the exon-exon junction complex (EJC). The EJC is a multiprotein complex that is deposited on mRNAs at the end of splicing and remains bound with at least its core components during and after export. The Mago and Y14 proteins are believed to be at the core of the EJC. Together they communicate with the nonsense-mediated decay pathway that surveys and targets aberrant mRNAs when they present a nonsense mutation upstream of at least one exon-exon junction.

The crystallographic results show that, perhaps not surprisingly for a protein involved in RNA metabolism, Y14 contains an RNA-binding domain (RBD). However, the RBD of Y14 binds the protein Mago rather than RNA, and this protein-protein interaction is crucial to elicit NMD. The structure of the Mago-Y14 complex reveals the two proteins intertwine to form a single surface with conserved exposed residues. Recent results on how this surface is involved in protein-protein interactions that mediate mRNA surveillance will be presented.