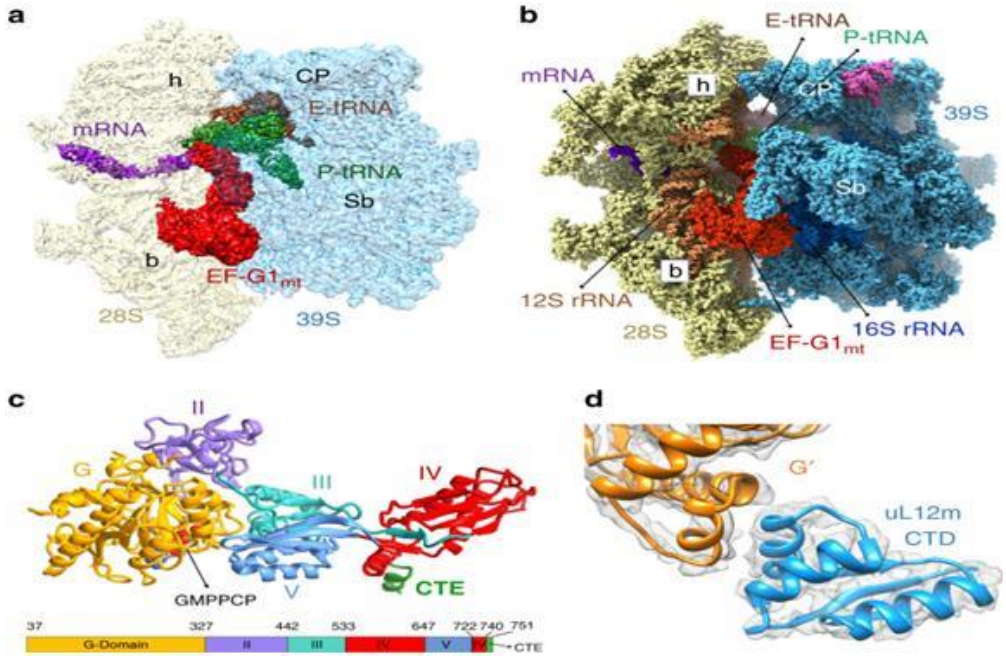
Structures of the human mitochondrial ribosome bound to EF-G1 reveal distinct features of mitochondrial translation elongation

In this work, Scientists from DBT - Regional Centre for Biotechnology (DBT-RCB), Faridabad presented the 2.68–3.96 Å cryo-EM structures of the human 55S mitoribosome in complex with the human mitochondrial elongation factor G1 (EF-$G1_{mt}$) in three distinct conformational states, including an intermediate state and a post-translocational state. These structures reveal the role of several mitochondria-specific (mito-specific) mitoribosomal proteins (MRPs) and a mito-specific segment of EF-$G1_{mt}$ in mitochondrial tRNA ($tRNA_{mt}$) translocation.



In particular, the mito-specific C-terminal extension in EF-$G1_{mt}$ is directly involved in translocation of the acceptor arm of the A-site $tRNA_{mt}$. In addition to the ratchet-like and independent head-swiveling motions exhibited by the small mitoribosomal subunit, team also discovered significant conformational changes in MRP mL45 at the nascent polypeptide-exit site within the large mitoribosomal subunit that could be critical for tethering of the elongating mitoribosome onto the inner-mitochondrial membrane.

The mammalian mitochondrial ribosome (mitoribosome) and its associated translational factors have evolved to accommodate greater participation of proteins in mitochondrial

translation. Dr. Prem Singh Kaushal (Assistant Professor, RCB), co-authored a research article with other collaborators on 'Structures of the human mitochondrial ribosome bound to EF-G1 reveal distinct features of mitochondrial translation elongation'.

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Contact Person & Contact Details:

Dr. Deepika Bhaskar, E-mail: deepika.bhaskar@rcb.res.in, Phone Number: 9818497821

Dr. Nidhi Sharma, E-mail: nidhi.sharma@rcb.res.in, Phone number: 8826808920