Combi Seminar

Wednesday, 7.31.19 | 1:30 | Foege Auditorium

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"Hallmarks of slow translation initiation revealed in mitochondrially localizing mRNA sequences"

We report the first investigation into the relationship between mRNA translation initiation rate and mRNA localization to the cytosolic surface of mitochondria.

BACKGROUND: The mRNA of some, but not all, nuclear encoded mitochondrial proteins localize to the periphery of mitochondria. Previous studies have shown that both the nascent polypeptide chain and an mRNA binding protein play a role in this phenomenon, and have noted a positive correlation between mRNA length and mitochondrial localization.

METHODS: We performed a cross-dataset statistical analysis of mRNA features related to translation or localization and a simulation of mRNA diffusion.

RESULTS: We found that translation initiation promoting factors such as Kozak sequences are associated with cytosolic localization, while inhibiting factors such as 5'UTR secondary structure correlate with mitochondrial localization. Moreover, the frequencies of nucleotides in various positions of the 5'UTR show higher correlation with localization than the 3'UTR. These results indicate that mitochondrial localization is associated with slow translation initiation.

DISCUSSION: In this project we struggled in disentangling cause from affect. Is slow translation initiation causally linked to mitochondrial localization? Or perhaps selected for because of mitochondrial localization? Or is the correlation rather more indirect, perhaps due to selection pressure on long mRNA's in general? I will discuss how we tried to address these questions.