

P014 A link between mRNAs translationally controlled by eIF4E-binding proteins and specific PUFs

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In eukaryotes, eIF4E-binding proteins (4EBPs) regulate translation of mRNAs by competing with eIF4G for binding of eIF4E-cap complex. However, the extent of the specific mRNA targets regulated by 4EBPs remains largely unknown. We performed translational profiling by microarray analysis of polysome and monosome associated mRNAs in yeast wild-type and 4EBP (Caf20 and Eap1) mutant cells to identify regulated mRNAs. This study is the first global identification of 4EBP target mRNAs. We found that yeast 4EBPs modulate the translation of over one thousand genes. Most target mRNAs differ between the 4EBPs revealing translational specificity for each 4EBP. Some interactions regulated translation of genes required for nitrogen utilization in yeast. To account for mRNA specificity, we found correlations between our data and targets of mRNA-binding proteins including yeast PUF proteins. PUF proteins bind to specific mRNA 3'-untranslated region sequences and control mRNA stability, transport and expression. Affinity chromatography uncovered specific RNA-stabilized complexes formed between Caf20p and Puf4p/Puf5p and between Eap1p and Puf1p/Puf2p. The combined action of each 4EBP with specific 3'UTR-binding proteins mediates translational control in yeast, showing that this form of translational control is more widely employed than previously demonstrated.