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PABP prevents the untimely decay of select mRNA populations in human cells

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Gene expression is tightly regulated at the levels of both messenger RNA (mRNA) translation and stability. The poly(A)-binding protein (PABP) is thought to play a role in regulating these processes by binding the mRNA 3' poly(A) tail and interacting with both the translation and the mRNA poly(A) tail-shortening (deadenylation) machineries.

In this study, we directly investigate the impact of PABP on translation and stability of endogenous mRNAs in human cells. Remarkably, our transcriptome-wide analysis only detects marginal mRNA translation changes in PABP-depleted cells. In contrast, rapidly depleting PABP alters mRNA abundance and stability, albeit non-uniformly. Otherwise stable transcripts, including those encoding proteins with constitutive functions, are destabilized in PABP-depleted cells. In contrast, many unstable mRNAs, including those encoding proteins with regulatory functions, decay at similar rates in presence or absence of PABP. Moreover, PABP depletion-induced cell death can partially be suppressed by disrupting factors that promote mRNA turnover (i.e. mRNA decapping and 5'-3' decay factors). Finally, we provide evidence that the LSM1-7 complex promotes decay of "stable" mRNAs in PABP-depleted cells.

Taken together, these findings suggest that PABP plays an important role in preventing the untimely decay of select mRNA populations.

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