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Requirement for Both EDEN and AUUUA Motifs in Translational Arrest of Mos mRNA upon Fertilization of *Xenopus* Eggs

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Abstract

Translational arrest of maternal Mos mRNA upon fertilization of *Xenopus* eggs is a prerequisite for the initiation of embryonic divisions. Recent studies suggest that an embryo deadenylation element (EDEN) present in the 3′ untranslated region (3′UTR) is sufficient for deadenylation (and, hence, probably for translational arrest) of Mos mRNA after fertilization. By directly monitoring translation of numerous Mos mRNA constructs in *Xenopus* eggs, however, we show here that the EDEN is necessary but not sufficient for translational arrest of Mos mRNA. We demonstrate that two AUUUA motifs, each located solitarily and distantly from the EDEN, are also required for the translational arrest of Mos mRNA after fertilization. Significantly, translational arrest of Eg2 mRNA, another EDEN-containing maternal mRNA, also requires a single AUUUA motif located far from the EDEN. Analysis of the poly(A) tails of various Mos mRNA constructs indicates that the EDEN alone confers only partial deadenylation on Mos mRNA, and that the AUUUA motifs act to enhance EDEN-directed deadenylation in a position-dependent manner. Finally, introduction of an excess of the EDEN, but not the AUUUA motifs, into eggs can restore translation of endogenous Mos mRNA. These results suggest that the EDEN, only together with appropriately positioned AUUUA motifs and a *trans*-acting factor(s), can efficiently deadenylate and hence translationally arrest Mos (as well as Eg2) mRNA after fertilization.

Keywords

AUUUA motif; EDEN; Eg2 mRNA; Mos mRNA; translation; *Xenopus* egg

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