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POSTER ABSTRACTS – SESSION 2 (DEC. 16, 2014)

**Specialized Ribosomes: A new frontier in gene regulation, organismal development, & evolution**

**Awardee:** Maria Barna

**Award:** New Innovator Award

**Awardee Institution:** Stanford University

The ribosome is generally considered to translate mRNAs similarly across cell types and developmental stages. However, recent studies suggest greater ribosome-mediated regulatory control in mammalian development and transcript-specific translation. In particular, our findings reveal that fundamental aspects of gene regulation and formation of the mammalian body plan are controlled by what we have termed “specialized ribosomes,” which have a unique activity or composition, that direct where and when specific protein products are made. An outstanding question raised from these studies is how ribosome-mediated control of gene expression is encoded within mRNA sequence. I will discuss my lab’s recent findings revealing how this regulation is achieved in *cis* and *trans*. In particular large-scale efforts that identify hundreds of unique RNA regulons embedded within the 5’UTRs of key developmental regulators within the vertebrate genome. These elements act as essential RNA “switches” in converting key transcripts into proteins. I will further discuss how the presence a novel Translational Inhibitory Element (TIE) within these same transcripts blocks generic cap-dependent translation, thereby enabling a unique mode of translation initiation. Together, these findings suggest that similar to the complex and highly regulated system of transcriptional control, *cis*-acting RNA regulons in conjunction with more specialized ribosome activity provide newfound regulatory control to gene expression critical for mammalian development.