Regulation of gene expression through transcriptional condensates in C. elegans embryonic development.

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The assembly of transcriptional machinery into dense, sub-micrometer-sized, liquid-like condensates is emerging as a key feature of transcriptional regulation. However, the mechanism of formation and function of these assemblies has not been thoroughly explored in a developing organism. We show, that in the nuclei of early *Caenorhabditis elegans* embryos, RNA polymerase II (Pol II) is organized into dynamic condensates. Quantitative microscopic analysis revealed that these condensates could be classified into two classes based on size, as most nuclei contained two major foci and several smaller ones. Using combined DNA FISH and immunohistochemistry, we found that the two major Pol II condensates form at the sites of a highly repetitive SL1 locus, which encodes an essential splice leader used in most *C. elegans* transcripts. Through time-lapse microscopy, we found that the Pol II condensates were sensitive to stress, as they dissolved in elevated temperatures. This disappearance coincided temporally, but not spatially, with the formation of nuclear stress bodies formed by Heat Shock Factor 1. Using genetics and genomic approaches, we are investigating the impact of these structures on animal physiology. The structures described here will serve as a model system to understand the role of biomolecular condensation in transcriptional regulation during development and stress response.