Zebrafish models for transcriptional regulation in development and stem cell differentiation

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The availability of multiple vertebrate genome sequences has revealed extensive evolutionary conservation in non-coding sequence. We presume that many of these conserved non-coding sequences function in transcriptional regulation, and are critical in normal development and genetic diseases, but we lack effective rules to predict their function from sequence alone. Taking advantage of the abundant and optically clear embryos and rapid early development of the zebrafish, we have developed a transposon-based system to evaluate the function of potential enhancer elements. We are applying this approach to key developmental genes, to identify enhancers acting in bone and cartilage, dopaminergic neurons, pancreatic islets, and other cell types. Identification of these enhancers is allowing us to unravel the signaling pathways controlling normal development of critical tissues, and ultimately to manipulate those pathways in culture to direct stem cell differentiation.

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Biology and Medicine. Dr Fisher laboratory is currently focusing on using the zebrafish as a model system for studying genetics and developmental biology, esp. skeletal development. Their recent contributions include the development of new reagents and technologies for the study of skeletogenesis in the zebrafish. See more details: www.hopkinsmedicine.org/geneticmedicine/People/Faculty/fisher.html