cells. We hypothesize that in the sclerotome, chick Hoxa-5 acts locally to influence cartilage differentiation in the precursors of the ventral-lateral cartilage, which shows differential morphologies across the cervical–thoracic transition. We are currently working to characterize the interaction between Hoxa-5 and other genes that influence cartilage patterning and differentiation in somites.

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Program/Abstract # 104
Investigations of early and late onset scoliotic curvatures in zebrafish
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Familial/idiopathic-type scoliosis affects 3–4% of the pediatric population. This syndrome largely manifests during early infant development due to abnormal vertebral development in utero, but can also present symptoms during adolescence. We provide evidence that three independent leviathan (levm531, vu41, vu105) mutant alleles are mutations in the zebrafish collagen type 8 alpha 1 (Col8a1a) gene. Homozygous mutants display altered dorsoventral folding of the notochord after 1 day post fertilization (dpf). In addition, leviathan mutants display ultrastructural defects of the notochord sheath and exhibit aggregation and misalignment of the notochord sheath cells. We suggest that mutations that affect proper folding of Col8a1a activate the unfolded protein response to degrade mutant proteins. Moreover, a small percentage of leviathan mutants can survive till adulthood and display dramatic scoliotic curvature of the axial skeleton. We hypothesize that the notochord sheath cells regulate the stability of the axial column both early and later in development. We are also investigating a novel heterozygous dominant viral insertion mutant fish, druk. We observe no defects in the early somitogenesis phase. Dramatic defects in EVL cell morphology and polarity are observed in response to knockdown of Col8a1a (SDF1a) and Rac1. Interestingly, morpholino knockdown of Rac1 shows a very similar morphological phenotype as the SDF1a and CXCR4a morphants. We propose that SDF1a signaling pathway, via Rac1, plays a role in coordinating the cell movements that lead to the proper alignment of myotome fibers within each somite in X. laevis suggesting a possible conserved pathway in the regulation of somite rotation among vertebrates.

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Program/Abstract # 105
Molecular mechanisms underlying Xenopus somite morphogenesis
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Somitogenesis establishes both the segmented body plan and the progenitors of the skeletal muscle, axial skeleton and dermis of the adult. In the frog, Xenopus laevis, somitogenesis consists of the partitioning of the presomitic mesoderm into somites that undergo a 90° rotation. These somites are comprised of myotome fibers that are aligned parallel to the notochord. Work from our lab reveals that signals present at the lateral edge of the paraxial mesoderm play an important role in the proper alignment of these myotome fibers. A prior study showed that the secreted cytokine, stromal derived factor 1a (SDF1a) played a role in the lateral migration of cells within the anterior compartment of zebrafish somites (Hollway et al., 2007). This lateral movement of cells is reminiscent of the 90° rotation that occurs during X. laevis somite morphogenesis. Using an RT-PCR approach we also found that SDF1a is enriched in this lateral tissue. Subsequent knockdown of SDF1a and its receptor, CXCR4a caused a disruption in myotome alignment. Using Western blot analysis, we show that knockdown of SDF1a leads to a reduction in Rac1 protein. Interestingly, morpholino knockdown of Rac1 shows a very similar morphogenetic phenotype as the SDF1a and CXCR4a morphants. We propose that SDF1a signaling pathway, via Rac1, plays a role in coordinating the cell movements that lead to the proper alignment of myotome fibers within each somite in X. laevis suggesting a possible conserved pathway in the regulation of somite rotation among vertebrates.

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Program/Abstract # 107
Alpha-catennin regulates cell cortex stability in zebrafish radial intercalation
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Adherens junctions (AJs) are essential components for cell–cell adhesion and play a key role in cell migration and epithelial–mesenchymal transition during embryogenesis, wound healing and cancer. The AJs are composed of members of the cadherin family, transmembrane cell adhesion proteins that are connected to the actin cytoskeleton through interaction with the b-catenin/a-catenin (acat) complex. The textbook model described acat as a static molecular