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Determining the Role of *Hoxc-4*, *Hoxd-4*, and *Hoxc-5* in Patterning the Cervicothoracic Transition in *Gallus Gallus*

Hox genes are a family of genes that encode transcription factors that govern the establishment of the head to tail axis in most embryos. They are thought to be evolutionarily conserved given their sequence similarity across species. However, previous research has shown that their expression patterns vary between species. Thus, the function of specific *Hox* genes in mice could differ in chicken embryos. Furthermore, because *Hox* genes are believed to work in combination to establish a "*Hox*" code, the *Hox* gene combination may differ as well. Mice and chicks have physically distinct cervical (neck) vertebral morphologies, and it is therefore worthy to compare the role of *Hox* genes in patterning the cervical vertebrae. *Hoxc*-4, *Hoxd*-4 and *Hox*c-5 are all expressed in the embryonic precursors of cervical vertebrae, known as somites, of mice. Previous research has shown that at least two of these genes are required for proper morphology of the cervical vertebrae. All three are expressed in the cervical region in chicken as well, thus we have hypothesized that they may play a similar role in patterning the cervical and thoracic vertebrae. To test their function, we generated an avian retrovirus encoding siRNAs (small interfering RNAs) which decrease the expression of the three target genes by degrading mRNA transcripts. We infected chicken embryos with the virus and assessed their vertebrae for skeletal phenotypes associated with a reduction of gene expression. So far, we have analyzed a phenotype in which the cervical vertebrae 9-11 are fused to a varying extent. *Hoxc*-4, *Hoxd*-4 and *Hox*c-5 are co-expressed in the somites that give rise to cervical vertebrae 9-11; therefore, we have concluded that *Hoxc*-4, *Hoxd*-4 and *Hoxc*-5 must play a role in establishing cervical vertebral identity in chicken. We hope to confirm a reduction in expression of these genes using a GFP reporter vector and generate more embryos to further characterize the phenotypic effects of reducing gene expression in *Hoxc*-4, *Hoxd*-4 and *Hoxc*-5 in chicken embryos.