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Hox genes, Development, and Cancer Metastasis

Understanding the inner workings of developmental genes such as the Hox genes can unlock new ways of thinking about relationships between growth and disease. Hox genes are involved in the growth of the body’s form, appearing early in development to orchestrate reliable structures. When hox genes are altered, it can result in unwanted, irregular morphological characteristics (Shubin 2009). Hox genes have a distinct organization as well, as each gene’s spatial location and order on the chromosome corresponds to a distinct region of the body. This spatial collinearity is common among most animals and appears to be evolutionarily conserved (Gaunt 2018.) Because the hox genes are so essential in early life stages, understanding how this organization is controlled may tell us more about how to intervene when development follows an abnormal path.

The hox genes are also implicated in cancer metastasis (Jonkers et al., 2020), and while this may seem unrelated to early life development, understanding hox genes in more detail may help illuminate how molecular mechanisms in the embryo may relate to the spread of cancer. In addition to morphological development, hox genes have also been found to be involved in the metastatic cascade where cancer tumors begin. Even though hox genes are generally overexpressed in several types of cancer, they still appear to contribute to both the progression of cancer growth as well as its suppression (Jonkers et al., 2020). This dual nature may parallel processes of early development, as groups of hox genes are expressed but very controlled, meaning that growth starts but also needs to stop at some point according to a specific plan. By looking at similarities between how hox genes function in early development vs. in cancer metastasis, we might discover how healthy growth and diseased growth may be similar. Understanding these similarities may help us better understand how hox genes might be controlled to artificially stop the growth of diseased tissue.

Works Cited

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