Somites: Formation and Role in Developing the Body Plan [1]

By: DeRuiter, Corinne Keywords: Somatic cells [2] Body plan [3]

Somites are blocks of mesoderm [4] that are located on either side of the neural tube [5] in the developing vertebrate embryo. Somites are precursor populations of cells that give rise to important structures associated with the vertebrate body plan and will eventually differentiate into dermis, skeletal muscle, cartilage, tendons, and vertebrae. Somites also determine the migratory paths of neural crest cells [6] and of the axons of spinal nerves.

Because of their developmental importance, somites [7] have been the topic over the years of many experiments. For example, an experiment published in 1992 by Nicole Le Douarin and Charles Ordahl, which involved fate mapping [8] of chick [9]-quail chimeras [10], revealed the arrangement of the inner somite and the migratory patterns of each section. This experiment showed the exact location of the precursor populations of the different muscle groups that derive from the somite, shedding light on their developmental importance.

The processes that follow somitogenesis [11] include myogenesis (generation of muscle), osteogenesis [12] (generation of bone), tendon formation, and specification of the intermediate mesoderm [4] (i.e., urogenital system). Because the somites [7] are an essential part of the developing body plan of vertebrates, any disruption in the cycle of formation or segmentation [13] can result in anomalies such as congenital vertebral defects [14]. Many spinal defects are also associated with kidney problems because the same lateral portions of the paraxial mesoderm [4] cells that form the somites [7] also form the mesonephros. Somites are literally the building blocks of the vertebrate body plan; they are essential for segmentation [16], bone and musculature development, as well as creating a template for the nervous system.

Sources
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