

Formation of the Dorsal Aorta

Most of the circulatory system of an early-stage amniote embryo is directed outside the embryo, its job being to obtain nutrients from the yolk or placenta. The intraembryonic circulatory system begins with the formation of the dorsal aorta. The dorsal aorta is composed of two cell layers: an internal lining of endothelial cells that is surrounded concentrically by a layer of smooth muscle cells. Elsewhere in the body, these two layers of blood vessels are usually derived from the lateral plate mesoderm, as we will detail in Chapter 20. The endotome of the posterior sclerotome, however, provides the endothelial cells and smooth muscle cells for the dorsal aorta and intervertebral blood vessels (see Figure 19.2E and F; Pardanaud et al. 1996; Wiegrefe et al. 2007; Nguyen et al. 2014). The presumptive endothelial cells are induced by Notch signaling in an ephrin B2-dependent manner. These sclerotomal cells are instructed to migrate ventrally by a presumed chemoattractant made by the primary dorsal aorta, a transitory structure made by the lateral plate mesoderm. Eventually, the endothelial cells from the sclerotome replace the cells of the primary dorsal aorta, which will become part of the blood stem cell population (Pouget et al. 2008; Sato et al. 2008; Ohata et al. 2009).

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