

Abstract

Left-right asymmetry of the body occurs across a number of organisms from invertebrates to vertebrates, and is mostly exhibited by the asymmetry of internal organs. These asymmetries are established at early stages of embryonic development due to the action of temporary structures called organizers of left-right asymmetry. In ray-finned fishes, the most-studied organizer is the so-called Kupffer's vesicle present in the teleosts. It is a hollow structure composed of monociliary cells. The cilia of these cells rotate and generate a leftward flow of extracellular fluid. The flow subsequently triggers the induction of the Nodal signalling cascade, which is responsible for left-right organ orientation and is considered evolutionarily conserved in vertebrates. The main participants in this pathway are the Nodal, Pitx2 and Lefty factors. In contrast to teleosts, the left-right organiser of non-teleost ray-finned fishes resembles the gastrocoel roof plate present in amphibians, which is apparently ancestral for ray-finned fishes. This bachelor thesis evaluates the origin and function of Kupffer's vesicle, describes the Nodal signalling cascade triggered by this organizer, and compares Kupffer's vesicle with the organizer of non-teleost ray-finned fishes.