

Abstract

Left-right asymmetry determines the orientation of visceral organs during gastrulation in the mouse embryo. The asymmetry originates in ventral node which is located on the anterior end of primitive streak. Cells of the ventral node possess motile nodal cilia. These cilia rotate and generate leftward flow of extra-embryonic fluid. The leftward flow initiates asymmetric expression of Nodal signalling pathways in nodal cells. Abnormal nodal flow and the interruption of asymmetric gene expression cause reversal arrangement of visceral organs, called *situs inversus*. The mechanosensing and chemosensing models are the main theories addressing the question of how the leftward nodal flow is sensed by nodal cilia. The mechanosensing model, also referred to as 'two cilia model', is based on two types of cilia, motile and immotile. Motile cilia generate nodal flow while immotile cilia act as mechanosensors with polycystin cation channels. According to the chemosensing model, morphogens are secreted and form gradient that induces asymmetric gene expression in the node. It is still unclear which model is the right one, but it is possible that the final model is combination of both.