

Scientists discover primitive gut's role in left-right patterning

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Scientists have found that the gut endoderm has a significant role in propagating the information that determines whether organs develop in the stereotypical left-right pattern. Their findings are published 6 March 2012 in the online, open-access journal *PLoS Biology*.

Superficially, we appear bilaterally symmetrical. Nonetheless, the stereotypical placement of our organs reveals a stereotypical internal asymmetry. For example, the heart is located on the left, while the liver is located on the right side. How this inherent left-right asymmetry is established is an area of interest, because of both its intrinsic biological significance, as well as for its medical applications.

In the mouse, which is an experimentally tractable mammalian model system, a body of work has shown that the initial event that breaks left-right symmetry occurs at the node, a specialized organ located in the midline of the developing embryo. How this initial asymmetry at the node leads to a cascade of events propagating laterality information to a distant location within the embryo has been a major question in the field for over a decade. Previous experiments have shown that this cascade results in the activation of a [genetic circuit](#) on the left side of the embryo, ultimately leading to asymmetric organ formation. If the cascade fails to be propagated, left-right asymmetry fails to be established.

Kat Hadjantonakis and colleagues at the Sloan-Kettering Institute of the Memorial Sloan Kettering Cancer Center in New York now report that

the asymmetric signals generated at the node are transferred to the extremity of the embryo across an epithelium residing on the embryo's surface. This epithelium, the gut endoderm, is the tissue containing the [progenitor cells](#) for the epithelial lining of the respiratory and digestive tracts and associated organs such as lungs, liver and pancreas.

Hadjantonakis and colleagues noted that [mouse embryos](#) lacking the HMG domain-containing transcription factor Sox17 exhibit defects in the formation of the gut endoderm and subsequently fail to establish left-right [asymmetry](#). They went on to demonstrate that cell-to-cell communication across gap junctions located within the gut endoderm epithelium is the mechanism of left-right information relay.

More information: Viotti M, Niu L, Shi S-H, Hadjantonakis A-K (2012) Role of the Gut Endoderm in Relaying Left-Right Patterning in Mice. *PLoS Biol* 10(3): e1001276. [doi:10.1371/journal.pbio.1001276](https://doi.org/10.1371/journal.pbio.1001276)

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