Pourquiié Lab uncovers mechanism contributing to appropriate formation of the spine

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The Stowers Institute's Pourquié Lab has shed light on the mechanism causing animals to develop the appropriate number of vertebrae.

Vertebrae are formed from their embryonic precursors, called somites. The number of somites is consistent within a species, but varies significantly across species. By comparing the developing embryos of zebrafish, chicken, mice, and corn snakes, the team established an understanding of how an organism regulates the number of somites formed.

The findings were published today in *Nature*'s advance online publication.

"We set out to understand why snakes form hundreds of vertebrae, while mice form about 50, and humans form just 33," said Céline Gomez, Ph.D., formerly a Postdoctoral Research Associate at the Stowers Institute and lead author on the paper. "We found that the control of both body elongation and vertebrae precursor size accounts for the different numbers of vertebrae in each of these species — the smaller the vertebrae precursors are along the body length, the more vertebrae are formed."

The presomitic mesoderm is the middle layer of the three cell layers that form an early embryo. It increases in size as the somites form and then

gradually shrinks until it is exhausted, terminating the process when the appropriate number of somites have been formed.

"In examining these diverse species, we discovered that the same process ended somite formation in each," said Olivier Pourquié, Ph.D., Investigator and senior author on the publication. "What influenced the number of somites in each species was the rate of somite formation. In snake embryos, somites form much more quickly than in the other species. As a result, there are more somites, but they are smaller."

Understanding the mechanism of vertebral column development in animals offers insight into how the spine forms in humans. A better understanding of the process may aid in the prevention or treatment of disorders like congenital scoliosis.

Source: Stowers Institute for Medical Research