Can cleft palate be healed before birth?

December 1 2009

In a study newly published in the journal *Development,* investigators at the USC School of Dentistry describe how to non-surgically reverse the onset of cleft palate in fetal mice - potentially one step in the journey to a better understanding of similar defects in humans.

Yang Chai, the study's principal investigator and director of the School of Dentistry's Center for Craniofacial Molecular Biology, said that cleft palate is one of the most common congenital birth defects in humans and that current surgical treatment for the craniofacial abnormality is often complex and invasive, sometimes stretching over a period of years before the treatment is considered complete.

Cleft palate can cause serious complications, including difficulty eating and learning to speak. However, close regulation of important signaling molecules during palate formation may one day allow doctors to reverse a cleft palate before the baby is even born, Chai said.

For example, the protein Shh must remain within a certain level in a developing fetus in order for a proper palate to form. If too little or too much of the protein is expressed, a cleft palate can occur.

Two genes are responsible for the regulation of Shh levels. Signaling from the Msx1 gene encourages Shh production, while Dlx5 discourages Shh, creating a healthy balance. Both genes are critical for the healthy development of the palate, teeth and other skull and facial structures.

The fetal mice were strategically bred to have a defect in the Msx1 gene,

resulting in lack of expression of the Shh protein and the formation of cleft palates. However, when the impact of the Dlx5 gene was suppressed, more Shh was successfully expressed and the palate began to regrow.

When the mice were born, their palates were intact. While some of the oral structures had minor differences as compared to the palates in completely healthy mice, the function of the rescued palates were healthy, allowing the newborn mice to feed normally.

With more research into the genetic processes behind cleft palate in humans, the breakthrough could someday make a big difference in how we prevent or treat cleft palate in humans, Chai said.

Source: University of Southern California (news : web)