First snaps made of fetal brains wiring themselves up

19:00 20 February 2013 by Sara Reardon
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Snapped at 31 weeks *(Image: Rob Widdis)*

Video: First MRI movies capture fetal brain wiring up

The first images have been captured of the fetal brain at different stages of its development. The work gives a glimpse of how the brain's neural connections form in the womb, and could one day lead to prenatal diagnosis and treatment of conditions such as autism and schizophrenia.

We know little about how the fetal brain grows and functions – not only because it is so small, says Moriah Thomason of Wayne State University in Detroit, but also because "a fetus is doing backflips as we scan it", making it tricky to get a usable result.

Undeterred, Thomason's team made a series of functional magnetic resonance imaging (fMRI) scans of the brains of 25 fetuses between 24 and 38 weeks old. Each scan lasted just over 10 minutes, and the team kept only the images taken when the fetus was relatively still.

The researchers used the scans to look at two well-understood features of the developing brain: the spacing of neural connections and the time at which they developed. As expected, the two halves of the fetal brain formed denser and more numerous connections between themselves from one week to the next. The connections tended to begin in the middle of the brain and spread outward as the brain continued to develop.

Thomason says that the team is now scanning up to 100 fetuses at different stages of development. These scans might allow them to start to see variation between individuals. They are also applying algorithms to the scanning program that will help correct for the fetus's movements, so fewer scans will be needed in future.

Once they understand what a normal fetal brain looks like, the researchers hope to study brains that are forming abnormal connections. Disorders such as schizophrenia or autism, for instance, are believed to start during development and might be due to faulty brain connections. Understanding the patterns that characterise these diseases might one day allow physicians to spot early warning signs and intervene sooner. Just as importantly, such images might improve our understanding of how these conditions develop in the first place, Thomason says.

Emi Takahashi of Boston Children's Hospital says that one way to do this would be to follow a large group of children after they are born, and look back at the prenatal scans of those who later develop a brain disorder. Although she says the study is a very good first step, understanding the miswiring of the brain is so difficult that it may be some time before the results of such work become useful in clinical settings.

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