Brain differences in premature babies who later develop autism

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Quinn, an autistic boy, and the line of toys he made before falling asleep. Repeatedly stacking or lining up objects is a behavior commonly associated with autism. Credit: Wikipedia.

Extremely premature babies run a much higher risk of developing autism in later childhood, and even during the neonate period differences are seen in the brains of those who do. This according to a new study by researchers from Karolinska Institutet and Karolinska

University Hospital in Sweden. The findings, which are published in the journal *Cerebral Cortex*, suggest that environmental factors can lead to autism

Extremely preterm neonates survive at increasingly early gestation periods thanks to the advances made in intensive care in the past decades. However, babies born more than 13 weeks prematurely run a serious risk of brain damage, autism, ADHD and learning difficulties. They are exposed to numerous stress factors during a period critical to brain development, and it is possible that this plays a key part in the development of autism spectrum disorder (ASD).

In this present study, the researchers examined over 100 babies who had been born extremely prematurely (i.e. before week 27, the beginning of the third trimester). With the parents' permission they studied the growth of the babies' brains using magnetic resonance imaging during the neonate period, and then screened the children for autistic features when they had reached the age of six.

"We were surprised by how many - almost 30 per cent - of the extremely preterm-born children had developed ASD symptoms," says Ulrika Ådén, researcher at the Department of Women's and Children's Health at Karolinska Institutet and neonatologist at the Neonatology clinic at Karolinska University Hospital in Sweden. "Amongst children born after full term pregnancy, the corresponding figure is 1 per cent."

The researchers found that it was more common in the group of children who had developed ASD for there to have been complications during the neonate period, such as surgery, than it was amongst their prematurely born peers who had not developed ASD. Already in the neonatal period, long before the children had manifested signs of autism, differences could be observed between the extremely preterm babies who went on to develop ASD and those who did not, with diminished growth of the parts

of the brain involved in social contact, empathy and language acquisition - functions that are impaired in autistic children.

Autism is generally attributed to genetic factors, even if no specific autism gene has been identified. This new study supports previous findings indicating that birth weight and complications can increase the risk of autism.

"Our study shows that environmental factors can also cause autism," says Dr Ådén. "The brain grows best in the womb, and if the developmental environment changes too early to a life in the atmosphere, it can disrupt the organisation of cerebral networks. With new therapeutic regimes to stimulate the development of such babies and avoid stress, maybe we can reduce the risk of their developing ASD."

More information: 'Poor Brain Growth in Extremely Preterm Neonates Long Before the Onset of Autism Spectrum Disorder Symptoms', Nelly Padilla, Eva Eklöf, Gustaf E. Mårtensson, Sven Bölte, Hugo Lagercrantz and Ulrika Ådén, *Cerebral Cortex*, online 21 December 2015, DOI: 10.1093/cercor/bhv300

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