MedicalXpress

Researchers find hand preference is well defined at 18 weeks of gestation

December 5 2017

A study led by Valentina Parma, researcher at the SISSA of Trieste, and Professor Umberto Castiello of the University of Padua, just published in *Scientific Reports*, shows that hand preference is already well defined at the 18th week of gestation. Analysing the characteristics of several foetal movements, the researchers can accurately predict the motor preference observed in the same boys and girls at age nine. The predictive capacity of the method seems to be a good starting point for the early recognition of pathologies characterised by cerebral asymmetries such as depression, schizophrenia and autism spectrum disorders.

It takes a few months for a newborn to grasp an object, and a few years to learn to draw and write, manifesting the preference for the use of the right or left hand. And yet, the new study shows that in the maternal womb, hand preference is well defined and the motor system is highly sophisticated.

The researchers have studied foetal kinematics to predict manual dominance of 29 foetuses. After nine years they compared their predictions with the preference shown by the same boys and girls obtaining an accuracy that ranged between 89 percent and 100 percent depending on the parameters used. In particular, the researchers analysed the movements of the hands of the foetuses at the 14th, 18th and 22nd week of gestation using a 4-D ultrasound scan, viewing the three dimensional image in real time and in movement, in 20-minute sessions. They studied three types of movements: two of greater precision,

directed to the eyes and mouth, and one directed to the uterine wall, as a control. The results have shown that starting from the 18th week the foetuses execute the movements requiring precision significantly more quickly with the hand that eventually becomes dominant.

The study shows the elevated level of maturation and specialisation of the motor system in utero. The accuracy of the method used in this study opens new perspectives for its use in the clinical field. Hand preference, in fact, is due to the prevalence of the contralateral cerebral hemisphere. This characteristic has sometimes been associated with pathologies involving a cerebral asymmetry, such as depression, schizophrenia and autistic spectrum disorders. Foetal kinematics could be used to identify new markers that would allow to intervene at an early stage and compensate for any development problems.

More information: Valentina Parma et al, The origin of human handedness and its role in pre-birth motor control, *Scientific Reports* (2017). DOI: 10.1038/s41598-017-16827-y

Provided by International School of Advanced Studies (SISSA)

Citation: Researchers find hand preference is well defined at 18 weeks of gestation (2017, December 5) retrieved 2 May 2024 from https://medicalxpress.com/news/2017-12-weeks-gestation.html

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