Medical Xpress

Researchers identify possible link between the environment and puberty

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Danish researchers have discovered a possible epigenetic link between the environment and pubertal timing. To a large extent, pubertal timing is heritable, but the underlying genetic causes are still unexplained. Researchers have now studied how chemical modifications of the human genome (so-called epigenetic modifications) change when girls and boys enter puberty. The results indicate that such epigenetic changes are involved in defining the onset of puberty.

Danish girls' pubertal onset has decreased from 11 to 10 years. Similar, but less pronounced, changes have been observed in boys. This has led researchers to question the involvement of genetics and recognize that genes are not alone in influencing a child's pubertal timing.

In this new study from EDMaRC at Rigshospitalet, Copenhagen, researchers therefore focused on the role of epigenetics and have found a number of areas in the human genome, which is controlled epigenetically during puberty. The researchers found that these epigenetic changes cause the upregulation of genes that are important for pubertal development. One of the newly discovered 'puberty genes' is TRIP6 (Thyroid Hormone Receptor Interactor 6), which is increasingly expressed through puberty, due to changes in the epigenetic control of the gene.

Epigenetics is a leading mechanism by which our environment communicates with our genes. Environmental and lifestyle factors in the broadest sense can affect the epigenetic regulation of genes and thereby

control whether, where and to what extent the genes are expressed. The identified epigenetic changes during puberty are therefore our best lead towards understanding how environmental factors can affect pubertal onset.

"To our knowledge, this study is the first to demonstrate how the environment can affect the pubertal onset in humans. It gives us a significant insight in to the crucial role of epigenetic factors on our reproductive development," says Professor Anders Juul, Senior author of the study.

"We've seen a tendency of especially girls starting puberty earlier than before and this study emphasizes the importance of understanding the role of environmental impact on pubertal development," he adds.

Highly specific changes in methylation of a child's DNA could differentiate children according to whether they had entered puberty or not and thus may be used to predict a child's pubertal stage.

"Changes in the DNA methylation patterns can be caused by many different factors. However, we could see very specific changes when children went through puberty, and have subsequently shown that this also leads to changes in the expression of the methylated genes," says Senior Researcher in epigenetics Kristian Almstrup, who led the study.

More information: Kristian Almstrup et al, Pubertal development in healthy children is mirrored by DNA methylation patterns in peripheral blood, *Scientific Reports* (2016). DOI: 10.1038/srep28657

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