

Child abuse could leave 'molecular scars' on its victims

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Children who are abused might carry the imprint of that trauma in their cells—a biochemical marking that is detectable years later, according to new research from the University of British Columbia and Harvard University.

The findings, based on a comparison of chemical tags on the DNA of 34 adult men, still need confirmation from larger studies, and researchers don't know if this tagging—known as methylation—affects the victims' health.

But the difference in methylation between those who had been abused and those who had not—if it is replicated in larger studies and can be described in greater detail—might one day be useful as a biomarker for investigators or courts in weighing allegations of [child abuse](#).

"Methylation is starting to be viewed as a potentially useful tool in criminal investigations—for example, by providing investigators with an approximate age of a person who left behind a sample of their DNA," said senior author Michael Kobor, a medical genetics professor at UBC who

leads the "Healthy Starts" theme at BC Children's Hospital Research Institute. "So it's conceivable that the correlations we found between methylation and child abuse might provide a percentage probability that abuse had occurred."

Methylation acts as a "dimmer switch" on genes, affecting the degree to which a particular gene is activated or not. Scientists are increasingly looking at this turning on and turning off of genes, known as epigenetics, because it's believed to be influenced by external forces—a person's environment or life experiences.

The researchers decided to look for methylation in sperm cells, on the premise that childhood stress might inflict long-term physical health effects not only on the immediate victims, but also on victims' offspring, as demonstrated in previous animal experiments.

They identified a group of men who are part of a much larger, long-term health tracking study coordinated by Harvard's T.H. Chan School of Public Health, and asked them to donate their sperm. In detailed questionnaires they had completed years before, some of the men said they had been victims of child abuse.

The researchers found a distinctive methylation difference between victims and non-victims in 12 regions of the men's genomes.

The scientists were struck by the degree of "dimming" in those dozen regions: Eight DNA regions were more than 10-per-cent different, and one region showed a difference of 29 per cent.

The study, published in *Translational Psychiatry*, does not demonstrate long-term physical consequences of child abuse, because it's still unknown how methylation of those genetic regions affects a person's health. In addition, scientists don't know if [methylation patterns](#) survive the

messy process of fertilization and thus can be passed down to a person's children.

"When the sperm meets the egg, there is a massive amount of genetic reshuffling, and most of the methylation is at least temporarily erased," said lead author Andrea Roberts, a research scientist at the Harvard Chan School. "But finding a molecular signature in sperm brings us at least a step closer to determining whether child [abuse](#) might affect the [health](#) of the victim's offspring."

Provided by University of British Columbia

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