Medical Xpress

Victorian baby teeth could help predict future health of children today

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The team from the Universities of Bradford and Durham analysed the teeth of children and adults from two 19th century cemeteries, one at a Workhouse in Ireland where famine victims were buried and the other in London, which holds the graves of some of those who fled the famine.

They found that the biochemical composition of teeth that were forming in the womb and during a child's early years not only provided insight into the health of the baby's mother, it even showed major differences between those infants who died and those who survived beyond early childhood.

Earlier work led by Dr Janet Montgomery and Dr Mandy Jay from Durham's Department of Archaeology found similar results in people living in the Iron Age on the Isle of Skye and in Neolithic Shetland.

These archaeological findings - published in the *American Journal of Physical Anthropology* - are now being tested in baby teeth from children born recently in Bradford and Sudan. If similar patterns can be seen in current day mothers and children, the researchers hope this could lead to a simple test on baby teeth to predict potential health problems in adulthood.

Lead researcher Dr Julia Beaumont from Bradford's School of Archaeological Sciences explains: "We know that stress and poor diet in mothers, both during pregnancy and after birth, can have an impact on a child's development. In the past that could mean a child didn't survive;

now it's more likely to mean a child has a greater risk of health issues in later life. While sometimes there are obvious signs of maternal stress in the baby at birth, such as a low birth weight, that isn't always the case. So a simple test on teeth that are naturally shed by children as they grow could provide useful information about future health risks."

Levels of carbon and nitrogen isotopes within bone and teeth, and the relationship between the two, change with different diets, so baby teeth can reveal clues about the diet of the mother during pregnancy and the diet of the child immediately after birth. The first permanent molar also forms around birth and is retained into adulthood. Each layer of the tooth relates to around four months' growth, starting in the womb, enabling it to be linked to a specific period of a baby's life.

These indicators have also been thought to show when a baby has been breastfed - seen as a healthy start in life. Nitrogen isotope levels are higher in people on protein rich diets and in breastfed babies, and lower for vegetarian diets.

However, in the samples taken from the famine cemetery, the results were counterintuitive. The babies who showed higher nitrogen isotope levels at birth didn't survive into adulthood. Those who did survive had lower and more stable nitrogen isotope levels throughout early childhood.

Similar results were found amongst Victorians buried in the London cemetery who lived during a period of high rates of infant death and amongst the prehistoric people in Scotland. Dr Beaumont believes that, far from being an indicator of a good start in life, the higher nitrogen isotope levels showed that the mothers were malnourished and under stress.

"At the period we studied, it's likely that most babies were breastfed, but

only some showed the spike in nitrogen isotope levels normally associated with it," she says. "Where pregnant and breastfeeding mothers are malnourished however, they can recycle their own tissues in order for the baby to grow and then to produce milk to feed it. We believe this produces higher nitrogen isotope levels and is what we're seeing in the samples from the 19th-century cemeteries. Babies born to and breastfed by malnourished mothers do not receive all the nutrients they need, and this is possibly why these babies didn't survive."

Dr Beaumont now hopes that the insights she's gained from the historical graves can be used to help children in the future. She is currently testing teeth from children through the Born in Bradford project, a long term study of a cohort of 13,500 children, born between 2007 and 2010, whose health is being tracked from pregnancy through childhood and into adult life. She hopes to be able to correlate nitrogen and carbon isotope levels to the medical history of the mother and the future health of the children.

"We currently cannot analyse any other tissue in the body where the stress we are under before birth and during early childhood is recorded," says Dr Beaumont. "If we can show that baby teeth, which are lost naturally, provide markers for stress in the first months of life, we could have an important indicator of future health risks, such as diabetes and heart disease."

Provided by University of Bradford

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