MedicalXpress

Deadly intestinal disease in preemies may be caused by genetic deficiency

October 19 2016

A life-threatening condition that causes the intestines in premature infants to become infected and die may be triggered by a disruption in the way the body metabolizes energy, according to Rutgers scientists.

In research published in the journal *Development*, scientists found a link between necrotizing enterocolitis (NEC) - a major cause of death in babies born before 36 weeks gestation - and the disruption of a process known as mitochondrial metabolism, which generates the energy needed for cells in the body to work properly.

"At this time we think the discovery that mitochondrial metabolism is a hallmark of mature intestinal development may provide a new way to screen and diagnose NEC before children are born, or at the time of their birth," said Michael Verzi, assistant professor in the Department of Genetics in Rutgers University-New Brunswick's School of Arts and Sciences and lead author of the study. "Early detection of NEC would give doctors a chance to head off the disease before it's too late."

There is no known cause for NEC which occurs in up to 10 percent of premature infants and is fatal 25 to 35 percent of the time. Babies with the disease - which results in a swollen belly, fever and constipation usually within two weeks of birth - are treated with intravenous fluids, antibiotics or surgery. While research indicates that the disease is much less common in babies who are fed breast milk, even infants treated successfully for NEC can have problems absorbing nutrients as they develop.

The Rutgers study indicates that a genetic deficiency might be what stops this critical metabolic development process from occurring in the fetus near the end of gestation, when the intestines should become fully developed.

Although more research is needed to determine the exact cause, scientists say one possibility for the deficiency may be linked to a mother's exposure to environmental toxins during pregnancy which inhibit the process from taking place.

"Without this metabolic process, the intestine cannot fully mature," Verzi said. "If children are born before their intestine is fully developed, it can lead to severe inflammation that leads to tissue death."

Verzi and his team examined data from premature infants who died as a result of the disease and conducted studies on mice in which the gene needed to regulate the mitochondrial function was inactivated in the developing intestine. When the mitochondrial metabolism was blocked, the intestine was not able to mature, he said.

"This shift in metabolism during intestinal development has never been recognized as crucial for intestinal growth to take place," Verzi said. "We think that the deficiencies in this important mitochondrial function serve not only as a cause for NEC but also could become a marker to help identify babies at risk."

More information: Namit Kumar et al. A YY1-dependent increase in aerobic metabolism is indispensable for intestinal organogenesis, *Development* (2016). DOI: 10.1242/dev.137992

Provided by Rutgers University