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Supplement could reduce heart disease risk in people of low birth weight

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Credit: Gabriela Pinto

A simple supplement could be a safe and cost-effective way of reducing heart disease in individuals born with a low birth weight, suggests research from the University of Cambridge. The study, carried out in rats, also raises the possibility of developing a blood test to indicate how much damage there is in the aortas of these individuals.

Researchers at the Institute of Metabolic Science fed low birth weight rats a supplement of the molecule co-enzyme Q (CoQ) and found that in those rats that grew quickly after birth, the supplement prevented cells in the aorta from ageing prematurely, which can lead to heart disease.

Scientists have known for some years that babies with a low birth weight who grow quickly are more likely to develop heart disease than those with a normal birth weight. This new study, published in The *FASEB Journal*, has identified a novel mechanism underlying this phenomenon and suggests a possible treatment.

Researchers funded by the British Heart Foundation and the Medical Research Council (MRC) fed pregnant rats either a control diet or a low protein, high carbohydrate diet. The mothers fed the low protein diet had pups with a low birth weight, but which grew quickly when suckled by a control-fed mother. When the researchers examined the aorta from these rats, they found that their cells had aged more quickly than those from the normal birth weight offspring and that this was associated with a deficit in CoQ in the aorta.

When the researchers gave the low birth weight rats extra CoQ in their diet after weaning, they found that this prevented the accelerated aging of and damage to their aortas. CoQ is produced naturally in the body and is required to ensure that the mitochondria - the cells' 'batteries' - work properly and to protect cells from oxidative stress caused by highly reactive molecules known as free radicals, which can cause damage to proteins, membranes and genes.

The team also found that CoQ is reduced in white blood cells from low birth weight offspring and hence that levels of CoQ in the blood cells can be used to see how much damage there is in the aorta.

"Our study has answered a question that has puzzled doctors for some time now - why children of low birth weight who grow quickly are prone to heart disease in later life," explains Professor Susan Ozanne from the MRC Metabolic Diseases Unit, who led the study. "We believe it's because they are deficient in co-enzyme Q. As this molecule is also then deficient in the individual's blood cells, it may be possible to develop a

simple blood test capable of diagnosing the amount of damage to their aorta and therefore likely to develop heart disease."

Dr Jane Tarry-Adkins, first author on the study, adds: "Although our study is only in rodents, it may one day have major implications for both the prevention and early treatment of heart disease. It suggests that it may be possible to treat at-risk individuals with a safe and cost-effective supplement that has the potential to prevent heart disease before they display any symptoms of the disease."

Globally, cardiovascular disease is responsible for more deaths than any other disease, claiming an estimated 17.3 million lives in 2008, a number which is predicted to grow to over 23.3 million by 2030. Reliable, early diagnostic tests for cardiovascular disease risk could help reduce this burden. The researchers plan to establish whether their findings can be confirmed in humans and therefore make their prognostic potential a realistic possibility.

More information: Tarry-Adkins, JL et al. Nutritional programming of Coenzyme Q – potential for prevention and intervention? FASEB; 29 Aug 2014. www.ncbi.nlm.nih.gov/pmc/articles/PMC4232289/

Provided by University of Cambridge