MedicalXpress

Unlocking the kidney riddle in newborns

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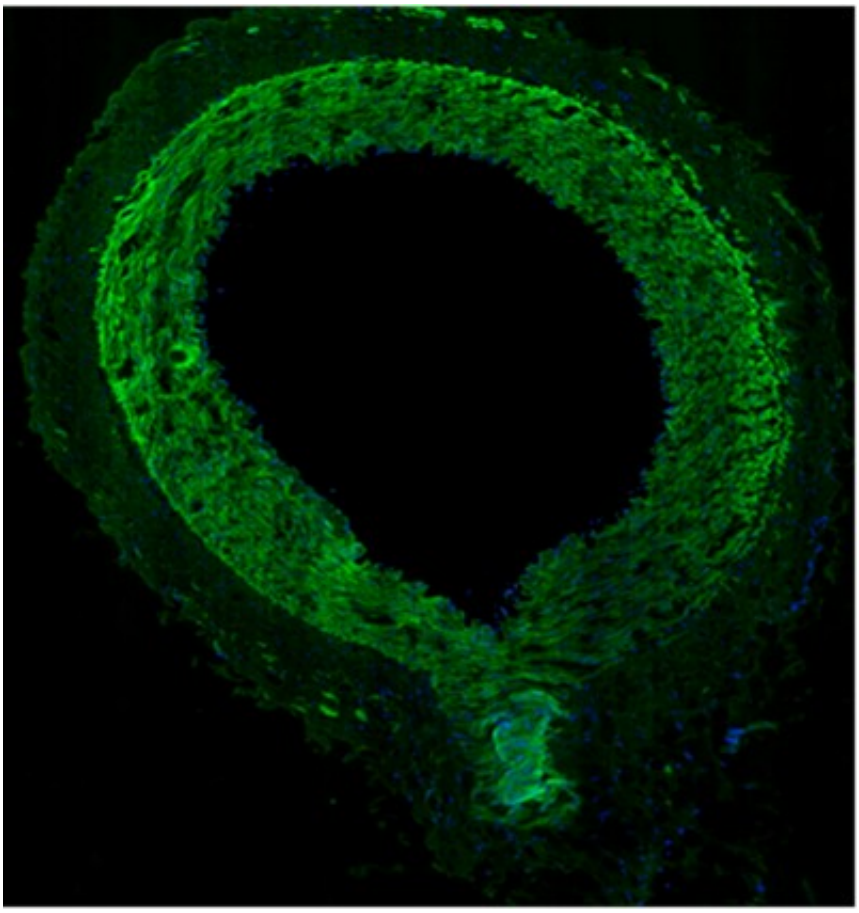

Oxidative stress in the renal artery

Researchers are closer to understanding why babies born with smaller kidneys have a high risk of developing cardiovascular disease.

The findings, published today in the journal *Circulation*, could have

important implications for affected children, who are more likely to develop chronic kidney disease and high blood pressure as adults.

Currently, renal disorders at birth affect about one in 500 babies. Many of these babies go on to lead healthy normal lives, however 20-40 per cent will develop chronic kidney disease and high blood pressure. Unfortunately, these conditions are the main cause of end-stage kidney disease and the need for dialysis in children. What is unknown is why, or which, child will be adversely affected.

To understand the mechanisms responsible for the development of renal failure in such children, the researchers from Monash University and the University of Queensland examined the impact of a reduction in fetal renal mass on the mechanisms regulating kidney and blood vessel function.

The team found that some important systems regulating kidney function were enhanced whilst others were turned off. Specifically, an increased response to nerve activity and an inability to respond to nitric oxide, a factor important for blood vessel health, were identified. Both these effects promote kidney injury.

Lead author Professor Kate Denton from the School of Biomedical Sciences at Monash University said the kidneys are crucial for the regulation of body fluid and blood pressure.

"If you're born with small kidneys, during infancy the functional units of the kidneys will grow in size to increase function. However, this is not all good as it places a greater workload on these units and they are more vulnerable to being damaged," Professor Denton said.

Fellow lead author Dr Marianne Tare, from the School of Biomedical Sciences at Monash University, said being able to identify which child is

most at risk of developing chronic kidney disease is enormously important.

"New imaging technologies are making it easier to identify affected babies, but currently we cannot predict what the future holds for these children. This makes it hard to counsel parents and to individualise clinical monitoring, but we do know that early detection and intervention significantly improves outcomes. So, we need to understand much more about the mechanisms that drive kidney injury," Dr Tare said.

The next phase of the research will see this team, in collaboration with clinical colleagues in the Netherlands, identify early life clinical markers of the future renal and cardiovascular health of these children.

Provided by Monash University