Australian study sheds light on kidney repair and disease

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A study by Monash University researchers has shed new light on the microscopic antennas in the kidney that are involved in the organ's repair process.

The work may be a crucial step towards a cure for polycystic kidney disease, a potentially fatal disease that affects more than one in 1000 people.

The study, led by Dr James Deane a researcher at the Centre for Inflammatory Disease at the Monash Medical Centre, showed how kidney repair processes are controlled and helps explain the cause of polycystic kidney disease.

The findings have appeared in the latest edition of world's leading kidney research publication, the Journal of the American Society of Nephrology.

"We have shown for the first time that the hair-like structures on kidney cells, called cilia, change their length in response to injury in human patients, growing up to four times their original length in the later stages of kidney repair," Dr Deane said.

"These hair-like structures are antennas and the increases in their length amplify the signals they send to kidney cells at vital stages of repair. We think this is how they turn off the repair process when it is complete and allow the kidney to start working normally again"

Dr Deane said that if the switching on and off the repair process is not properly controlled, rapidly reproducing cells will distort the tubes of the kidney and prevent them from functioning properly, which is what appears to happen in people that have polycystic kidney disease, a condition which is currently untreatable.

"Our research helps put a logical framework behind what is happening in polycystic kidney disease, as the mutations that cause the disease can damage the hair-like structures of kidneys cells," Dr Deane said.

"We hope that this work will lead to new ways of treating both kidney injury and polycystic kidney disease."

The kidney is made up of about a million tiny living tubes that produce urine to rid the body of waste products. The cells that make up these tubes have hair-like structures, which are two thousandths of a millimetre long and respond to urine flow by sending reassuring signals back to the cells.

In an injured kidney there is a reduction in urine flow and reassuring signals from the hair-like structures are diminished. This causes kidney cells go into repair mode. Surviving kidney cells take on a new form that allows them to reproduce rapidly to replace cells that have died. When enough cells have been produced it is important that kidney cells stop reproducing and return to their normal form. This is where some extra input from the hair-like structures appears to be required.

Source: Monash University (news : web)