Title: The mechanism and intervention of renal injury

Application deadline: Applications accepted all year round

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Summary (max 200 words)

Acute kidney injury (AKI) has high mortality and could progress to chronic kidney disease (CKD). The ischemia/reperfusion injury (IRI) is one of the main courses of AKI. The mechanism of AKI has not been fully understood and there is lack of effective diagnosis and treatment. Autophagy recently attracted significant attention in AKI, while properdin, a positive regulator of alternative pathway of complement activation, may also play crucial roles.

We demonstrated apoptosis and inflammation with up-regulated caspase-3 in AKI, whereas small interfering RNA (siRNA) targeting caspase-3 protected tubular cells/kidneys. Latterly, we also showed a novel erythropoietin derived peptide (CHBP) without erythropoiesis improved AKI via inhibiting caspase-3, apoptosis and inflammation. Modern technologies such as microarray enable simultaneously investigating hundreds of thousands of genes. We have evaluated gene expression profile in human renal allograft biopsies and subsequently developed an analytic regime.

In the proposed project, both wild-type and properdin knockout mice subjected to renal IRI will be used to explore multiple pathways involved in AKI and intervention such as using CHBP and caspase-3 siRNA, focusing on immunity, inflammation, autophagy, apoptosis and fibrosis. Most importantly, new combinational biomarkers will be also defined and validated for timely diagnosis and precise personal treatment to prevent CKD.