【Outstanding Academic Research Meeting I-1】

MicroRNA-oriented vascular pathologies and calcification in renal failure: molecular mechanisms and a translational journey

微小核糖核酸導向之腎功能惡化相關血管病變：相關機轉及轉譯旅程

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Patients with kidney disease (KD) are at high “vascular” risk. Amongst all kidney-related vascular pathologies, vascular calcification (VC) is the most renowned one, referring to the ectopic deposition of calcium apatite in vascular wall. The presence of VC enhances tissue stiffness and worsens cardiac loading, predisposing affected individuals to myocardial hypertrophy, heart failure, and a higher risk of cardiovascular mortality. Patients with KD are prone to developing VC and its progression, and this vascular pathology also constitute a dreadful component of chronic kidney disease (CKD)-mineral bone disorder (MBD). The pathogenesis of KD-associated VC remains complex and not well characterized, especially epigenetics related processes. Starting from in vitro models, miRNA expression profiling to animal modeling, we systematically evaluated significant miRNA changes during VC development. We also demonstrated the source(s), the regulatory element(s), and the direct target(s) of candidate miRNA(s), validated by functional assays. Importantly, we were able to demonstrate the utility of several miRNAs in animal and human circulation, supporting their applicability as biomarkers for risk and outcome prediction. Our findings can also be detected in other VC at-risk populations, enhancing their clinical potentials. Our findings therefore aid in filling the jigsaw puzzles of the complex pathogenesis based on a transcriptomic-epigenomic perspective and landscape.