Targeting the Warburg effect in atrial fibrillation: a proteomic study and an animal trial

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Introduction: Previous studies have documented altered energy metabolism in atrial fibrillation (AF). Footprints of the Warburg effect are observed. Metformin can inhibit the Warburg effect and is associated with decreased risk of AF.

Methods: A qualitative and quantitative analysis of proteomics in the left atrial appendage (LAA) of eighteen patients with mitral stenosis was conducted, including nine with chronic AF and nine with sinus rhythm (SR). Eighteen beagle dogs were divided into SR, AF and AF+MET group. Key factors of Warburg effect, expression of glucose transporters, signaling pathways involved, and electrophysiological parameters were assessed.

Result: The proteomic study demonstrated the role of metabolic remodeling in AF and suggested the existence of the Warburg effect. The animal trial further proved that the use of metformin can decrease inhibit the Warburg effect and decrease the incidence of AF.

Conclusion: Metabolic remodeling and the Warburg effect exists in chronic AF and metformin can alleviate these, probably via the inhibition of the PI3K/AKT/mTOR and HIF-1α signaling pathway.