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Oxidative inhibition of erythrocyte sodium pump: A functionally relevant circulating marker of oxidative stress

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Oxidative stress plays critical roles in the pathogenesis of diabetes and heart disease. The activity of Na pump has been shown to be depressed from the membrane of erythrocyte preparations of these patients coupled with alterations in membrane protein composition. We had previously discovered that the β1 subunit of the Na pump undergoes oxidative modification by oxidative stress in vitro (β1-GSS) and this mediates Na pump inhibition. This study aims to develop and validate erythrocyte β1-GSS as an oxidative stress biomarker in the premier emerging tool for prognosis of pathophysiological oxidative stress in patients with or at risk of cardiovascular disease (CVD) and diabetes. The marker is quickly and easily tested from blood using ELISA; and could be packaged and marketed as a simple kit. The eβ1-GSS biomarker is modified in heart attack, heart failure and diabetes, and exhibits potential to predict disease progression. With further investment, the eβ1-GSS biomarker could be developed initially as a versatile CVD prognosis tool for universal pre-hospital diagnostics, CVD-severity risk-stratification, and as a Companion Diagnostic (Dx) for CVD medications. Subsequently it could be adapted for diabetes.

Biography

Chia-chi Liu is a Research Fellow at the University of Sydney. She majored in Cell and Molecular Biology at Taipei Medical University, Taiwan. She obtained her second Master degree in Biotechnology at University of New South Wales; and received a PhD in Chemistry and Bio-molecular Science from Macquarie University in 2007. Her core focus is investigating the relationship between oxidative stress and the sodium pump function. Her research interests include the development of new diagnostic methods for oxidative damage of the pump; the discovery of new drugs for heart disease; and the design of novel therapeutic proteins for cancer treatment. She has been awarded an Australian National Heart Foundation Post-Doctoral Fellowship and Sydney University Research Support Fellowship; and is the inventor for an innovative Australian patent in diagnostic technology.

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