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ATP metabolism in the red blood cells as potential biomarker for post exercise hypotension and cardiovascular protection

The importance of adenosine and Adenosine Triphosphate (ATP) in regulating many biological functions has long been recognized, especially for their effects on the cardiovascular homeostasis which may be used for management of hypertension and cardiovascular diseases. In response to ischemia, ATP is broken down to release adenosine. The activity of adenosine is very short lived because it is rapidly taken up by myocardial and endothelial cells, erythrocytes (RBC) and also rapidly metabolized to oxypurine metabolites and other adenine nucleotides. Extracellular and intracellular ATP is broken down rapidly to ADP and Adenosine Monophosphate (AMP), and finally to adenosine by 5'-nucleotidase. These metabolic events are known to occur in the myocardium as well as in RBC. We investigated in this study, the feasibility of exploiting ATP metabolism in the RBC as systemic biomarker for post exercise hypotension and cardiovascular protection. An experimental exercise rat model was used to probe the relationship between post exercise hypotension and ATP metabolism in the RBC. The cardiovascular protective effect of exercise preconditioning was further investigated in an acute myocardial infarction model using mortality and ATP metabolism in the RBC as endpoints. We have shown post-exercise hypotension correlated significantly with RBC concentrations of ATP and that exercise pre-conditioning reduced cardiovascular mortality and breakdown of ATP in the RBC. The post exercise effect was greater in hypertensive than in normotensive rats. The presentation will also discuss the opportunities, challenges and obstacles of exploiting ATP metabolism as targets for drug development and personalized medicine.

Biography

Pollen K F Yeung has completed his PhD from University of Saskatchewan (Saskatoon, SK, Canada) and is currently a Professor of Pharmacy and Medicine at Dalhousie University in Halifax, NS, Canada. He has published more than 90 peer reviewed articles in reputed journals and is currently serving as an Editorial Board Member for Recent Review of Clinical Trials, Drug Metabolism Open Journal, Medical Sciences Monitor, Metabolites, Cardiovascular Pharmacology Open Access, and Natural Products Chemistry and Research Open Access.

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