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An integrated model of coronary heart disease

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Coronary heart disease (CHD) is known to be the largest cause of death globally. This is worrying when considering the substantial investments employed in the research and prevention of CHD. It may be possible that current reductionistic research techniques are not suitable in the study of CHD due to the highly interconnected nature of human biology. It may thus be possible to gain a better understanding of CHD by using a systems engineering approach to develop an integrated model of CHD.

An extensive literature review was conducted to develop the integrated model. The model contains information on the pathogenesis, biomarkers, pharmaceuticals and health factors of CHD. Using the integrated model it is possible to analyse typical health factors implicated in CHD progression or mediation. Furthermore, it is possible to analyse pharmaceuticals used in CHD treatment and prevention.

Analysis of the integrated model is achieved by using “connection graphs” which elucidate the interactions between health factors or pharmaceuticals and the pathogenesis of CHD through the effect on biomarkers. In this study moderate alcohol consumption and statin therapy were analysed in greater detail by quantifying the biomarker effects.

The results indicate that moderate alcohol consumption could decrease CHD risk through actions on coagulation, lipid, metabolic and inflammation as indicated by biomarker quantification. Statin therapy would appear to present increases in CHD risk on coagulation, vascular function and metabolic biomarkers, while decreasing CHD risk through effects on lipid and inflammatory biomarkers.

Biography

Marc Mathews completed his bachelors degree in mechanical engineering at the University of Pretoria in 2013. He is currently enrolled in his masters degree studies at the University of the North-West and is a consultant to Human-Sim (Pty) Ltd. He has published two papers on his studies in international peer reviewed journals.

Edward Mathews holds a PhD in mechanical engineering and is the head of the North-West University's Centre for Research and Continued Engineering Development situated in Pretoria. He is a consultant to Human-Sim (Pty) Ltd and has published 185 peer reviewed articles.

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