

Coronary Artery Disease Mediated Myocardial Ischemia and its Effects on the Body :OUTLINE

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Introduction

- Coronary Artery Disease affects (large number) annually
 - At currently defined clinically significant levels it causes myocardial ischemia, and eventual infarction
 - Sub clinical levels of disease can present as ischemia seen in routine exercise stress tests, but not always
 - theoretically during such stress tests ischemia is present, but it is not always detectable
 - Stress tests are done either mechanically (running on a treadmill) or chemically (a stimulant), and they are treated the same, but the ischemia that develops might be different
 - An understanding of how ischemia develops under conditions of subclinical coronary artery disease during cardiac stress tests would improve the understanding of the effects on the body and improve our ability to detect it during such stress tests in order to diagnose pathologies such as sub clinical coronary artery disease
 - computational Modeling approaches for cardiac ischemia have developed quickly in the last decade and can be used to improve our understanding of how various ischemia patterns present
 - By combining the modeling approaches with our understanding of how these different types of stress tests induce different ischemia we can better formulate models for understanding and diagnosing such ischemia

Background

- Introduction to the structure and function of coronary vasculature
 - Discuss aberrations present in coronary vascular disease (plaques, hardening) and how these affect cardiac perfusion
 - Introduce how clinical stress tests are conducted and the difference between chemical and physical stress tests
 - Segment about ecgi in reference to stress tests
 - Introduce the concepts of computational modeling of ischemia on a whole heart scale

Methods

Paper 1:[1] -Difference between Bruce and Dobutamine stress tests

- Assessment of ischemia created

Paper 2:[2]

- formulation of ischemic model

- Validation

Results

Paper 1: -The ischemia formed is different

- The shape, distribution, and formation varies between the stress tests

Paper 2:

- was able to accurately recapitulate ischemic potentials using modeled ischemic sources

Discussion

- There is a deficit in the understanding of the development of ischemia during stress tests

- Incorporating the findings in Paper 1 to a model formulation such as paper 2's could result in improved understanding and diagnosis of such ischemia.

References

- [1] B. Zenger, W. Good, R. MacLeod, J. Tate, V. Sharma, and J. Bergquist, "Electrocardiographic Comparison of Dobutamine and Bruce Cardiac Stress Testing With High Resolution Mapping in Experimental Models," *2018 Computing in Cardiology Conference (CinC)*, vol. 45, pp. 2–5, 2019.
- [2] B. M. Burton, K. K. Aras, W. W. Good, J. D. Tate, B. Zenger, and R. S. MacLeod, "Image-based modeling of acute myocardial ischemia using experimentally derived ischemic zone source representations," *Journal of Electrocardiology*, vol. 51, no. 4, pp. 725–733, 2018. [Online]. Available: <https://doi.org/10.1016/j.jelectrocard.2018.05.005>