

Terrestrial Cardiovascular Coronary Artery Disease (CAD) Screening, Treatment and Risk Mitigation-Lessons Learned from Space Medicine

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Introduction: The Bellagio II Summit sought to correlate current ISS Space Medicine practice in the screening/assessment and management of CAD and to identify terrestrial applications for the general population pertaining to primary, secondary and tertiary diagnoses and treatments. We identified current Space Medicine practice for screening and monitoring cosmonaut and astronaut in the pre-, in-, and post-flight mission phases. We will discuss current Space Medicine standards and guidelines in the recognition and monitoring of CAD development, stabilization, and regression.

Methods: We reviewed current Space Medicine standards, medical records, expert panels, and available literature for monitoring of cardiovascular health in astronauts and cosmonauts during ISS selection, mission operations, post spaceflight, and lifetime surveillance.

Results: Space Medicine utilizes a number of CAD screening techniques to identify subtle and cumulative changes to cardiovascular health. Cardiovascular screening efforts include review of family history, use of risk-stratification scores, exercise stress testing, echocardiography, biomarkers, and standard hemodynamic clinical monitoring. Further, astronauts and cosmonauts undergo regular monitoring of coronary artery calcium (CAC) scores, carotid intimal media thickness (CIMT) measurements, and cardiovascular angiographic imaging techniques if clinically indicated. To date, there have been 16 individuals diagnosed with asymptomatic CAD with anatomic calcium scoring. These individuals underwent risk stratification for ISS mission selection/qualification and lifetime surveillance and will be discussed.

Discussion: ISS Space Medicine monitoring techniques address the numerous screening tools that indicate overall coronary health for astronauts and cosmonauts. Accumulated data provides an integrated awareness of CAD and its management and will be presented. Many of these techniques can be applied to the terrestrial population for primary, secondary, and tertiary screening, monitoring, and treatment of CAD.

LEARNING OBJECTIVES:

1. Understand the development of the MMOP CAD primary, secondary, and tertiary guidelines for ISS Missions.
2. Understand the risk assessments for CAD and ISS mission qualification.
3. Understand the pathophysiology for CAD plaque development, stabilization, and regression.

MOC QUESTIONS:

Question 1

CAC Scores above 100 in astronauts/cosmonauts require angiographic analysis for luminal lesions. (True/False)

Answer: True

Question 2

What is the risk number for CAD to be qualified for an ISS mission?

A. < 5 % per year, B. < 0.5 % per year, C. < 10 % per year

Answer: B

Question 3

Can CAD be stabilized and or reversed by risk modifications with diet, exercise, and medications? (True/False)

Answer: True