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Commentary Open Access

# Commentary on Comparison of Coronary Artery Calcification Scores, National Cholesterol Education Program Guidelines for Coronary Heart Disease Risk Assessment, Treatment Paradigms in Individuals with Chronic Traumatic Spinal Injury

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**Abstract**

This commentary considers the implications of the findings related to the effect of a study related to coronary heart disease (CHD) risk assessment in individuals with a chronic spinal cord injury (SCI). The findings from the study suggest that there is poor agreement in CHD risk assessment between the previously used guidelines, the National Cholesterol Education Program (NCEP) Guidelines, and coronary artery calcium scores (CACS). Since this publication, a new atherosclerotic cardiovascular disease (ASCVD) risk estimator has been developed. This has not been used in any study with SCI participants. The study also showed that 18 (47.4%) of the participants had some element of CAC, indicating the presence of CHD. Many previous articles have discussed CHD risk factors and mortality in the SCI population. Despite this, there have been very few interventions to decrease the CHD risk in the chronic SCI population.

## Introduction

This commentary considers the implications of the findings related to the effect of a study related to coronary heart disease (CHD) risk assessment in individuals with a chronic spinal cord injury (SCI) described by Lieberman et al. [1]. This was a cross-sectional study comparing the use of coronary artery calcium scores (CACS) and the National Cholesterol Education Program (NCEP) Guidelines for CHD risk assessment. The authors reported only an 18% Percent Agreement between the two risk assessment tools with a Kappa of -0.03. They also reported that 18 (47.4%) of their participants had a CACS>0, indicating that they had some level of CHD.

This article has been referenced 17 times, two of which were improperly referenced. Of the nine publications in English with SCI participants, eight were review articles. There were not any articles describing the new CHD risk estimator tool described below and there were not any articles further exploring CACS as a risk assessment tool in the SCI population. In addition to this, there were not any articles describing an intervention aimed to decrease the elevated CHD risk in the SCI population that referenced the Lieberman et al. [1] article.

Since the time of the publication by Lieberman et al. [1], the NCEP guidelines have been replaced. A new atherosclerotic cardiovascular disease (ASCVD) risk assessment tool has been adopted by the American College of Cardiology (ACC) and the American Heart Association (AHA) [2]. The NCEP guidelines utilized the Framingham Risk Score (FRS) [3]. However, the outcome was only CHD, and the population this was derived from was completely White, and. Therefore, the work groups who developed the ACC/AHA tool derived risk equations from community-based cohorts that included African-Americans are therefore were widely representative of the US population. They also focused on estimating an individual's first hard ASCVD event, defined as first occurrence of nonfatal myocardial infarction, CHD death or fatal or nonfatal stroke. This inclusion of stroke in the assessment of CVD risk is consistent with evidence from a statement from the AHA and the American Stroke Association [4]. This tool is referred to as the ASCVD Risk Estimator and again this risk estimator has not been used in the SCI population.

The ASCVD Risk Estimator has been used in the general population and compared to CACS. A retrospective study of 687 participants, average age 53.5+7.7 years, demonstrated a Kappa of 0.23+0.029, indicating a low level of agreement. 65.6% of participants were placed into the same risk category, but 13.8% had significant disagreement in level of risk between the two risk assessment tools, defined as being in the highest risk group by one risk assessment and in the lowest in the other risk assessment [5]. The authors came to a similar conclusion that Lieberman et al. did which was that CACS may be beneficial in those with an intermediate ASCVD risk. Since the ASCVD Risk Estimator has replaced the NCEP Guidelines, a SCI study comparing the ASCVD Risk Estimator and CACS should be done in order to determine their applicability in the SCI population.

The Lieberman et al. article was published in 2011. It added to the literature supporting CVD, and specifically CHD, as significant diseases and potentially causes of mortality in the SCI population [6,7]. Following an acute SCI, there is a significant loss of skeletal muscle and an increase in fat mass below the level of injury [8-11]. There is also a decrease in sympathetic nervous system activity [12]. As a result of the decreased lean mass, decreased sympathetic nervous system activity, and decreased physical activity, persons with SCI have decreased energy expenditure compared to able-bodied individuals [13-15]. Subsequently, obesity, and particularly central adiposity, is common among persons with chronic SCI and is more prevalent than in able-bodied persons [16-22]. The sedentary lifestyle can also result in low levels of high density lipoprotein cholesterol (HDL-C), an additional CHD risk factor [23,24].

Many other articles had previously documented CHD risk factors including diabetes mellitus [25,26], dyslipidemia [27,28], obesity [17,29]

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and inflammation [30,31]. Yet, a literature search of clinical trials with the search terms ("spinal cord" or tetraplegia or paraplegia or quadriplegia) AND (cardiovascular disease or coronary heart disease or diabetes) only revealed two articles [32,33] with interventions aimed to improve cardiovascular health or improve body composition. A similar search with the same SCI terms along with exercise or nutrition resulted in 169 studies. However, only 10 of these were geared towards cardiovascular health or body composition changes. It will most likely take many more diet and lifestyle and possibly medication intervention studies aimed to reduce CHD risk factors, such as obesity, dyslipidemia and diabetes mellitus, in individuals with chronic SCI in order to develop mechanisms that can reduce the incidence of ASCVD in the SCI population.

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