Cardiovascular health benefits of exercise in people with spinal cord injury: more complex than a prescribed exercise intervention?

We thank Totosy de Zepetnek et al[1] for the article, demonstrating that attaining the current physical activity guidelines for adults with spinal cord injury (SCI) does not meaningfully improve body composition or traditional cardiovascular disease (CVD) risk biomarkers. However, we would like to point out some important considerations.

Derived from the first law of thermodynamics, human energy balance is expressed as: Energy Balance = Energy Intake – Energy Expenditure. Numerous psychosocial and environmental barriers for people with SCI limits engagement in the most malleable component of energy expenditure, physical activity. When physical activity is performed, the energy cost of most activities of daily living and leisure-time activities are considerably lower than those reported in the general population[2]. This is likely due to these activities being restricted to the smaller upper body skeletal muscle mass, achieving a lower metabolic cost. Paralysis leads to a progressive loss of metabolically active tissue below the injury lesion, which also reduces resting metabolic rate. Physical inactivity, coupled with lower energy costs of common upper body activities and reduced resting metabolic rate clearly affects total daily energy expenditure. Consequently, we contend that upper-body exercise alone, may not be capable of generating a significant energy deficit that will translate to measurable fat mass losses over the periods typically observed by studies in this population.

Irrespective of how negative energy balance is achieved, be it through energy restriction or expenditure, substantial and similar improvements in CVD biomarkers have been observed in non-disabled overweight adults[3]. We do not dispute that exercise has positive independent effects on cardiovascular fitness, but instead suggest that for people with SCI, potentially manipulating energy balance could be the most important consideration for improving CVD risk.

In order to address the concept of energy balance, future studies should estimate both energy intake and expenditure, factors that have been neglected in interventions aimed at improving health in people with SCI. As with all exercise interventions, it is conceivable that 'prescribed' exercise simply replaces other activity, diminishing the net effect on total energy expenditure. It has also been demonstrated that exercise interventions result in lower than predicted changes in body mass, which reflects compensatory increases in energy intake in response to a

perceived state of deficit[4]. These concepts (substitution of physical activity behaviors and compensatory energy intake) may reduce the effectiveness of exercise interventions with regards to inducing desirable body composition or cardiovascular health adaptations. In order to monitor these, renewed efforts are required to accurately quantify energy intake[4] and expenditure[5].

In conclusion, the authors are to be commended for conducting a randomised controlled trial assessing a range of CVD risk factors in this population. We are also supportive of the exploration of alternative therapies. However, a simple accessible solution, controlling or manipulating energy balance remains to be investigated in this population. This letter is intended to highlight the potential role of energy balance (i.e. intake and expenditure) in modulating the impact of physical activity on CVD risk in people with SCI.

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