

# Do Sit-Stand Workstations Improve Cardiovascular Health?

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Sit-stand workstations have been around for many years but they have recently gained in popularity. The reasons are many but reduced cost, increased marketing, and a promise of improved health seem to be the primary drivers.

While there is some evidence that the use of sit-stand workstations will relieve low back pain and improve productivity (Garett 2016)<sup>1</sup>, there is little evidence that more standing at work will improve cardiovascular health. Cardiovascular health is defined here as myocardial infarctions and coronary artery disease. None-the-less, several countries and professional organizations have published public health guidelines recommending more standing for sedentary work (Straker 2016, AMA 2013)<sup>2,3</sup>.

The basis for pushing more standing to improve the cardiovascular health of office workers follows from a misinterpretation of epidemiologic and physiologic studies.

First, the epidemiologic evidence. At least 5 large, prospective studies have found that increased total sitting time, i.e., combining work and leisure sitting time, increases the risk of cardiovascular disease (VanDerPloeg 2012, Borodulin 2014, Petersen 2014, Matthews 2015, Chao 2015)<sup>4,5,6,7,8</sup>. These studies controlled for important confounders such as age, education, smoking, employment, leisure time physical activity, BMI, diet, hypertension, and cholesterol. The risk increased approximately 50% when comparing those who sat more than 10-12 hours per day to those who sat less.

On the other hand, at least 6 large, prospective studies have found that increased occupational sitting time did not increase the risk of cardiovascular disease (Krause 2000, Stamatakis 2013, Chao 2015, Kikuchi 2015, Moller 2016, Smith 2017)<sup>9,10,8,11,12,13</sup>. Again the studies controlled for important confounders. Two of the studies found the inverse. Workers who predominantly sat at work had greater protection from cardiovascular disease than those who predominantly stood (Krause 2000, Smith 2017)<sup>9,13</sup>.

Why the differences? By and large, these were all well-designed studies of good quality with good control of confounders. The differences are likely to be explained by the sitting at home time, the couch potato time, rather than the sitting time at work.

This brings up the second level of evidence, the effects of sitting vs. standing on overall metabolism, blood pressure, and lipid and glucose metabolism. Surprisingly, overall metabolism is almost the same for sitting and standing. The differences are small and range from 0 to 30 kcal/h (Tudor-Locke 2014)<sup>14</sup>. Furthermore, when you consider that, on average, someone with a sit-stand workstation, and some system to remind them to stand, will stand for an extra 1-2 hours more per day, at best, a sit-stand workstation would lead to 60 kcal extra metabolism per day, or half a bottle of beer.

## Key Messages

- Some evidence that the use of sit-stand workstations will relieve low back pain and improve productivity
- Little evidence that more standing among office workers will improve cardiovascular health
- The effects of sitting vs. standing on overall metabolism, blood pressure, and lipid and glucose metabolism is almost the same for sitting and standing - a real increase in metabolism requires pedaling or treadmill walking at work (increase of 100 to 200 kcal/h) (Zderic 2006, Tudor-Locke 2014)

Fidgeting can increase metabolism by 50 kcal/h, but a real increase in metabolism requires pedaling or treadmill walking at work (increase of 100 to 200 kcal/h) (Tudor-Locke 2014)<sup>14</sup> and these interventions at work are noisy and not well-accepted.

A large Danish study found that leisure time sitting was associated with increased triglycerides, cholesterol, weight, and waist circumference; however, occupational time sitting was not associated with any of these markers (Saidj 2013)<sup>15</sup>. This supports

the couch potato theory of sitting and cardiovascular risk – there is a difference between sitting at work and lounging in front of a TV. Several small intervention studies have demonstrated mixed effects of sit-stand workstations on blood pressure but they suffer from serious methodologic limitations (Mainsbridge 2014; Graves 2015)<sup>16,17</sup>.

## Implications for the Prevention of MSD

- There is some evidence that the use of sit-stand workstations will relieve low back pain and improve productivity. However, there is no evidence supporting the theory that increased occupational sitting time increases cardiovascular risk.

## Conclusion

In summary, there is no evidence supporting the theory that increased occupational sitting time increases cardiovascular risk. In fact, the opposite may be true - there is some evidence linking increased occupational standing time to cardiovascular risk. As health and safety professionals it is important that we do not promote health based interventions, especially for cardiovascular disease, for which there is a lack of good evidence.

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