

## Long working hours: an avoidable cause of stroke?



William Osler, in an article about atherosclerosis published 100 years ago, wrote that the main cause of myocardial infarction was “wear and tear of life”.<sup>1</sup> Although we now have more detailed theories regarding the causal mechanisms, there is still some kinship between modern studies of work-related determinants of cardiovascular diseases and Osler’s broad approach to the cause of disease.<sup>2</sup>

One important aspect of work environment is working time. Long working hours correlate with increased incidence of cardiovascular diseases and their risk factors.<sup>3,4</sup> However, contradictory results show that long working hours are not associated with increased risk of metabolic syndrome.<sup>5</sup> In a working paper from 2003, White and Beswick reviewed 66 studies from 1920 to 2002 with a guarded conclusion that there are “...potentially negative effects of working long hours on physical health. The strongest evidence probably concerns the links with cardiovascular disorder...”.<sup>6</sup>

In *The Lancet*, Miki Kivimäki and colleagues<sup>7</sup> present findings from a meta-analysis of long working hours and risk of cardiovascular disease, based on both published and unpublished data, for up to 603 838 men and women from 24 cohorts in Europe, the USA, and Australia. The investigators conclude that, compared with standard working hours of 35–40 h per week, long working hours (defined as working  $\geq 55$  h per week) are a risk factor mainly for stroke (relative risk [RR] 1.33, 95% CI 1.11–1.61), with estimates showing a dose–response association (RR 1.10 [95% CI 0.94–1.28] for 41–48 h, 1.27 [1.03–1.56] for 49–54 h, and 1.33 [1.11–1.61] for  $\geq 55$  h per week). The study is a pioneering one because of its large scale, comprising more than 5 million person-years of follow-up, including not only myocardial infarction but also stroke as endpoints. So far, Kivimäki and colleagues’ results provide the strongest indication of a causal association between long working hours and an aspect of cardiovascular disease—namely, stroke. On the other hand, the authors report a less convincing association between long working hours and coronary heart disease (RR 1.13, 95% CI 1.02–1.26). Because coronary heart disease is more prevalent than stroke in people of working age,<sup>8</sup> this finding is an interesting one that has probably been missed because of the smaller populations studied previously.

In the present study, the investigators were able to adjust for various confounding factors (ie, age, sex, socioeconomic status, smoking, body-mass index, physical activity, and alcohol consumption). But, as in many epidemiological studies, outcome is measured with better accuracy than exposure—working time is self-assessed and measured just once. And, as in all observational studies, there could be selection effects (eg, work involvement—the degree to which an employee is engaged in and enthusiastic about doing his or her work) and confounding factors (eg, workload or sleeping hours) that are not controlled for.

Prevention of cardiovascular diseases almost exclusively focuses on medical and individual preventive measures.<sup>9</sup> Findings from other studies have shown that this approach is not always simple and tends to increase inequities in health, because individuals with the most favourable socioeconomic situation are often the most successful in implementing these preventive activities.<sup>10</sup>

Working conditions are important determinants of people’s health. Some of these conditions might be difficult to change because of the nature of the work (eg, underground work, climate conditions, or toxic exposures), but the length of a working day is a human decision. Essentially, if long working hours present a danger to health, it should be possible to change them, which is not always the case with other work environmental factors.



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As Kivimäki and colleagues point out,<sup>7</sup> the increase in risk is substantial. Long working hours are not a negligible occurrence. Among member countries of the Organisation for Economic Cooperation and Development (OECD), Turkey has the highest proportion of individuals working more than 50 h per week (43%), and the Netherlands the lowest (<1%). For all OECD countries, a mean of 12% of employed men and 5% of employed women work more than 50 h per week.<sup>11</sup> Although some countries have legislation for working hours—eg, the EU Working Time Directive (2003/88/EC) gives people the right to limit their average working time to 48 h per week<sup>12</sup>—it is not always implemented. Therefore, that the length of a working day is an important determinant mainly for stroke, but perhaps also for coronary heart disease, is an important finding.

Kivimäki and colleagues could now test their results in a more experimental way—eg, by randomly allocating some individuals working long hours to reduced working hours and measuring the consequences for health. In such a way, intermediate mechanisms that are currently only mentioned in the discussion of the present report<sup>7</sup> could be assessed (eg, stress response, blood pressure, salt intake, long exposure to sedentary positions, and sleeping time). Such investigations would be beneficial because the consequences of long working hours, rather than long working hours alone, are likely to be the underlying causes of Kivimäki and colleagues' findings.<sup>13</sup> For now, we have a risk factor that could and should be the subject of general policy decisions.

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I declare no competing interests.

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