

(page 1591), the second sentence should have begun with “Subtypes and sub-subtypes.”

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Shifts to and from Daylight Saving Time and Incidence of Myocardial Infarction

TO THE EDITOR: More than 1.5 billion men and women are exposed to the transitions involved in daylight saving time: turning clocks forward by an hour in the spring and backward by an hour in the autumn. These transitions can disrupt chronobiologic rhythms and influence the duration and quality of sleep, and the effect lasts for several days after the shifts.^{1,2}

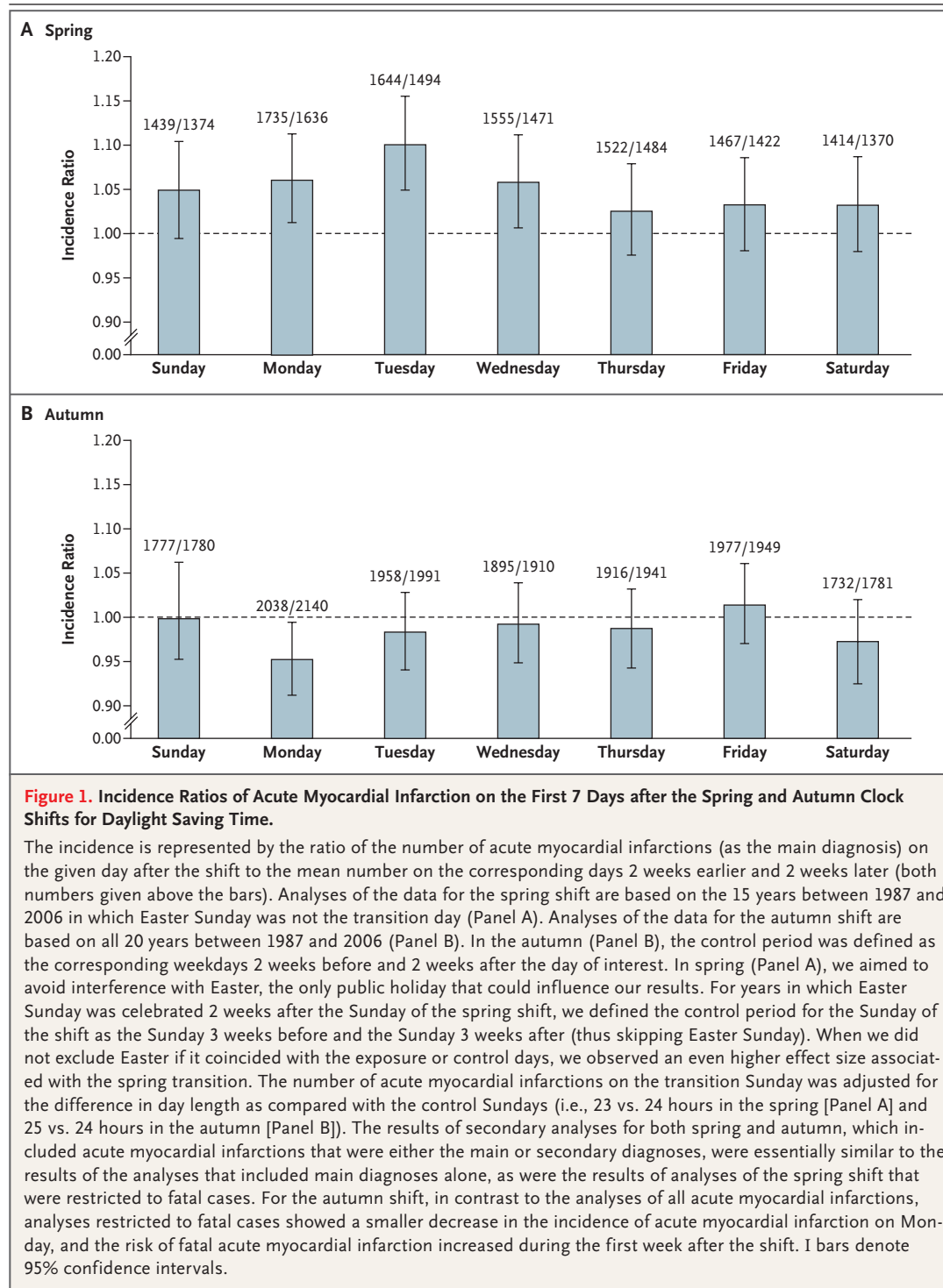
We examined the influence of these transitions on the incidence of acute myocardial infarction. To calculate the incidence ratio, we compared the incidence of acute myocardial infarction during each of the first 7 days after the spring or autumn transition and the mean of the incidences on the corresponding weekdays 2 weeks before and 2 weeks after the day of interest. For example, for the Tuesday after the transition, we would have divided the incidence on that Tuesday by the mean of the incidence on the Tuesday 2 weeks earlier and the incidence on the Tuesday 2 weeks later. We used data from the Swedish registry of acute myocardial infarction, which provides high-quality information on all acute myocardial infarctions in the country since 1987. The incidence ratios, as measures of relative risk, and exact 95% confidence intervals were calculated.

The incidence of acute myocardial infarction was significantly increased for the first 3 weekdays after the transition to daylight saving time in the spring (Fig. 1A). The incidence ratio for the first week after the spring shift, calculated as the incidence for all 7 days divided by the mean of the weekly incidences 2 weeks before and 2 weeks after, was 1.051 (95% confidence interval [CI], 1.032 to 1.071). In contrast, after the transition out of daylight saving time in the autumn, only the first weekday was affected significantly (Fig. 1B); the incidence ratio for the whole week was 0.985 (95% CI, 0.969 to 1.002).

The effect of the spring transition to daylight saving time on the incidence of acute myocardial infarction was somewhat more pronounced in women than in men, and the autumn effect was more pronounced in men than in women. The separate analyses of the 1987–1996 and 1997–2006 periods yielded essentially the same results as those for the whole 1987–2006 period. The effects of transitions were consistently more pronounced for people under 65 years of age than for those 65 years of age or older.

The most plausible explanation for our findings is the adverse effect of sleep deprivation on cardiovascular health. According to experimental studies, this adverse effect includes the predominance of sympathetic activity and an increase in proinflammatory cytokine levels.^{3,4} Our data suggest that vulnerable people might benefit from avoiding sudden changes in their biologic rhythms.

It has been postulated that people in Western societies are chronically sleep deprived, since the average sleep duration decreased from 9.0 to 7.5 hours during the 20th century.⁴ Therefore, it is important to examine whether we can achieve beneficial effects with prolonged sleep. The finding that the possibility of additional sleep seems to be protective on the first workday after the autumn shift is intriguing. Monday is the day of the week associated with the highest risk of acute myocardial infarction, with the mental stress of starting a new workweek and the increase in activity suggested as an explanation.⁵ Our results raise the possibility that there is another, sleep-related component in the excess incidence of acute myocardial infarction on Monday. Sleep-diary studies suggest that bedtimes and wake-up times are usually later on weekend days than on weekdays; the earlier wake-up times on the first workday of the week and the consequent minor sleep deprivation



vation can be hypothesized to have an adverse cardiovascular effect in some people. This effect would be less pronounced with the transition out of daylight saving time, since it allows for additional sleep. Studies are warranted to examine the

possibility that a more stable weekly pattern of waking up in the morning and going to sleep at night or a somewhat later wake-up time on Monday might prevent some acute myocardial infarctions.

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