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## Early, but not late chronotypes, are up during their biological night when working the night shift

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Bhatti *et al.*<sup>1</sup> recently examined the impact of chronotype on melatonin levels in shift-workers and concluded that '(...) morning type shift-workers were better able to maintain normal patterns of melatonin secretion (...), suggesting that morning types may be protected against the negative effects of shift-work related melatonin disruption.' However, their data show that, compared to daytime workers sleeping at night, early chronotypes have lower melatonin levels than late chronotypes during daytime sleep after a nightshift. They also show a larger difference in melatonin secretion during their first regular nighttime sleep after night shifts (Table 3, dichotomous categorization: = -34.6% and late types: = -4.2%), suggesting that early chronotypes are more affected by working night shifts than late ones.

This makes sense when considering the biological definition of chronotype<sup>2</sup>, where early chronotypes, with an earlier subjective, internal night, exhibit earlier peak melatonin secretion than late chronotypes<sup>3</sup>. Night shift-work consequently coincides with the subjective night of early types, but only partially (or not) for later chronotypes, so that earlier ones should be affected most from working at night. Indeed, we have shown that early chronotypes experience poorer and shorter sleep after night shifts, as compared to later ones<sup>4</sup>. Recent evidence, which reported lower 24h melatonin levels in early *vs.* late chronotype night shift workers, provides further support for this assertion.<sup>5</sup>

Overall, the paper by Bhatti and colleagues remains challenging to interpret due to several limitations, including 1) their non-validated chronotyping approach with arbitrary cut-off values; and 2) the *a priori* exclusion of night shift-workers who sleep during the day on days off (likely representing extreme late chronotypes).

Future studies that evaluate working times both on an external (social) as well as an internal (biological) time-scale are needed to elucidate the interplay between working times and the circadian system in greater detail.

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