Sleepiness and Cardiometabolic Impact of Short Sleep Duration and OSA

What About the Clock?

To the Editor:

We read with great interest the paper by Drager et al[1] in the June 2019 issue of *CHEST* regarding the interactive dynamics between OSA and short sleep duration (SSD) on one hand, and sleepiness and cardiometabolic risk on the other. The associations identified in this large cohort would suggest that a priori daytime sleepiness is more likely driven by restricted sleep duration, whereas cardiometabolic risk

indicators seemed to be exclusively associated with OSA. These findings are somewhat in contradiction with many other epidemiological and interventional studies (reviews supporting contradictory findings on both issues are given elsewhere[2,3]). Notwithstanding, Drager et al[1] have neglected to assess a key mediator with a demonstrated significant impact on such important interactions, namely the circadian timing system (CTS). The CTS is critically involved in mediating physiological regulatory mechanisms of both alertness/sleepiness and cardiometabolic function, and is also often affected in OSA and in patients with SSD.[4,5] For example, although a delayed circadian clock may lead to shortened sleep, and consequently affect sleepiness and some other executive functions, it was recently shown that SSD, later bedtimes, and delayed circadian timing of sleep were significantly associated with insulin resistance.[6] Circadian disruption and circadian misalignment can also play an important role in the link between OSA and cardiometabolic risk, and they interact with both intermittent hypoxia and sleep fragmentation to coactivate shared pathways underlying end-organ morbidity, such as inflammation and autonomic dysregulation.

It is also noteworthy that SSD could differently affect the outcomes of interest as enunciated by the authors,[1] depending on which particular sleep stage is predominantly suppressed or restricted in OSA, as non-rapid eye movement sleep and rapid eye movement sleep stages have distinct, albeit complementary, functions in sleep, sleepiness, and cardiometabolic functions. Thus, the omission of any circadian clock measures along with the absence of interventional components by Drager et al[1] precludes any more definitive insights into their interesting and certainly provocative findings.

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Response

To the Editor:

We appreciated the interest and comments provided by Drs Meira e Cruz and Gozal regarding our publication in *CHEST* (June 2019) addressing the associations of OSA, short sleep duration (SSD), and their interactions on sleepiness and cardiometabolic risk factors.[1] Drs Meira e Cruz and Gozal noted that our results on the potential consequences of SSD are not consistent with previous literature. The supported review articles comprised evidence based on subjective sleep duration. It is noteworthy that the vast majority of the original articles quoted in the reviews addressed morbidity and mortality of SSD, disregarding circadian clock or the presence of OSA. We can argue that our results are consistent with recent evidence using objective data. For instance, at least three studies found no associations between sleep duration with weight gain or cardiovascular risk factors.[2-4] We are not claiming that SSD is an innocent bystander, but we share the opinion that it is time to stop using subjective sleep duration and to consider OSA as a major confounding factor. Indeed, our study found that subjects with OSA had a higher frequency of SSD than participants without OSA.[1] Subjective sleep duration has critical limitations. We have data (in preparation) from the same cohort showing that approximately 40% of participants have significant sleep duration misperceptions when subjective data were compared with objective data.

We agree with the criticism that our study has a cross-sectional design, and we clearly reported this limitation in the discussion section.[1] Definitive evidence impose