

LETTER TO THE EDITOR

Response to ‘A retrospective review of sleep disordered breathing, hypertension and cardiovascular diseases in spinal cord injury patients’

Spinal Cord (2015) 53, 498; doi:10.1038/sc.2015.17; published online 10 February 2015

We thank Sankari *et al.*¹ for their interest in our paper. We examined the diurnal blood pressure and urine patterns of 54 patients with spinal cord injury (SCI) who were referred for clinically significant problems with blood pressure control, a majority of these referrals being for orthostatic intolerance.² We reported in the paper: ‘co-morbidities include sleep apnoea ($n=6$), hypertension ($n=3$), diabetes mellitus ($n=3$), atrial fibrillation ($n=2$) and congestive cardiac failure ($n=1$)’. Thus, there was generally a low prevalence of cardiovascular co-morbidities. Six (14%) tetraplegics had a diagnosis of sleep-disordered breathing (SDB). It is possible that there was unidentified SDB in other patients; however, the retrospective nature of the study meant that we examined the available information rather than directly investigating the patients. Our findings of a high prevalence of nocturnal hypertension and reversed dipping in a referred population may not be generalisable to the wider SCI population in which the high prevalence of SDB has been observed.

We agree that there may be an association between SDB and the diurnal blood pressure changes that we documented in our study population. SDB may contribute to abnormalities in the diurnal blood pressure profile in the same way as in the able-bodied population. In addition, there may be a common underlying factor contributing to both SDB and diurnal blood pressure changes specific to SCI, such as the disruption of the sympathetic signals.

Conversely, in the able-bodied population, there is also evidence that elevated blood pressure may contribute to SDB in a variety of ways, one being fluid redistribution from the legs to the neck during sleep³—a mechanism especially relevant to the SCI population. A few small studies have found improvement in obstructive sleep apnoea with reduction of blood pressure, providing further support for this mechanism.³

Thus, it is not clear which is the cause and which is the consequence, and it is likely that both SDB and abnormal blood pressure interact. We agree that both need to be considered and

further examined to elucidate mechanisms, including any that is specific to the SCI population, in order to guide management.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ACKNOWLEDGEMENTS

This research was supported by a grant from the Transport Accident Commission (DP174). MYG is supported by a scholarship and stipend through the University of Melbourne and Spinal Research Institute.

MY Goh^{1,2,3}, ECK Wong¹, MS Millard^{1,3,4}, DJ Brown³,
DJ Berlowitz^{2,5,6} and CJ O’Callaghan¹

¹Department of Clinical Pharmacology, Austin Hospital,
Heidelberg, Victoria, Australia;

²University of Melbourne, Parkville, Victoria, Australia;

³The Spinal Research Institute, Heidelberg, Victoria, Australia;

⁴Victorian Spinal Cord Service, Heidelberg, Victoria, Australia;

⁵Institute for Breathing and Sleep, Austin Hospital, Heidelberg,
Victoria, Australia and

⁶Department of Respiratory and Sleep Medicine, Austin Hospital,
Heidelberg, Victoria, Australia

E-mail: Min.Goh@austin.org.au

- 1 Sankari A, Martin JL, Badr MS. A retrospective review of sleep disordered breathing, hypertension and cardiovascular diseases in spinal cord injury patients. *Spinal Cord* (e-pub ahead of print 10 February 2015; doi:10.1038/sc.2015.16).
- 2 Goh MY, Wong ECK, Millard MS, Brown DJ, O’Callaghan CJ. A retrospective review of the ambulatory blood pressure patterns and diurnal urine production in subgroups of spinal cord injured patients. *Spinal Cord* 2014; 53: 49–53.
- 3 White LH, Bradley TD, Logan AG. Pathogenesis of obstructive sleep apnoea in hypertensive patients: role of fluid retention and nocturnal rostral fluid shift. *J Hum Hypertens* (e-pub ahead of print 23 October 2014; doi:10.1038/jhh.2014.94).