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Foreword*

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“Sleep that knits up the ravell’d sleeve of care,” says Macbeth, but *“To sleep: perchance to dream: ay, there’s the rub,”* says Hamlet. Shakespeare’s insights into the value of sleep, as well as a possible drawback, are still relevant. Sleep and breathing are inextricably intertwined; respiration decreases as non-rapid eye movement (non-REM) sleep progresses from lighter to deeper stages, and becomes irregular in rapid eye movement (REM) sleep. Sleep onset can lead to sleep-disordered breathing syndromes, such as obstructive sleep apnoea (OSA) or periodic breathing, which interrupt sleep in a vicious circle of events that initiate more widespread pathophysiology.

Because many physiological systems and mechanisms are involved in this dance of sleep and respiration, we felt that a collection of articles presenting these differing aspects would help readers grasp both the complexities and the broad picture that is emerging, and hence this Special Issue, *Sleep and Breathing*, in *Respiratory Physiology & Neurobiology*. Although various aspects of the interactions between sleep and breathing have been extensively represented in *Respiratory Physiology & Neurobiology* on an ongoing basis, this is only the second Special Issue explicitly focused on the subject since the one titled *Sleep and Breathing: from Molecules to Patient Populations* edited by L. Kubin and D. Gozal was published some ten years ago (Kubin and Gozal, 2003).

The contributions in this Special Issue cover a wide range because the topic is vast. Many core physiological aspects of the links between sleep and breathing are covered, including the impact of external disturbances to the system like altitude, presented by Ainslie et al. (2013), and spinal cord injury by Fuller et al. (2013). The neurophysiology of sleep and breathing receives particular attention, with an overall view of brain structure and function in sleep-disordered breathing by Harper et al. (2013). Particular neural mechanisms

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important for respiratory-sleep interaction and involving the pontine parabrachial complex are discussed by Martelli et al. (2013), and the role of respiratory chemoreflexes in arousal by Guyenet and Abbott (2013). Two animal models for studying the interaction between sleep and respiration are presented by Pagliardini et al. (2013), and by Davis and O'Donnell (2013).

Of course, the major clinical problem involving sleep and breathing interaction is OSA, and major efforts to understand this syndrome and develop treatments have focused on the physiology and pathophysiology of the upper airway. Circadian and respiratory aspects of upper airway muscle control are discussed by Volgin et al. (2013), as well as by Stettner et al. (2013), and motor unit activity in upper airway muscles in humans is described by Trinder et al. (2013). A possible strategy for maintaining airway muscle activation during REM sleep is discussed by Grace et al. (2013). Current ideas concerning the impact of recurrent nocturnal hypoxia caused by repeated upper airway obstructions are summarised by Mateika and Syed (2013), and prospects for pharmacological interventions in human patients by Wang et al. (2013). Muzumdar and Arens (2013) discuss the physiological effects of OSA in childhood. Finally, Khoo and Blasi (2013) showcase a model perspective on the changes in autonomic control in OSA.

We hope that these articles will stimulate thought, and that you enjoy reading them. If they prompt further research endeavours then so much the better. After all, as Shakespeare put it in *All's well that ends well*, “*Our remedies oft in ourselves do lie.*”

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