What's a Good Night's Sleep Worth?

Neil S. Cherniack

Department of Medicine, UMDNJ – New Jersey Medical School, Newark, N.J., USA

The ill effects of a poor night's sleep caused by recurring apneas have been repeatedly reaffirmed. A good night's sleep is worth a lot.

Increased flow dilates blood vessels presumably by releasing nitric oxide from the endothelium. This dilatation is attenuated in hypertensives. In this issue of *Respiration* Oflaz et al. [1] report a study of the diurnal variation in flow-mediated vasodilatation comparing normotensive patients with obstructive sleep apnea to controls, and find that the deterioration that occurs in the morning in healthy normals during sleep is even greater in the patients. This confirms previous findings in obstructive sleep apnea that have found abnormalities in the endothelial function of both resistance and conducting blood vessels. These include increases in intimal thickness and reduced acetylcholine-induced relaxation, which improve with nasal continuous positive airway pressure (CPAP) [2–4]. However, the study by Oflaz et al. [1] is the first to examine diurnal changes in sleep apnea and adds to the evidence that obstructive sleep apnea is a significant risk factor for hypertension.

It is apparent that repeated apneas are associated with a long list of functional changes including, besides vascular endothelial dysfunction, heightened sympathetic activity, impaired baroreceptor reflexes, hypercoagulability, inflammation, and metabolic dysregulation [4, 5]. Sleep apnea patients are reported to have increased levels of C reactive and other proinflammatory molecules such as TNF- α and IL-6, increased adhesion molecules, hyperleptinemia, increased insulin resistance, elevated angiotensin II levels, and aldosterone levels above normal [4, 5]. There is increasing reason to believe obstructive sleep apnea is an important risk factor not just for hyper-

tension but also for a long list of cardiovascular diseases including cardiac ischemia, stroke, left ventricular diastolic dysfunction, congestive heart failure, and cerebrovascular disease [6].

Perhaps an even more compelling reason to view sleep apnea seriously is provided by the recent study of over a thousand patients by Yaggi et al. [7] that reported increased mortality in patients with obstructive sleep apnea. The encouraging news is that treatment of sleep apnea particularly by nasal CPAP can ameliorate the endothelial dysfunction, reduce hypertension, and even reduce mortality particularly in younger patients [8].

The problem is whom to treat and with what. The study by Oflaz et al. [1] gives us no insight on this important issue. There is evidence that abnormalities such as endothelial dysfunction increase with the apnea/hypopnea index [3]. It has been suggested that even mild apnea is a risk factor but perhaps more so in those younger than 60 [9]. But the issue remains, because mild sleep apnea as defined by an apnea/hypopnea index of 5–15 per hour probably affects many millions of people, and nasal CPAP is a costly and burdensome treatment for many patients. Studies such as the one reported in this issue raise the possibility that even mild sleep apneas require some intervention such as behavior modification or oral appliances to prevent more serious illnesses. Oral appliances have been shown to be effective in mild cases and seem to be more acceptable than nasal CPAP [10]. However, it is not known whether the use of such devices prevents cardiovascular complications.

Treatment considerations are made more complex because it appears obstructive sleep apneas can lead to cardiovascular pathology via different pathways [11]. Oxida-

tive stress may be an important cause since circulatory changes can be reproduced by intermittent hypoxia and reversed by the administration of oxygen radical scavengers [12]. Changes in the activation of the sympathetic system or abnormalities in the formation of NO may also be important. Better ways of determining sleep quality and the severity of sleep apnea than are currently employed may make it possible to differentiate what is cur-

rently believed to be mild disease on the basis of the apnea/hypopnea index and identify subgroups in which treatment might be especially valuable.

Finally, it is increasingly apparent that sleep apnea is more than a local disease of the upper airways. Sleep apnea may only be one manifestation of some broader systemic illness and treatment of the apneas alone may be insufficient to completely abrogate cardiovascular risks.

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