CORRESPONDENCE

The risk of future cardiovascular diseases in the patients with OSAS is dependently or independently associated with obstructive sleep apnoea

To the Editor:

In the recent issue of *European Respiratory Journal*, KIELY and McNICOLAS have sophisticatedly demonstrated that the increased risk of future cardiovascular diseases is independent of obstructive sleep apnoea (OSA) in patients with obstructive sleep apnoea syndrome (OSAS) [1]. Although many investigators have reported that there is a significant link between OSA and the cardiovascular events, they insisted that the patients with OSAS are at high risk of future cardiovascular diseases from factors, *i.e.* diabetes mellitus, hypertension, hypothyroidism, hyperlipidemia, other than OSAS. In addition, these independent risk factors of cardiovascular diseases are not associated with OSAS severity, *i.e.* increasing apnoea/hypopnoea index (AHI) level [1]. The results are very interesting, but could not be entirely accepted. It has been reported that OSA is associated with hypertension, independent of the confounding factors of age and obesity and that nondipping of 24 h blood pressure profile is related to apnoea severity [2]. Indeed the nocturnal high blood pressure in patients with OSAS is easily controlled by the nasal continuous positive airway pressure, but hardly by ordinary hypertensive therapy [3]. Interestingly, WEICHLER *et al.* have reported that the treatment of hypertension may reduce the frequency of sleep-disordered breathing [4]. Furthermore, two recent studies have suggested there is a significant causal relationship between hypertension and sleep-disordered breathing. PEPPARD *et al.* reported a dose-response association between sleep-disordered breathing at baseline and the presence of hypertension 4 yrs later, that was independent of known confounding factors [5]. They also suggested that persons with minimal sleep-disordered breathing (less than AHI 5) had a higher odds ratio of hypertension than those with no episodes of sleep-disordered breathing. BIXLER *et al.* have also reported that sleep-disordered breathing is independently associated with hypertension when potential confounders including age, BMI, sex, menopause, alcohol use and smoking were controlled for in the logistic regression analysis [6]. Although the mechanism of hypertension and cardiovascular events in OSAS patients are not fully elucidated, it has been suggested that abnormalities in cardiovascular variability is implicated in the subsequent development of overt cardiovascular disease in patients with OSA [7]. It has recently been reported that blood pressure measured in young adult men is positively associated with increased cardiovascular mortality in later life [8].

Considered together, it is reasonable to speculate that

OSA *per se* contributes to raised blood pressure in adulthood, and is implicated in the pathogenesis of cardiovascular events in later life.

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From the authors:

We thank Dr. Teramoto and colleagues for their interest in our paper, and are happy to respond to their comments. Our data demonstrate, using well-established risk prediction methods, that the patients with obstructive sleep apnoea syndrome (OSAS) assessed in the present study are at high risk for future cardiovascular disease from factors other than OSAS. We do

not claim, as stated by these authors, that the OSAS itself provides no additional independent cardiovascular risk, and the report specifically recognizes this possibility in paragraphs one and two of the discussion. Furthermore, in our report, we discuss the previous literature on the relationship between OSAS and hypertension, and we agree with Dr. Teramoto and colleagues that the existing literature supports OSAS as an independent risk factor for hypertension over and above comorbid factors such as obesity, hyperlipidaemia and diabetes mellitus.

The purpose of the present report was to draw attention to the possible confounding influence of comorbid disease in the assessment of potential relationships between OSAS and cardiovascular mor-

bidity, particularly myocardial infarction and stroke. While we agree with the authors that it is reasonable to speculate that OSAS *per se* contributes to the pathogenesis of cardiovascular events in later life, properly controlled studies will be required to prove this relationship. The present report should underline the importance of identifying appropriate control populations for such studies.

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