

# Personalized Medicine for Obstructive Sleep Apnea Therapies Are We There Yet?



Bradley A. Edwards, PhD<sup>a,\*</sup>, Shane Landry, PhD<sup>a</sup>,  
Simon A. Joosten, MBBS, BMedSc, FRACP, PhD<sup>b,c</sup>,  
Garun S. Hamilton, MBBS, FRACP, PhD<sup>b,c</sup>

## KEYWORDS

• Apnea • Phenotyping • Combination therapy

## KEY POINTS

- Despite the existence of several treatments for obstructive sleep apnea (OSA), it is difficult for clinicians to know which therapy to recommend for a particular individual because they are either poorly tolerated or only resolve OSA in a proportion of patients.
- Recent evidence has highlighted that OSA is a multifactorial disorder, whereby each individual has OSA due to a combination of different pathophysiologic traits.
- Given this evidence, the concept of personalized medicine and the need for individualized therapy for OSA patients is now receiving a wealth of attention.
- Tools have now been developed to quantify deficits in specific physiologic traits contributing to OSA in a given individual.
- The development of such tools provides clinicians with a new way to systematically determine what treatment options are best suited for individual patients, paving the way toward personalizing the treatment of OSA.

Obstructive sleep apnea (OSA) is a highly prevalent sleep disorder with serious cardiovascular<sup>1-3</sup> and neurocognitive consequences.<sup>4</sup> Importantly, the currently available treatments have been shown to improve both the physiologic and the metabolic consequences of OSA and possibly even increase survival in those individuals in

whom the intervention effectively treats the disorder. However, a major concern for both patients and clinicians is that in many cases the current treatments (discussed later) are either poorly tolerated (both initially and long-term adherence) or only resolve OSA in a proportion of patients. Therefore, understanding OSA pathophysiology

---

B.A. Edwards and S. Landry contributed equally to this work.

Disclosure Statement: Dr B.A. Edwards is supported by the National Health and Medical Research Council (NHMRC) of Australia's CJ Martin Overseas Biomedical Fellowship (1035115). Dr S. Landry is supported by the NHMRC NeuroSleep Centre of Research Excellence. G.S. Hamilton has received equipment to support research from Resmed and Philips Respironics.

<sup>a</sup> Sleep and Circadian Medicine Laboratory, Department of Physiology, School of Psychological Sciences and Monash Institute of Cognitive and Clinical Neurosciences, Monash University, 264 Ferntree Gully Road, Notting Hill 3168, Australia; <sup>b</sup> Monash Lung and Sleep, Monash Medical Centre, 246 Clayton Road, Clayton 3168, Victoria, Australia; <sup>c</sup> Department of Medicine, School of Clinical Sciences, Faculty of Medicine, Nursing and Health Sciences, Monash University, Clayton 3800, Victoria, Australia

\* Corresponding author. Sleep and Circadian Medicine Laboratory, Monash University, Ground Floor BASE Facility, 264 Ferntree Gully Road, Clayton, Victoria, Australia.

E-mail address: [bradley.edwards@monash.edu](mailto:bradley.edwards@monash.edu)

Sleep Med Clin 11 (2016) 299–311

<http://dx.doi.org/10.1016/j.jsmc.2016.05.003>

1556-407X/16/\$ – see front matter © 2016 Elsevier Inc. All rights reserved.

and developing efficacious treatments are clinical imperatives.

### **CURRENT TREATMENT OPTIONS FOR OBSTRUCTIVE SLEEP APNEA PATIENTS** ***Continuous Positive Airway Pressure***

Continuous positive airway pressure (CPAP) is the current gold-standard treatment for OSA and works by pneumatically splinting open the upper airway to the point that airway obstruction is not possible. CPAP therapy is exceedingly effective in abolishing OSA and improves hypoxemic and sleep quality parameters.<sup>5–7</sup> Furthermore, it has been shown to improve daytime sleepiness and quality of life as well as reduce hypertension and the risk of fatal and nonfatal cardiovascular events.<sup>8–10</sup> For these reasons, clinicians usually recommend CPAP as the first-line treatment for OSA. Despite its effectiveness, CPAP is poorly tolerated by many individuals, with up to 50% of patients unable to tolerate or adhere to therapy beyond 3 months.<sup>11,12</sup> For those that refuse or cannot tolerate this treatment, clinicians often consider trialing alternative treatments/interventions such as mandibular advancement splints (MAS), upper airway surgical procedures, or weight loss.

#### ***Mandibular Advancement Splints***

MAS devices work by repositioning the tongue and bringing the mandible forward, thereby tightening the soft tissue and muscles of the upper airway and increasing the lateral cross-sectional dimensions and overall volume of the airway.<sup>13</sup> Between ~48% and 64% of patients can be effectively treated with a MAS device (defined as reducing the apnea-hypopnea index [AHI] to <5 events/h), although this varies substantially between studies (in part due to the definition used for treatment success).<sup>14</sup> Although in general MAS therapy is less effective in reducing the AHI compared with CPAP, the improvement in other important patient health outcomes (ie, daytime sleepiness, neurobehavioral, and blood pressure) with MAS therapy appears to be equivalent to CPAP.<sup>15,16</sup> A potential reason for the equivalent effects of CPAP and MAS on these health outcomes may be attributed to a higher adherence to MAS therapy offsetting the greater treatment efficacy of CPAP.<sup>15</sup>

#### ***Upper Airway Surgery***

Although less commonly used compared with CPAP or MAS, various surgical procedures are also used clinically for the treatment of OSA. Most often these are last resort options, typically

only initiated once a patient has demonstrated noncompliance with CPAP or MAS. The most common surgical treatment of OSA is a procedure called an uvulopalatopharyngoplasty or UPPP,<sup>17</sup> which involves the removal of the tonsils and adenoids as well as a “tightening” of the soft palate. However, there are several other procedures surgeons consider, each targeting different structures in the airway, including: nasal surgery, tonsillectomy, various palatal procedures, tongue base reduction and repositioning surgeries, maxillo-mandibular advancements (MMA), and in rare cases, tracheostomy.<sup>18</sup> Nonetheless, similar to MAS therapy, the treatment success of these procedures varies considerably in the literature. This variability may be attributed to the type of procedure, characteristics of the patients undergoing surgery, and definitions of treatment success.<sup>19</sup>

#### ***Weight Loss***

Obesity is a leading risk factor for OSA.<sup>20</sup> Accordingly, weight loss via lifestyle interventions (diet, exercise, or both) for overweight or obese OSA patients is commonly recommended by clinicians, not only to lessen the severity of OSA but also to offset the wealth of obesity-related health problems. Systematic review and meta-analysis of intensive weight loss interventions suggest that these can significantly reduce both the body mass index (BMI) and the AHI; however, resolution of OSA is only achieved in a minority of individuals.<sup>21,22</sup> Surgical weight loss procedures are typically used in cases of severe obesity and have been shown to have a greater efficacy in reducing BMI and AHI compared with lifestyle interventions.<sup>23</sup> Such procedures result in reducing the AHI by an average of 71%; however, complete resolution of OSA is still uncommon (less than 38%), with many patients demonstrating a residual AHI in the moderate severity range.<sup>24</sup>

#### ***Summary***

Notably, a common finding among the non-CPAP interventions is that they resolve OSA in only a portion of patients, and the success rate between studies varies dramatically.<sup>14,24,25</sup> Importantly, all of the current treatments for OSA use an overly simplistic “one-size-fits-all” approach that fails to take into account the multiple “phenotypes” now recognized to comprise OSA. Given that the concept of precision or personalized medicine is gaining in popularity for the treatment of a variety of diseases, there is now a great deal of momentum to develop an individualized approach to treating OSA, whereby newer treatment strategies personalized to an OSA patient’s requirements

Download English Version:

<https://daneshyari.com/en/article/3837220>

Download Persian Version:

<https://daneshyari.com/article/3837220>

[Daneshyari.com](https://daneshyari.com)