

2024 AADSM Annual Meeting Late-Breaking Abstracts and Case Reports

Disclaimer: The following are the abstracts and case reports accepted for the 2024 Annual Meeting.

Abstracts and case reports do not follow the same peer-review process followed for the submission of original research articles for the Journal of Dental Sleep Medicine. Rather, all submissions were blind peer-reviewed for acceptance by members of the AADSM Scientific Committee. The committee uses criteria to score research abstracts which include (but are not limited to) applicability to dental sleep medicine, novelty, clarity, proper research methodology and data analysis, well-founded conclusions and creativity. Criteria to score case reports include (but are not limited to) applicability, uniqueness, clarity, well-founded discussion and creativity.

It is important to keep in mind that abstracts and case reports presented at the Annual Meeting are intended to spur education and discussion for both attendees and authors.

Brand names are not permitted to be used in titles and are limited to two references within the submission body. Furthermore, the abstracts include author disclosures of any conflicts of interest or affiliation with a company. If a company or governmental body provided any financial support for the research, this is also disclosed. The AADSM does not endorse or recommend any products or services presented in these abstracts.

ABSTRACT #001

MEDICAL GRADE CLASS VI DEVICES DEMONSTRATES STATISTICALLY SIGNIFICANTLY LOWER MEAN STAINING THAN OTHER DEVICES TESTED

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Introduction: This investigation reports the stain resistance for seven OSA devices. Staining is a potential indication of the relative health and safety risks associated with prescribing certain devices. The American Society for Microbiology has linked staining with the prevalence of bacteria.

A recently published study using the [National Health and Nutrition Examination Survey](#) (NHANES) database links intraoral bacteria and dementia.

Method: A stain deposition study was performed by a third-party laboratory (Intertek, UK). A calibrated spectrophotometer, measured at three locations for each device, was used to establish the baseline color of six OAT devices, and one CPAP mask, as a reference.

Seven total devices were exposed to accelerated aging, by inserting each device into a mustard stain and then heating to 37 degrees celsius for 28 days. The color of the subject devices post aging was measured using the same calibrated spectrophotometer at the same three locations, yielding a total of six measurements per subject device.

Staining was determined by comparing the post aging values relative to the baseline values. The Tukey method at a 95% confidence level was used to test for statistical significance.

Results:

Device staining (Change in color, delta b)

	<i>Mean Staining (delta b)</i>	<i>StDev</i>
Medical Grade Class VI OAT	2.36	0.67
Medical Grade Class VI OAT Herbst	0.46	2.68
Leading CPAP Mask	4.06	1.46
CAD/CAM OAT Herbst with Liner	6.27	1.87
CAD/CAM OAT with Liner	8.12	2.10
Cold-cured PMMA Herbst Device	13.94	1.25
Polished P12 3D Printed Surgical Nylon	3.36	87.58

Tests of Statistical Significance (Tukey Method, 95% Confidence, Means that do not share a grouping are statistically different.)

<i>Device</i>	<i>n</i>	<i>Mean</i>
<i>Staining</i>	<i>Grouping</i>	<i>Significance</i>
Polished P12 Nylon	6	
87.58	A	
Cold-cured PMMA Herbst	6	
13.94	B	

CAD/CAM OAT w/ Liner	6		
8.12	C		
CAD/CAM Herbst w/ Liner	6		
6.27	C		D
Popular CPAP Mask	6		
4.06	D		E
Med. Grade Class VI OAT Herbst	6		
2.68		E	
Med. Grade Class VI OAT	6		
2.36		E	

Conclusions: This investigation suggests that healthcare providers should continue to consider OAT device material composition when selecting an OAT device.

This investigation establishes that different OAT devices, as a function of their different materials, exhibit statistically significant differences in their propensity to stain, which could be a proxy for bacteria, if not an inconvenience for that patient which could adversely impact compliance and continued device usage.

Four of the seven OAT devices tested had a statistically significantly higher mean staining value than the reference device, the CPAP mask. The remaining three devices were not statistically different from the CPAP mask.

The two Medical Grade Class VI OAT devices exhibited a statistically significantly lower mean staining value than the other four OAT devices in the study.

Support: ProSomnus Sleep Technologies provided the sample devices and paid the independent laboratory to conduct the test.

ABSTRACT #002

FINITE ELEMENT ANALYSIS (FEA) OF A CAD/CAM, 3-D PRINTED ORAL APPLIANCE TO TREAT OBSTRUCTIVE SLEEP APNEA

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Introduction: Obstructive sleep apnea (OSA) is a prevalent, serious, and chronic condition. Oral appliance (OA) therapy is an increasingly prescribed treatment option due to patient compliance and similar health outcomes to CPAP. However, concerns exist regarding occlusal changes and joint-related side effects. Finite Element Analysis (FEA) is a widely accepted mathematical simulation approach for biomechanical analysis, enabling the modeling of teeth displacement and

force distribution by OAs across the teeth and periodontal ligaments (PDL). This study evaluates the force distribution of Panthera D-SAD (Classic and X3) OAs, considering appliance design choices such as titration systems, plateaus, and bands.

Methods: The FEA static application model developed according to computer-aided engineering workflows at the University (2) includes material properties and boundary conditions such as forces and constraints. Digital reconstruction (CT scan) of a female OSA patient's oral anatomy, including teeth and PDLs, served as the model, which was then integrated into FEA software (Ansys) and subsequently matched with the OA digital files. Various design permutations and their impact were studied to assess the forces generated and teeth displacements.

Results:

Titration System: The titration system's position dictates the location of the highest force load on the teeth. For both OA models, depending on the position of the titration system, a negligible average difference of 0.72 Newton (N) applies to the upper and lower canines, premolars, and molars in favor of traction OA.

Anterior Bands: Bands with overlap and no contact with weaker anterior teeth resulted in zero forces applied. The reduction of contact between the splint and the anterior teeth redistributes the force among the stronger teeth and leads to a 17.14% reduction of negligible teeth displacement, predominately for the anteriors. The upper band with overlap and no contact led to better force distribution within the OA than the upper simple labial band with no contact, but negligible (average difference of 2.33N).

Plateaus: Evaluation of full/full versus lateral/lateral plateaus revealed a negligible difference in force distribution, with a slight advantage for the latter (3.01%; 0.84N).

Conclusions: This FEA study indicates that Panthera OA design options channel forces onto the strongest teeth (canines, premolars, and molars). Negligible differences in force distribution and tooth movement were found in all studied permutations without anterior contact. Consequently, titration systems, bands, and plateaus can be chosen by qualified dentists according to the patient's dental/medical needs. The difference in force distribution between the overlap and simple labial band being negligible, positioning of the tongue against the upper

incisors could be prioritized based on retention and the inclination of the incisors. The positioning of plateaus between anterior and posterior regions may impact muscle electromyographic activity. A comprehensive understanding of applied forces by different OA models allows clinicians to incorporate a person-centered approach, optimizing treatment outcomes and minimizing potential complications. A limitation of this study is the use of a static model, which excludes the impact of mandibular movements. A phase II dynamic modeling study is warranted.

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