

# Evaluation of Switching from Cigarette Smoking to Nicotine Pouches on Oral Health

Kimberly R. Milleman<sup>1</sup>, Jeffery L. Milleman<sup>1</sup>, Abigale L. Yoder<sup>1</sup>, Jianmin Liu<sup>2</sup>, Jingzhu Wang<sup>2</sup>, Jeffery S. Edmiston<sup>2</sup>, Mohamadi A. Sarkar<sup>2</sup>, Maria Gogova<sup>2</sup>

<sup>1</sup>Salus Research, Inc., Fort Wayne, IN, USA

<sup>2</sup>Altria Client Services LLC., Richmond, VA, USA



## **Disclosures**

This study was sponsored by Altria Client Services. All authors were employees of, or consultants to Altria Client Services at the time the study was conducted.

## **Conflicts of interest**

Kimberly R. Milleman, Jeffery L. Milleman and Abigale L. Yoder are at Salus Research, Inc and have received grants from Altria Client Services to conduct this study.

Jianmin Liu, Jingzhu Wang, Jeffery Edmiston, Mohamadi Sarkar, Maria Gogova are employees of Altria Client Services.

# PURPOSE & OBJECTIVE

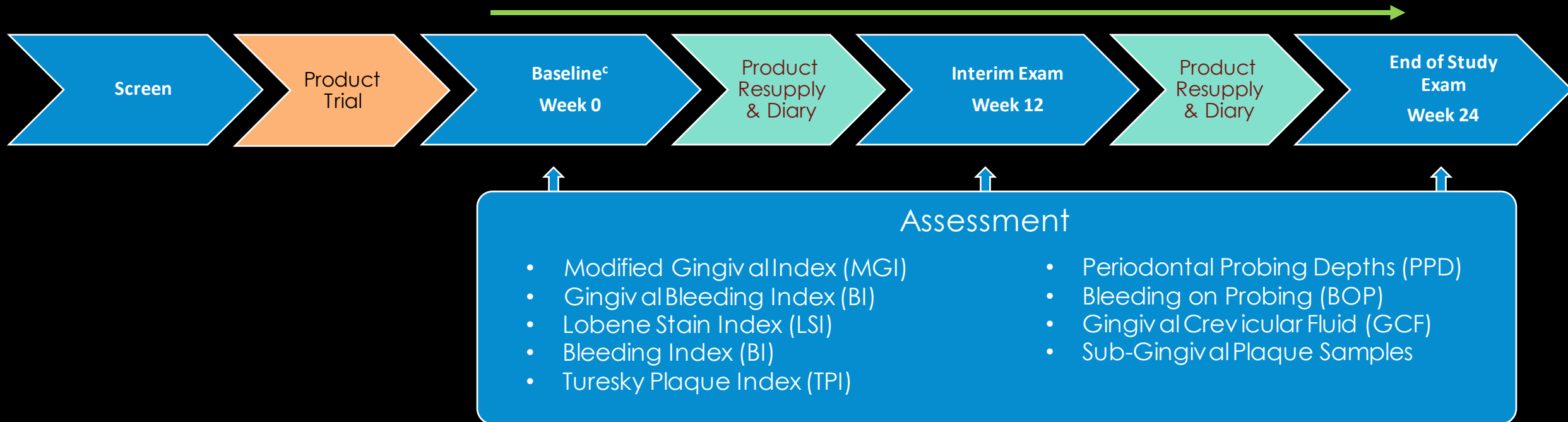
The objective of this study was to characterize the changes in gingival inflammation, dental plaque and extrinsic dental stain of adult who smokes switched to on!® nicotine pouches (NP) compared to those that continued to smoke (CS) lit-end cigarettes for 24 weeks.

# STUDY DESIGN

**Site: Salus Research, Fort Wayne, Indiana**

Single-Center, Randomized, Open-Label<sup>a</sup>, 2-arm, Parallel group, 24-week study

n = 150<sup>b</sup>  Test: Replacing cigarette with NP  
Control: Continue smoking usual brand cigarette



<sup>a</sup> Examiner blind

<sup>b</sup> Test:Control = 3:2; Stratified by Age, Gender and Bleeding Index

<sup>c</sup> Complete dental scaling and polishing at Baseline

# KEY INCLUSION & EXCLUSION CRITERIA

## Inclusion Criteria

- Between ages of 23 and 65 years
- MGI  $\geq 1.75$  and BI  $\geq 10$  Bleeding sites at the Screening and Baseline visits
- Currently smoke at least 10 combustible cigarettes per day
- Willingness to replace cigarette smoking for 24 weeks with the mint NP

## Exclusion Criteria

- Clinically significant abnormal findings on physical examination or medical history
- History of any type of malignant tumors
- BMI  $> 40 \text{ kg/m}^2$  or less than  $18 \text{ kg/m}^2$  at screening
- Uncontrolled Diabetes defined as HbA1c  $> 8.0\%$
- Exhibit  $\geq 30\%$  of teeth with stage II – IV periodontitis at Screen or Baseline visits
- More than 3 teeth with PPD  $> 5\text{mm}$
- Current use of systemic or topical antibiotics
- Any health condition requiring prophylactic antibiotics prior to dental exams
- History of periodontal treatment within 6 months or surgery within 3 years
- Presence of extensive crown or bridge work, orthodontic bands, dental implants or decay

# STUDY PRODUCTS

## Study Group

## Products

---

Test	on! Nicotine Pouches <sup>a</sup> (2, 4, & 8 mg nicotine, mint flavor)
Control	Combustible Cigarette <sup>b</sup>

<sup>a</sup> Nicotine pouches manufactured for Helix Innovations, LLC

<sup>b</sup> Subject's usual brand cigarette, self-supplied





# ENDPOINTS

## PRIMARY ENDPOINTS

- Mean change in whole mouth MGI and BI scores at 24 weeks
- Changes from Baseline in subgingival microbiome profiles at 24 weeks

## SECONDARY ENDPOINTS

- Mean change in whole mouth MGI and BI scores at 12 weeks
- Changes from Baseline in subgingival microbiome profiles at 12 weeks
- Mean change in whole mouth TPI at 12 and 24 weeks
- Mean change in total LSI scores at 12 and 24 weeks
- Mean change in PPD and BOP at 12 and 24 weeks
- Mean change in GCF volume (measured by Periotron 8000) at 12 & 24 weeks

# ANALYSIS POPULATIONS

## Data Sets Analyzed

- The modified intent to treat (MITT) population<sup>a</sup> were used
- Two subgroups in Test Group were further analyzed at Weeks 12 and 24
  1. The on!<sup>®</sup> switchers subgroup (OSS,  $n_{w12}=12$ ;  $n_{w24}=10$ )
    - a) Used at least one NP since the last visit and
    - b) Average cigarette per day (CPD)  $\leq$  10% of baseline level and
    - c) Total NNAL<sup>b</sup> (ng/g creatinine)  $\leq$  25% of baseline level
  2. The dual use subgroup (DUS,  $n_{w12}=31$ ;  $n_{w24}=26$ )
    - a) Used at least one NP since the last visit and
    - b) Average cigarette per day (CPD)  $>$  10% of baseline level or
    - c) Total NNAL\* (ng/g creatinine)  $>$  25% of baseline level.

<sup>a</sup> Include those subjects for whom there is a baseline and at least one post-baseline dental measurement

<sup>b</sup> NNAL = 4-[methylnitrosamino]-1-[3-pyridyl]-1-butanol, a metabolite of tobacco-specific n-nitrosamine compound

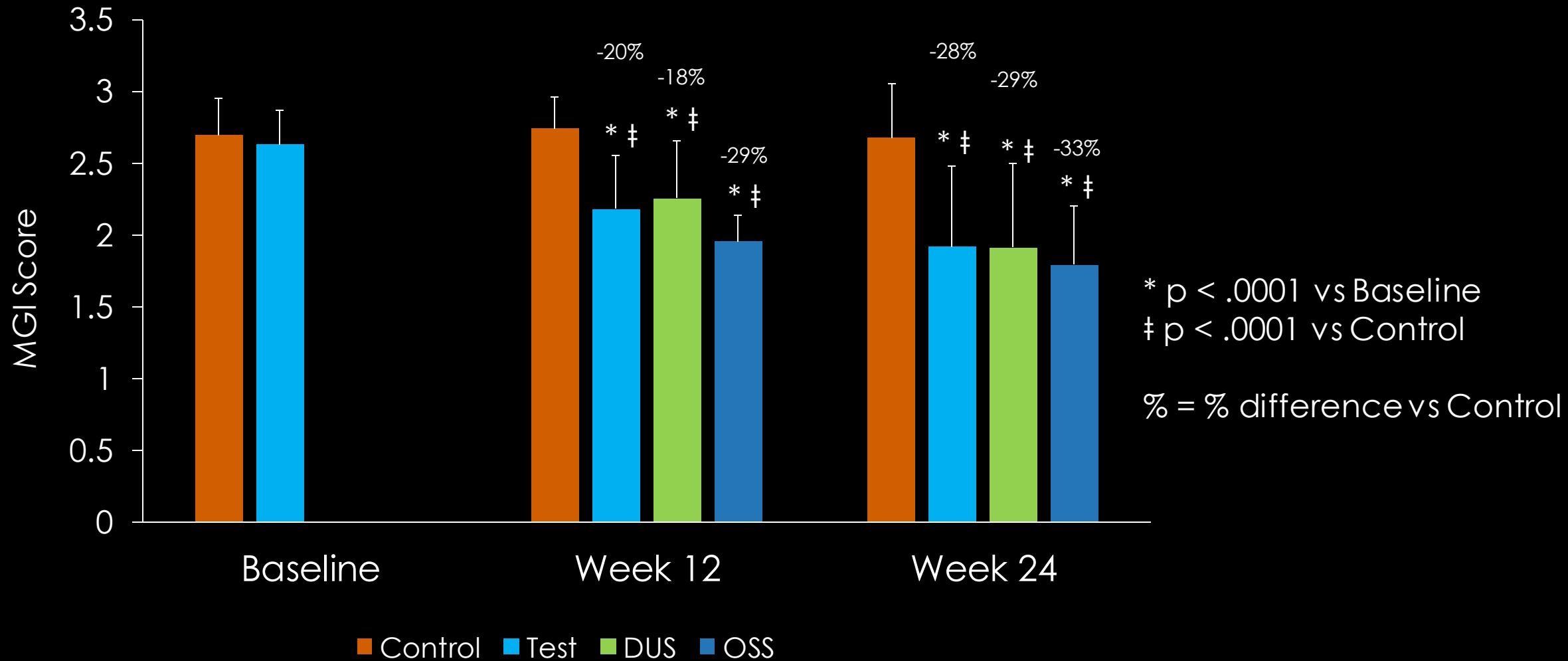


# RESULTS – DEMOGRAPHICS (MITT POPULATION)

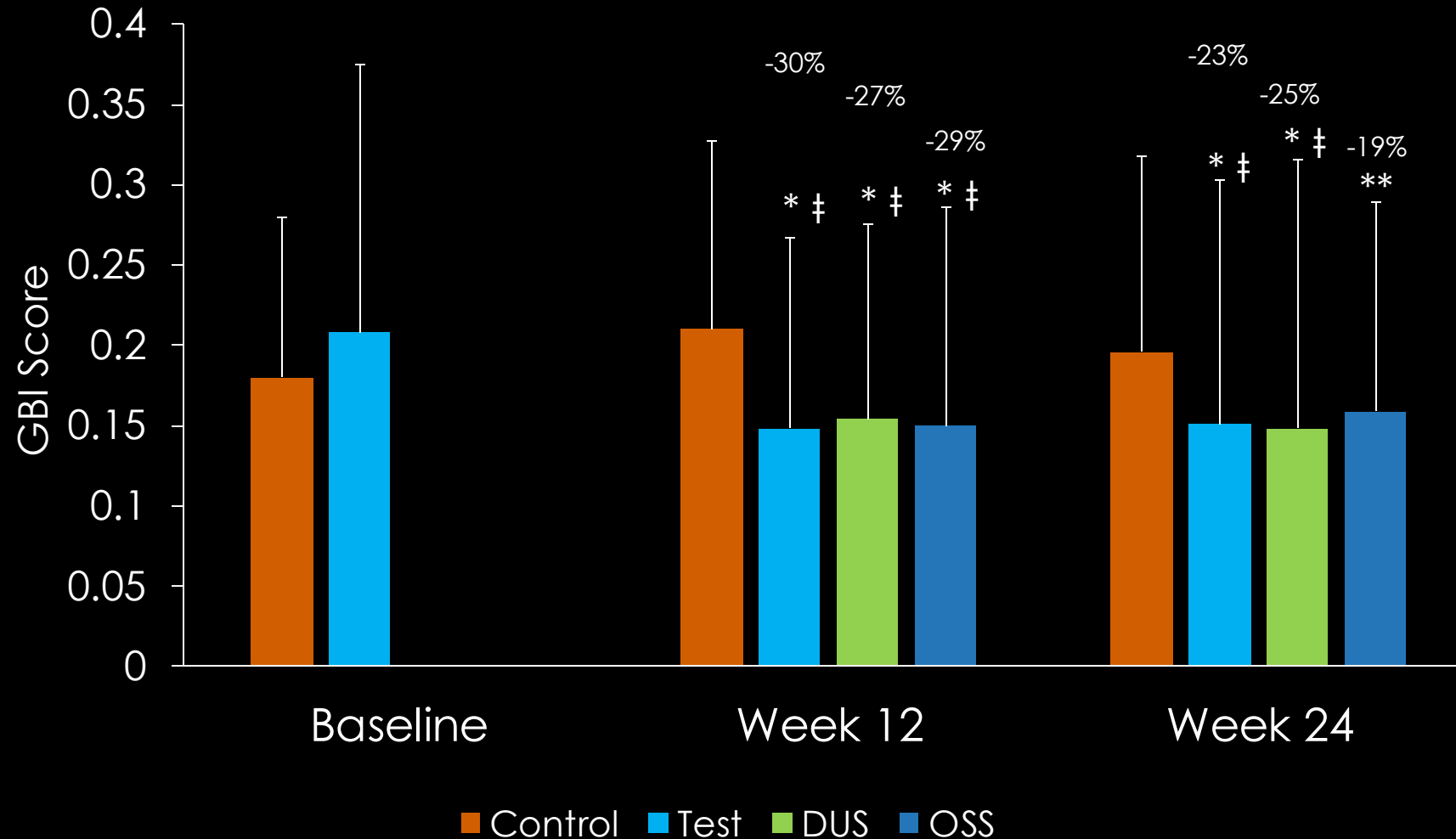
	Test Group (n=48)	Control Group (n=52)	Overall (n=100)*
<b>Age (years) Mean (SD)</b>	39.8 (10.71)	42.4 (11.38)	41.2 (11.09)
<b>Gender</b>	Male = 23 (47.9%) Female = 25 (52.1%)	Male = 21 (40.4%) Female = 31 (59.6%)	Male = 44 (44%) Female = 56 (56%)
<b>Race</b>	White = 38 (79.2%) Black = 9 (18.8%) Asian = 1 (2.1%)	White = 40 (76.9%) Black = 11 (21.2%) Asian = 1 (1.9%)	White = 78 (78%) Black = 20 (20%) Asian = 2 (2%)
<b>Ethnicity</b>	Hispanic = 3 (6.3%) Not Hispanic = 45 (93.8%)	Hispanic = 4 (7.7%) Not Hispanic = 48 (92.3%)	Hispanic = 7 (7%) Not Hispanic = 93 (93%)
<b>Years Smoked</b>	17.8 (11.39)	21.6 (12.08)	19.8 (11.85)
<b>CPD</b>	15.4 (4.86)	17.5 (9.58)	16.5 (7.72)

\*A total of 155 subjects were randomized (92 in Test; 63 in Control); 55 subjects discontinued.

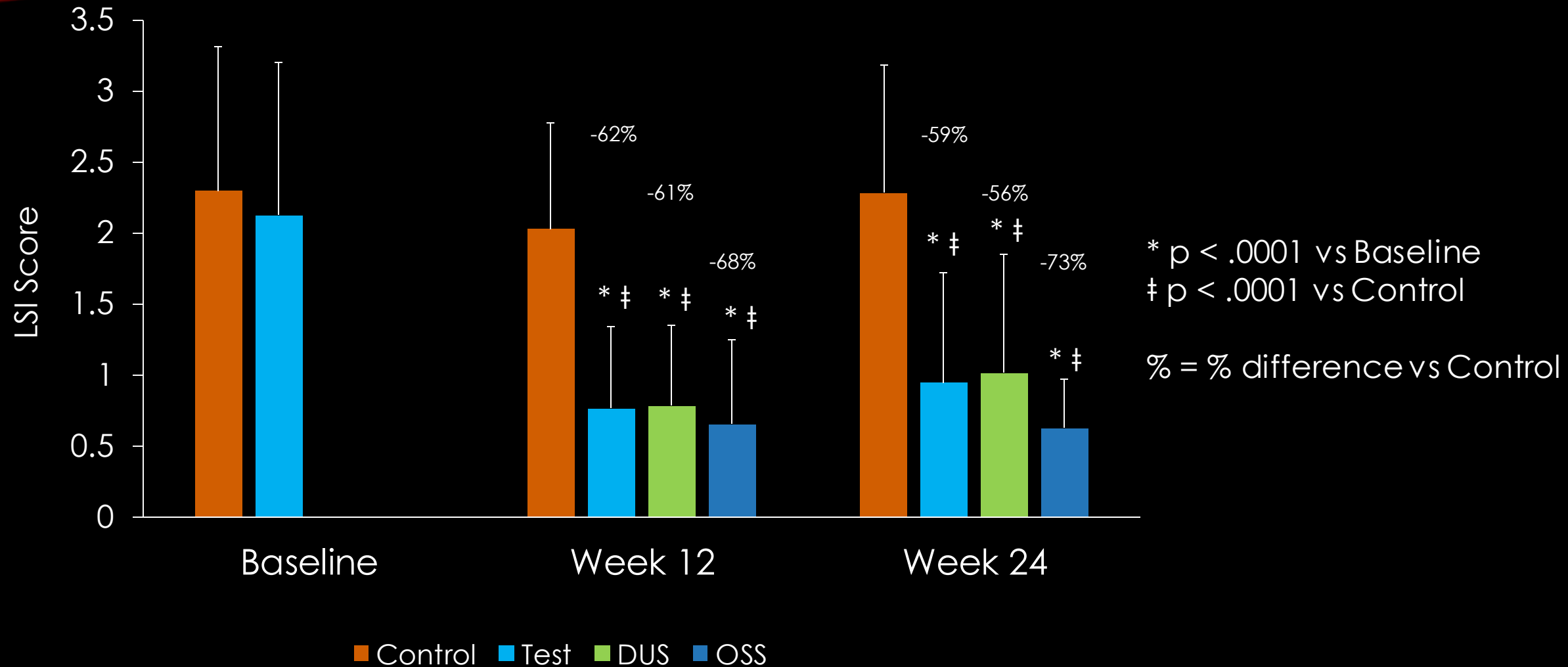
# RESULTS - MODIFIED GINGIVAL INDEX



# RESULTS - BLEEDING INDEX



# RESULTS - LSI COMPOSITE SCORES



# CONCLUSIONS

- The results of this exploratory study demonstrates that switching from smoking combustible cigarettes to nicotine pouches (on!®) significantly reduced (~25%) gingival inflammation at 12 weeks and remained lower at 24 weeks.
- After a complete dental prophylaxis at baseline, the nicotine pouch group resulted in a highly statistically significant ~70% reduction in dental stain deposition after 24 weeks.
- The on!® nicotine pouches were generally well tolerated over the study period.
- Overall, this 24-week randomized clinical trial provides evidence that switching from combustible cigarettes to on!® nicotine pouches can lead to a statistically significant and clinically meaningful reduction in negative oral health effects caused by smoking.