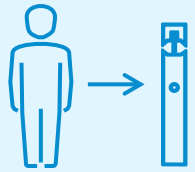
Characterization of Nicotine Pharmacokinetics and Puffing Topography During Use of Prototype Vaping Products in Adults Who Smoke

Jeffery Edmiston, PhD

October 27, 2026

Background



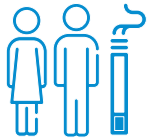
Switching from smoking to Electronic Nicotine Delivery Systems (ENDS)

- **Reduces exposure to HPHCs**
- **May reduce smoking-related health risks**



Evaluated eight ENDS prototypes of identical nicotine concentration

- Nicotine pharmacokinetics (PK) were characterized using four representative prototypes
- Puffing topography was assessed across all prototypes to compare use behaviors
- One hour of *ad libitum* use during PK and topography sessions



Recruited adults who smoke cigarettes

- 22-65 years old
- Smoking 10-30 commercial cigarettes per day (CPD) for at least one year
  - Exhaled carbon monoxide (eCO) ≥10 ppm
  - Urinary cotinine ≥500 ng/ml
- Experience with ENDS was allowed provided that smoking requirements were met

Study Flow

Day -8
Visit for Study Product

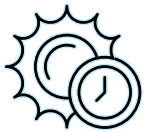
Day 1
Check-in

Screening Period (-28 days)



8 Days of At-home Use

Study Day	1	2	3	4	5	6	
PK Day		1	2	3	4	5	AM
Topography Sessions	1 & 2	3 & 4	5 & 6	7 & 8	9 & 10	END OF STUDY	PM
Abstinence	12 hr	12 hr	12 hr	12 hr	12 hr		



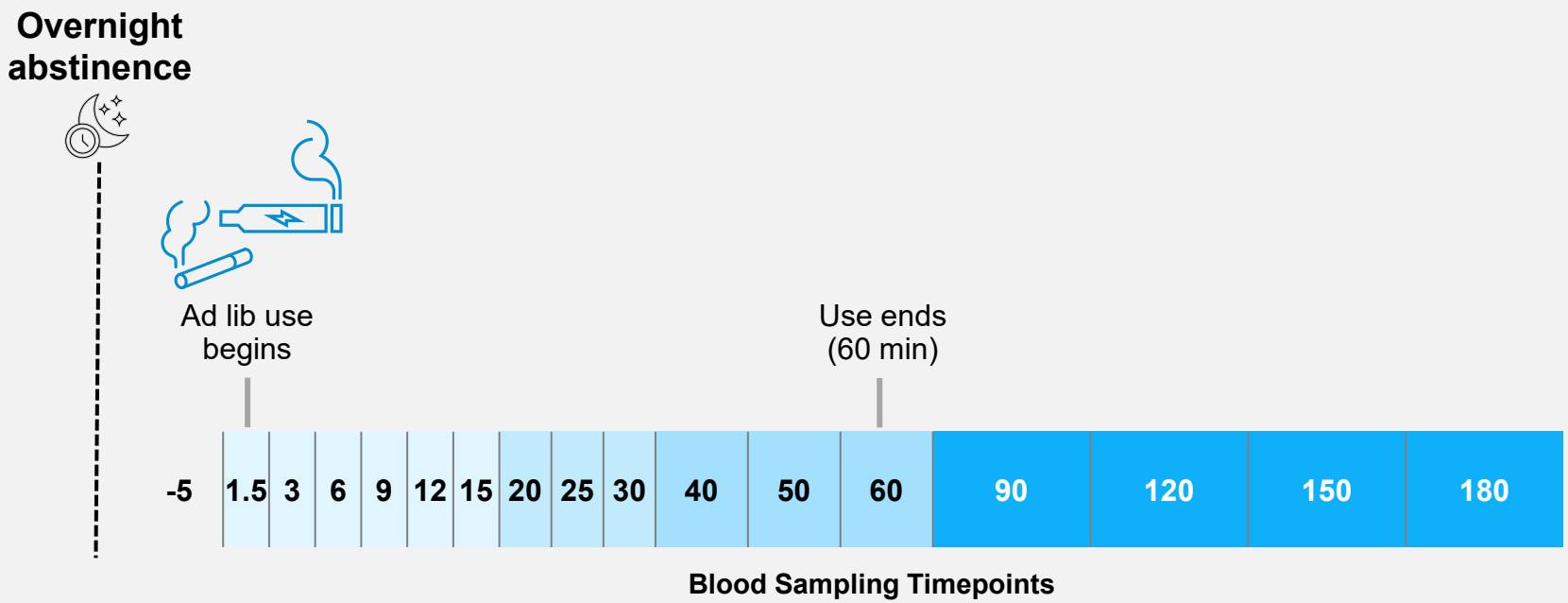


PK Design

Daily Study Flow

1. 3 hr PK session
2. 4 hr break
3. 5 hrs of daily topography

Session 1 topography 60 min | 3 hr break | **Session 2** topography 60 min



SUBJECTIVE MEASURES

Modified Cigarette Evaluation Questionnaire (mCEQ): end of each afternoon topography session, only after the second session on UBCC days

Direct Effects of Product: 6, 15, 30, 60 min

Urge/Craving: -5, 6, 15, 30, 60 min

Product Liking: 6, 15, 30, 60, 180 min

DEVICE WEIGHTS

Pre and post use for PK and topography

Participant Demographics

COMPLETED PARTICIPANTS	**48**
Mean Age	42.9 ± 10.4
Sex	26 Male (54.2%) 22 Female (45.8%)
Race	76% White 22% African American 6% Hispanic/Latino 2% American Indian and Alaska Native

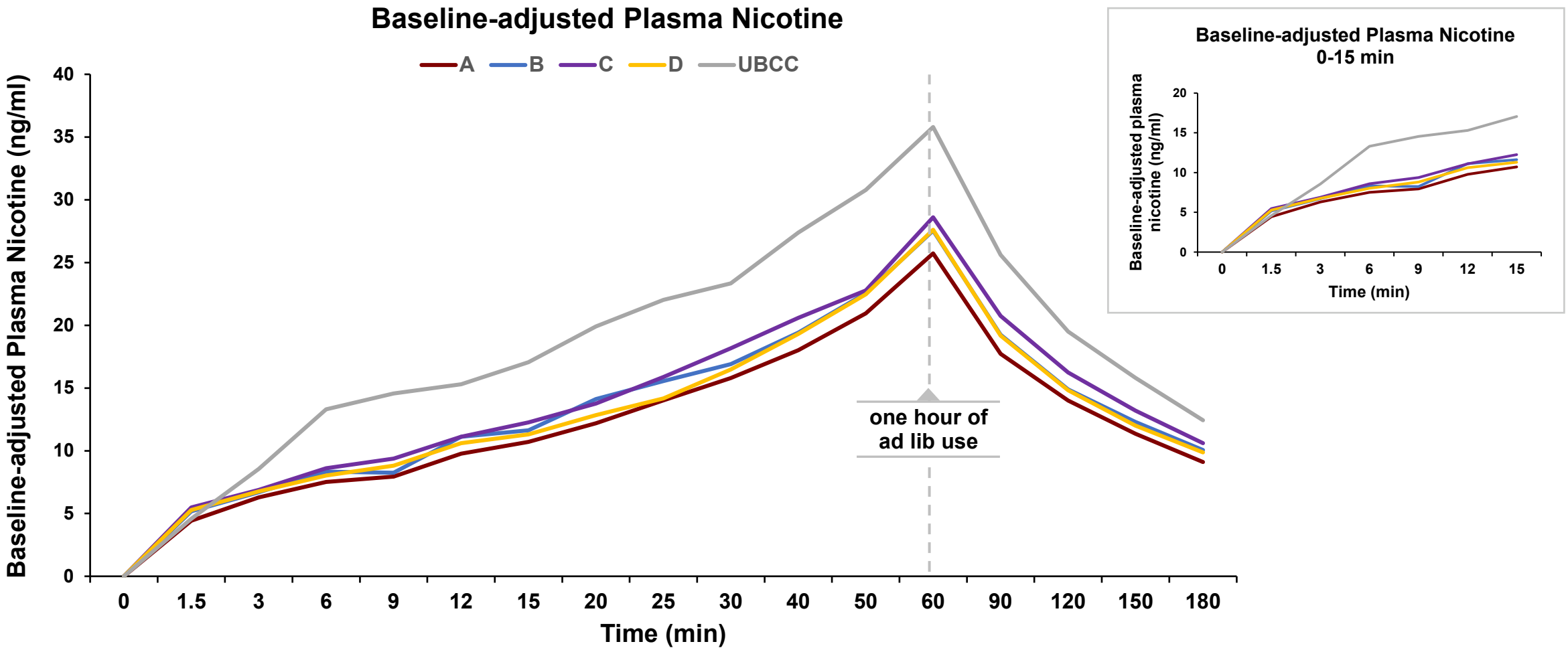
UBCC HISTORY

- 15.6 ± 5.22 CPD
- 20.7 ± 11.97 years smoking
- 34% menthol smokers

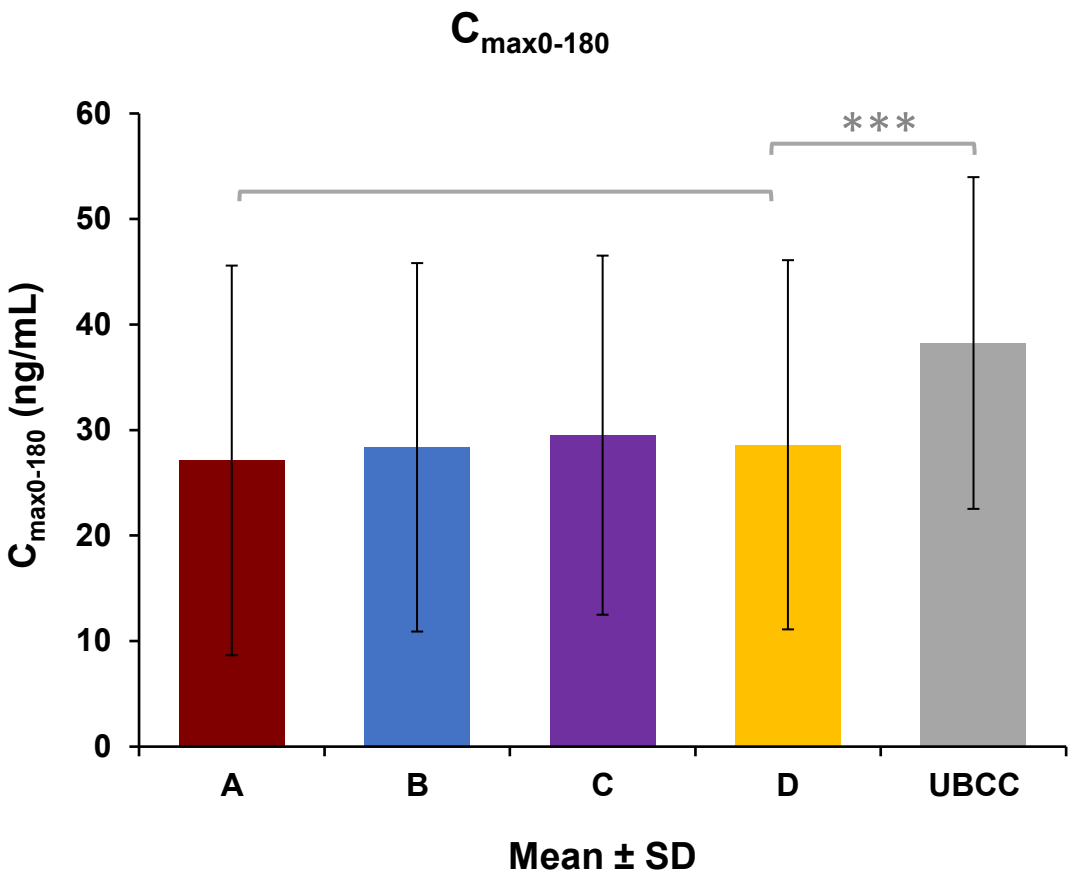
ENDS HISTORY

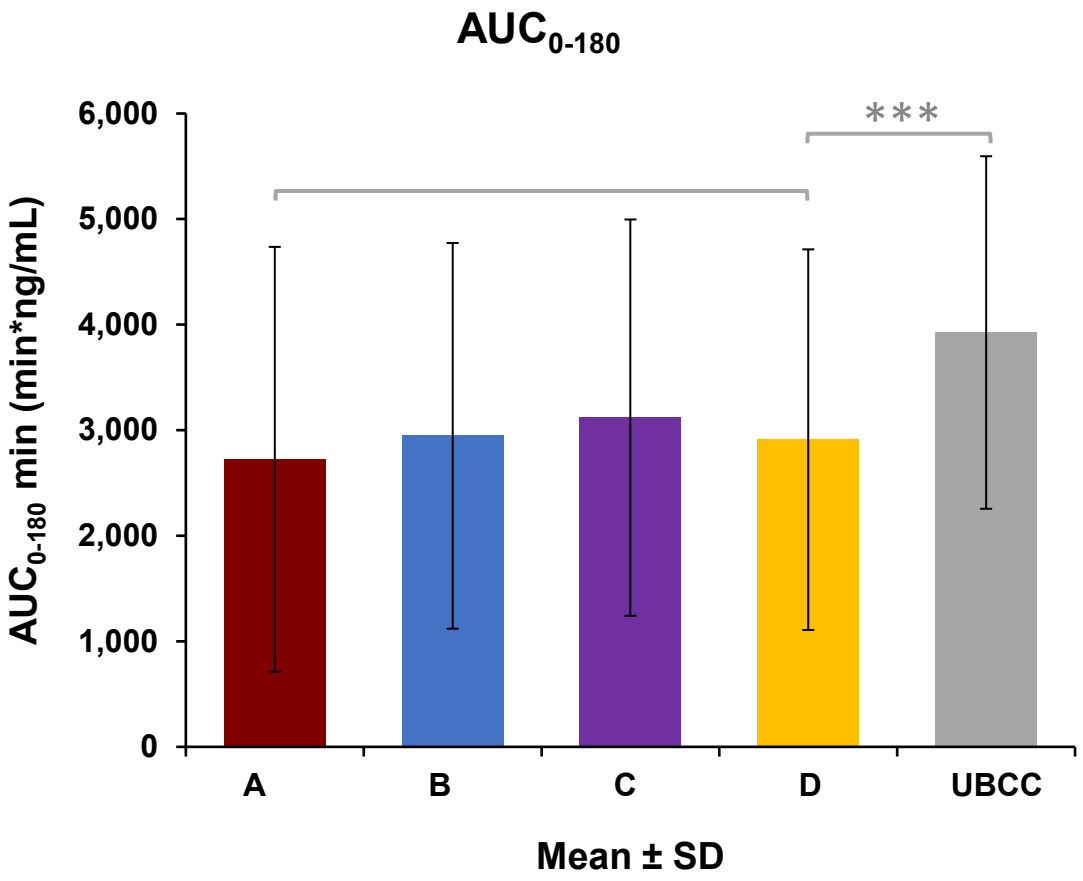
- 8 participants with ENDS experience
  - 6 everyday users (12.5%)

Pharmacokinetic Results



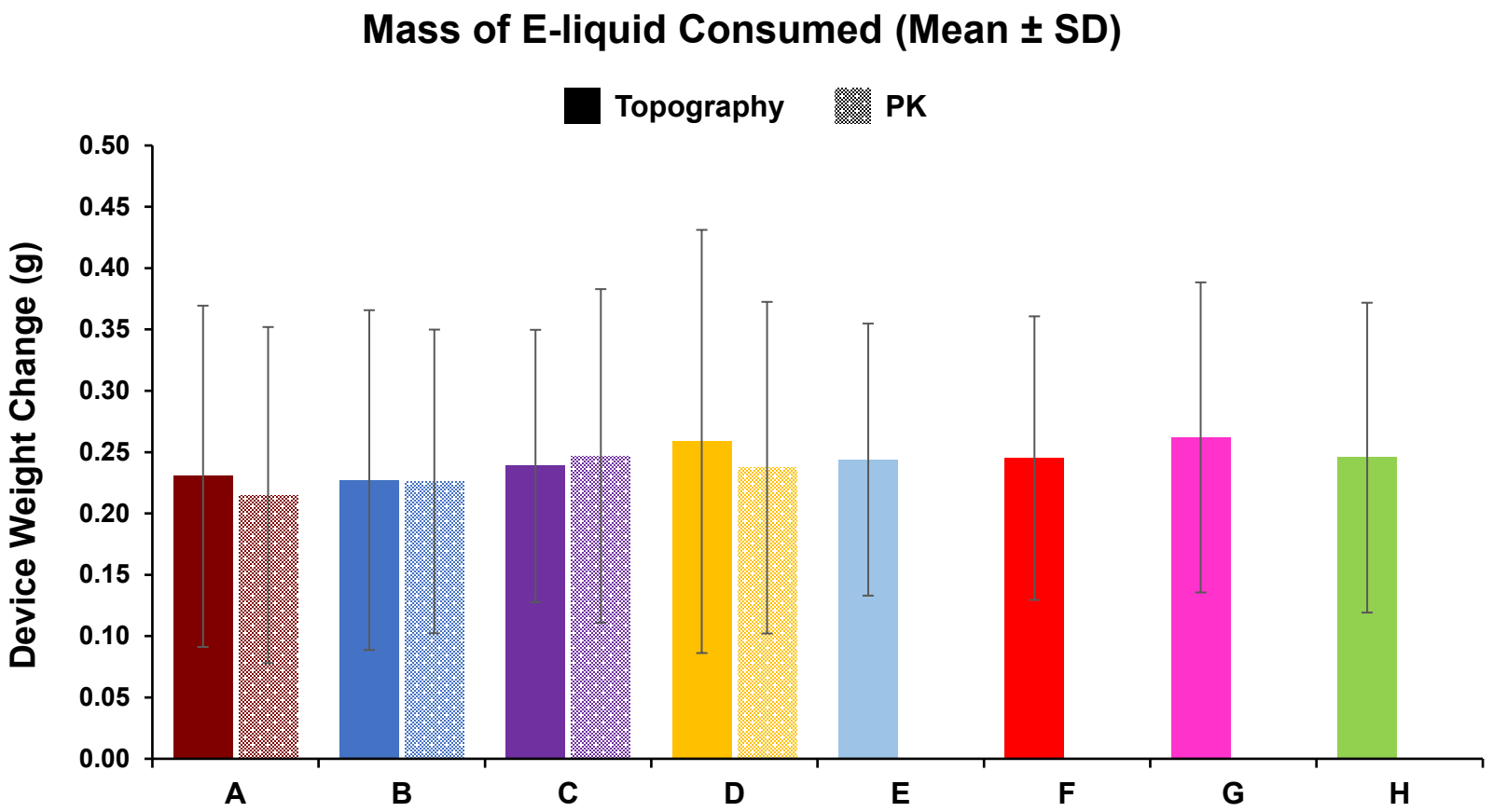
PK Parameters





*** Significantly lower compared to UBCC, p < 0.0001.

Product Use

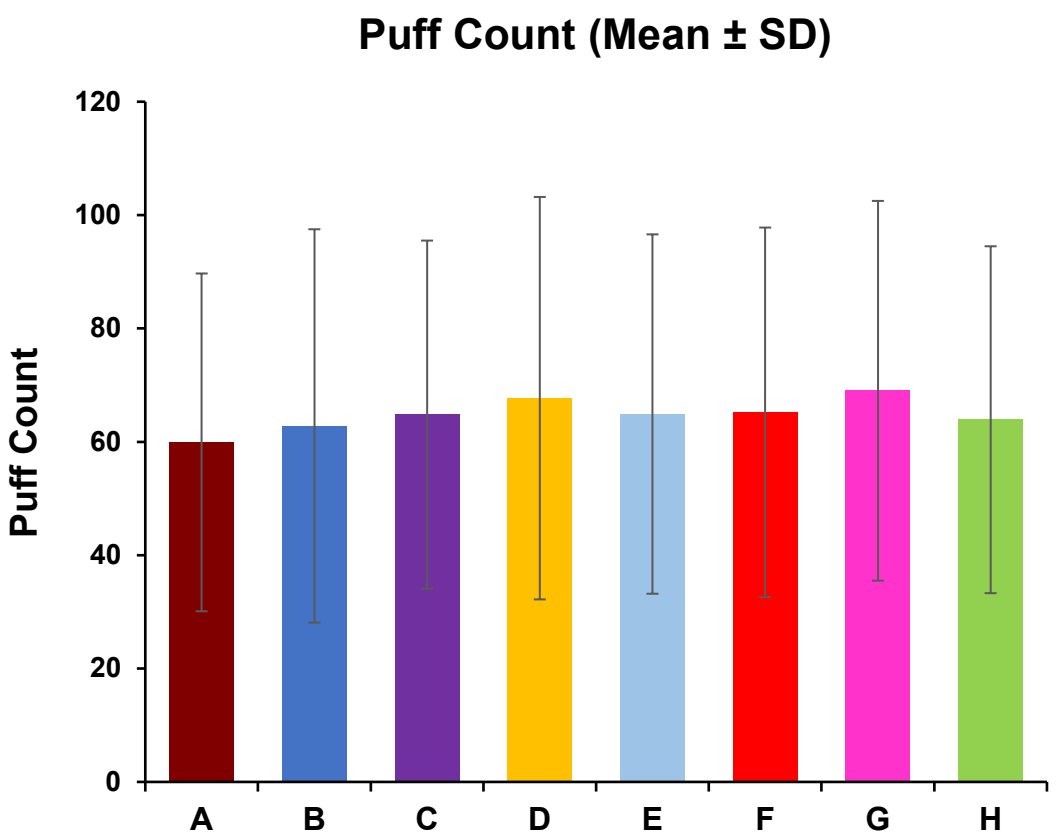


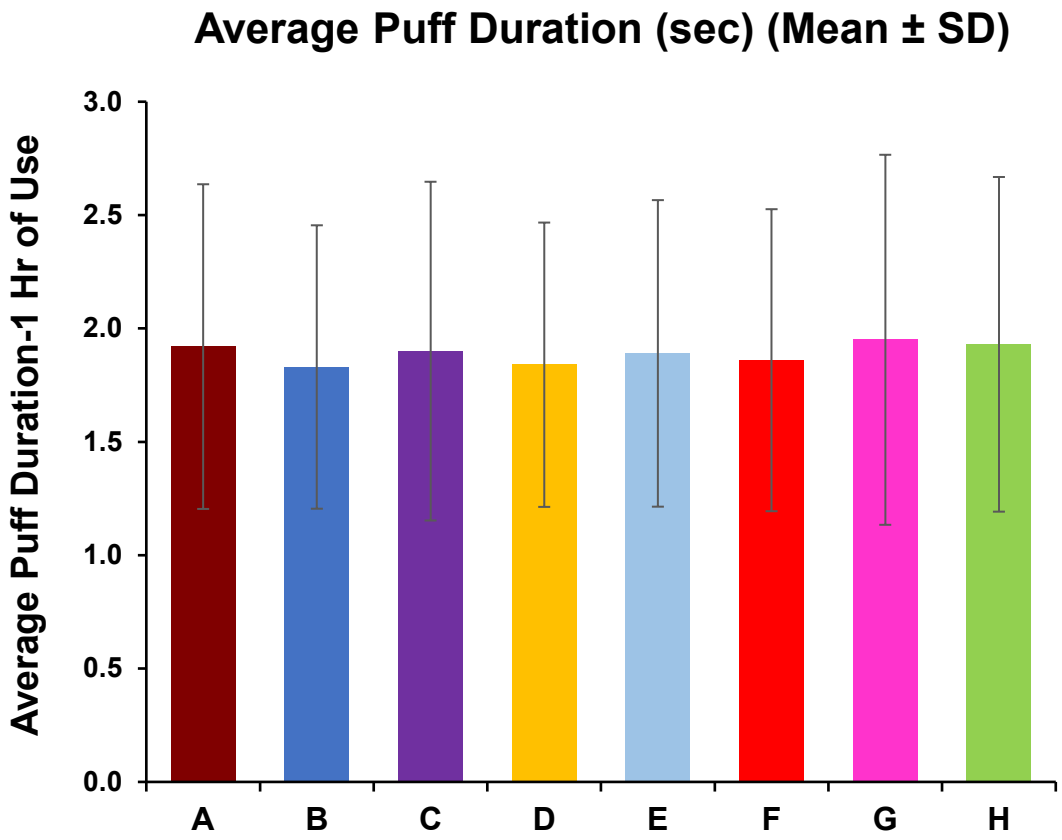
NUMBER OF CIGARETTES SMOKED

Topography Session	
Mean ± SD	4.9 ± 1.56
Range	2-10

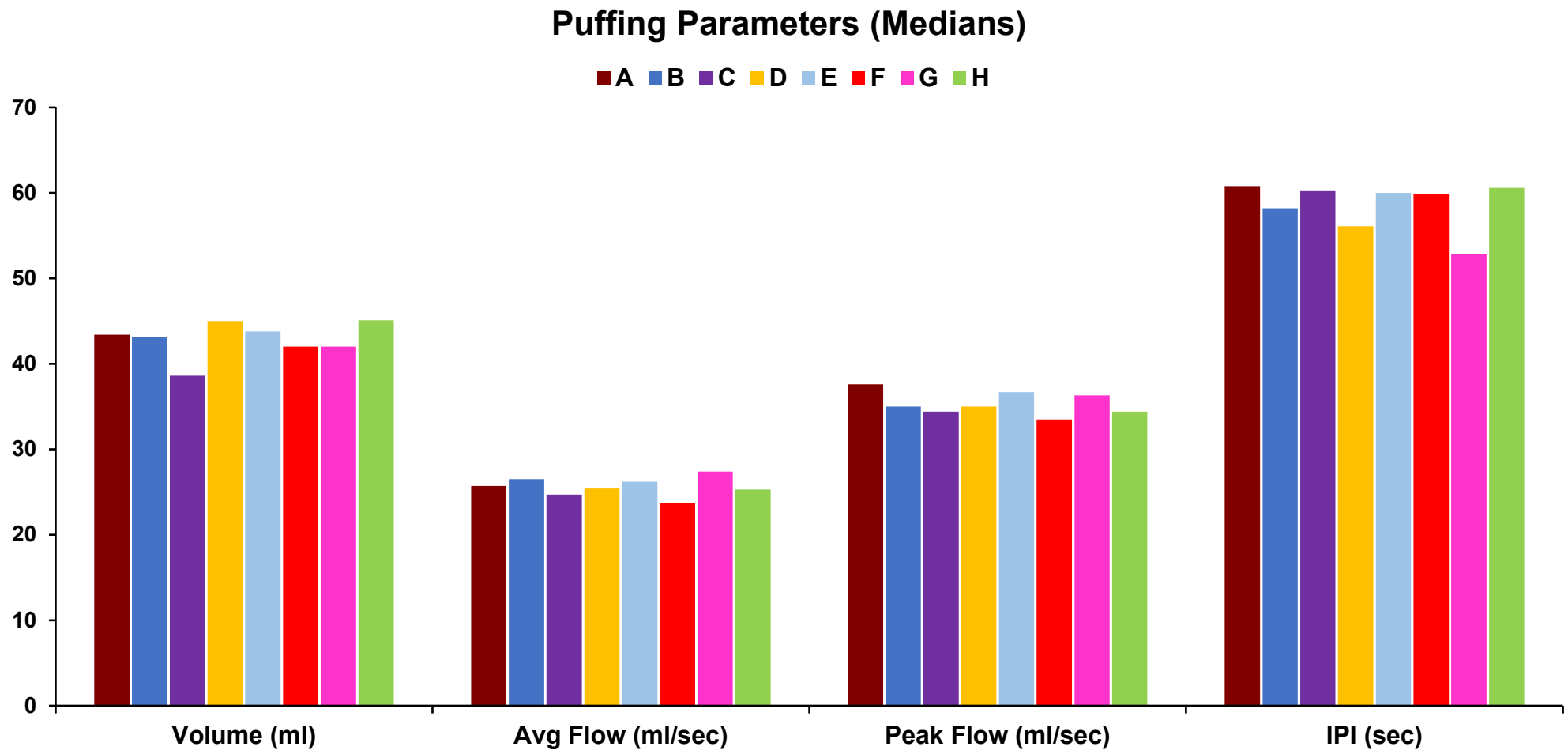
PK Session	
Mean ± SD	4.8 ± 1.64
Range	1-9

Topography

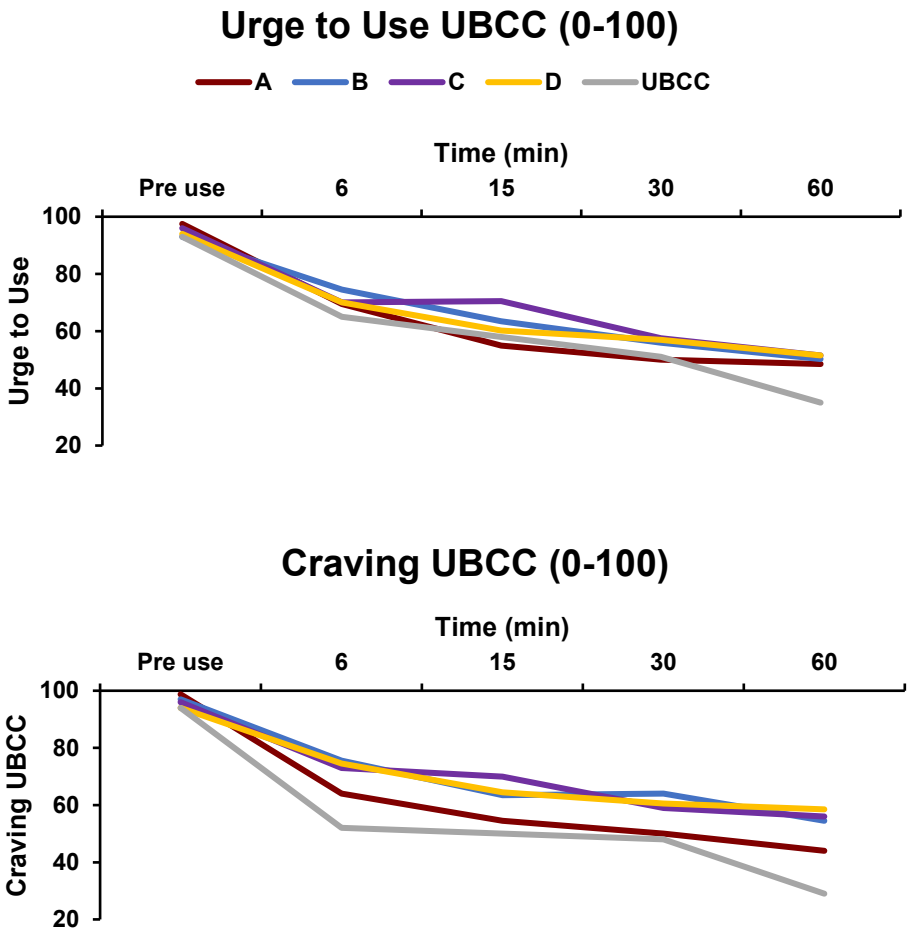

Puff Count (Mean ± SD)
Puff Count
120
100
80
60
40
20
0
A
B
C
D
E
F
G
H

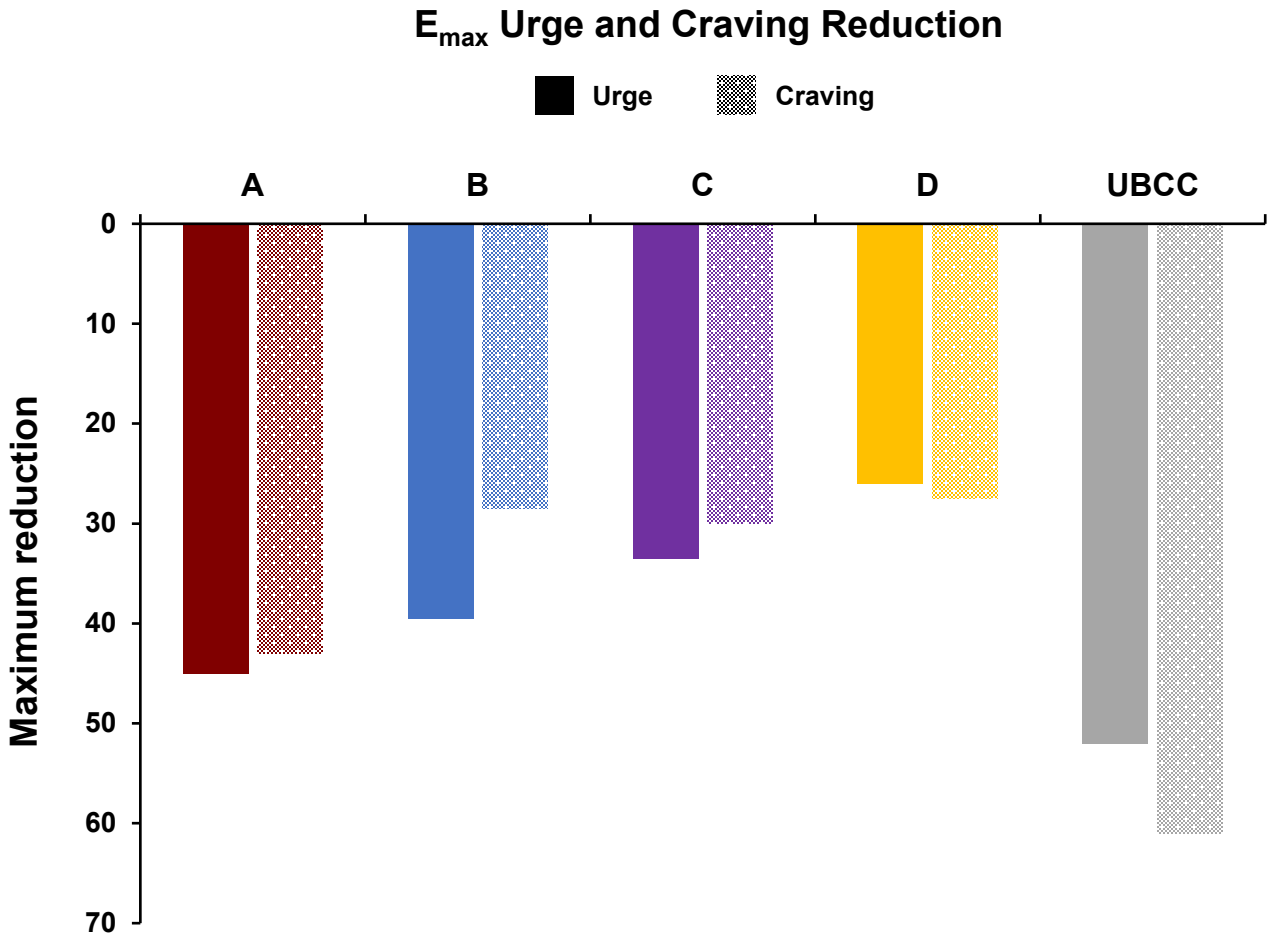

Average Puff Duration (sec) (Mean ± SD)
Average Puff Duration-1 Hr of Use
3.0
2.5
2.0
1.5
1.0
0.5
0.0
A
B
C
D
E
F
G
H

Topography

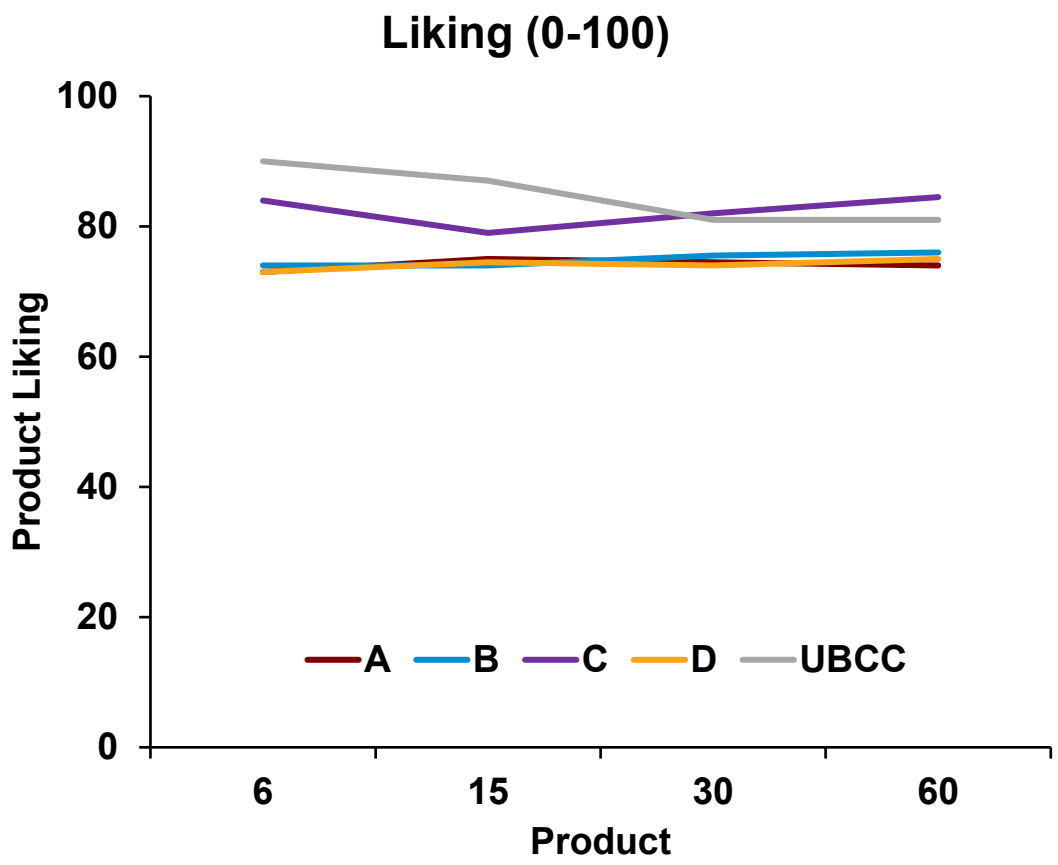

Puffing Parameters (Medians)
A B C D E F G H
70
60
50
40
30
20
10
0
Volume (ml)
Avg Flow (ml/sec)
Peak Flow (ml/sec)
IPI (sec)

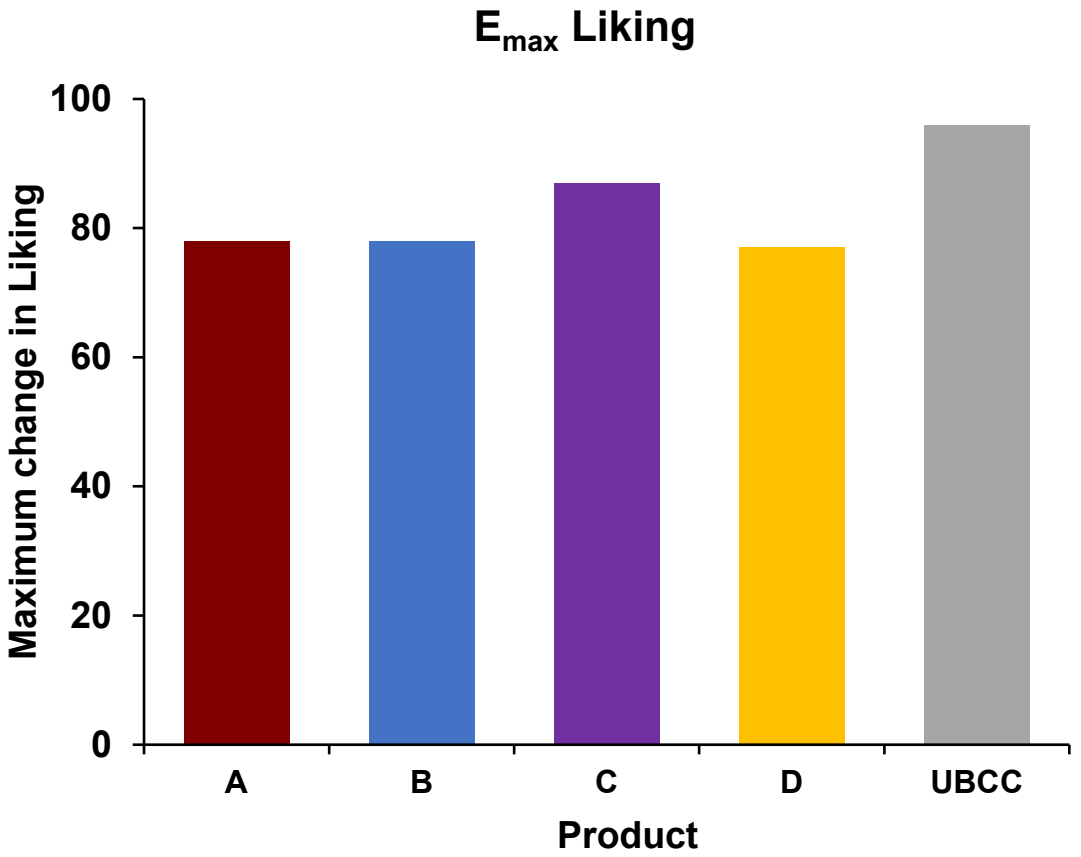
Subjective Measures-Urge and Craving



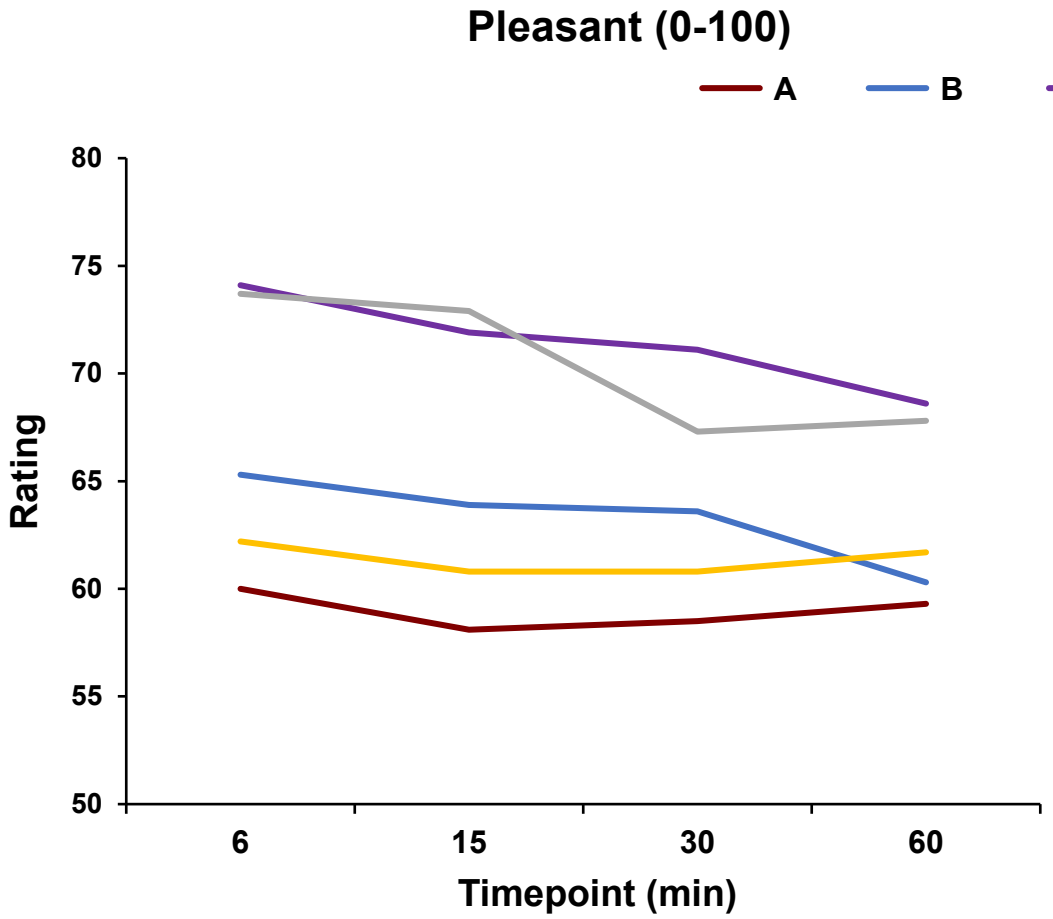


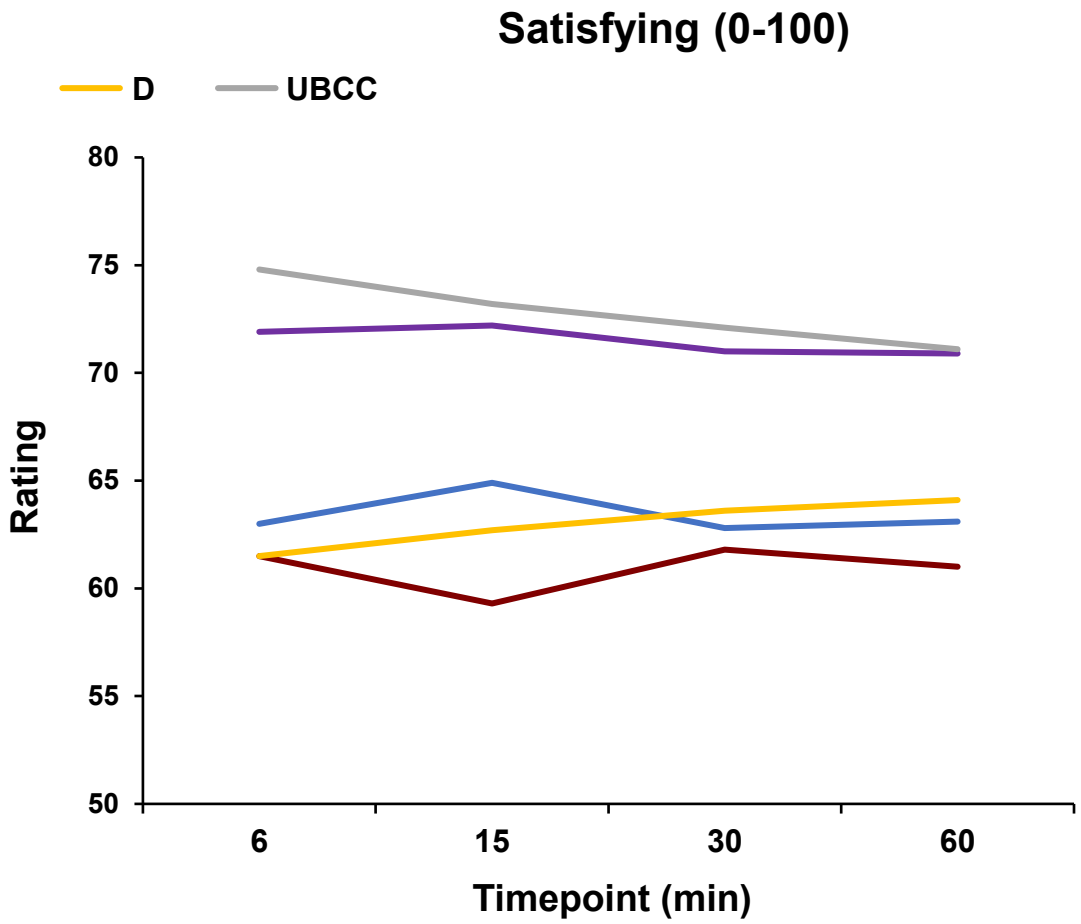
Subjective Measures-Product Liking



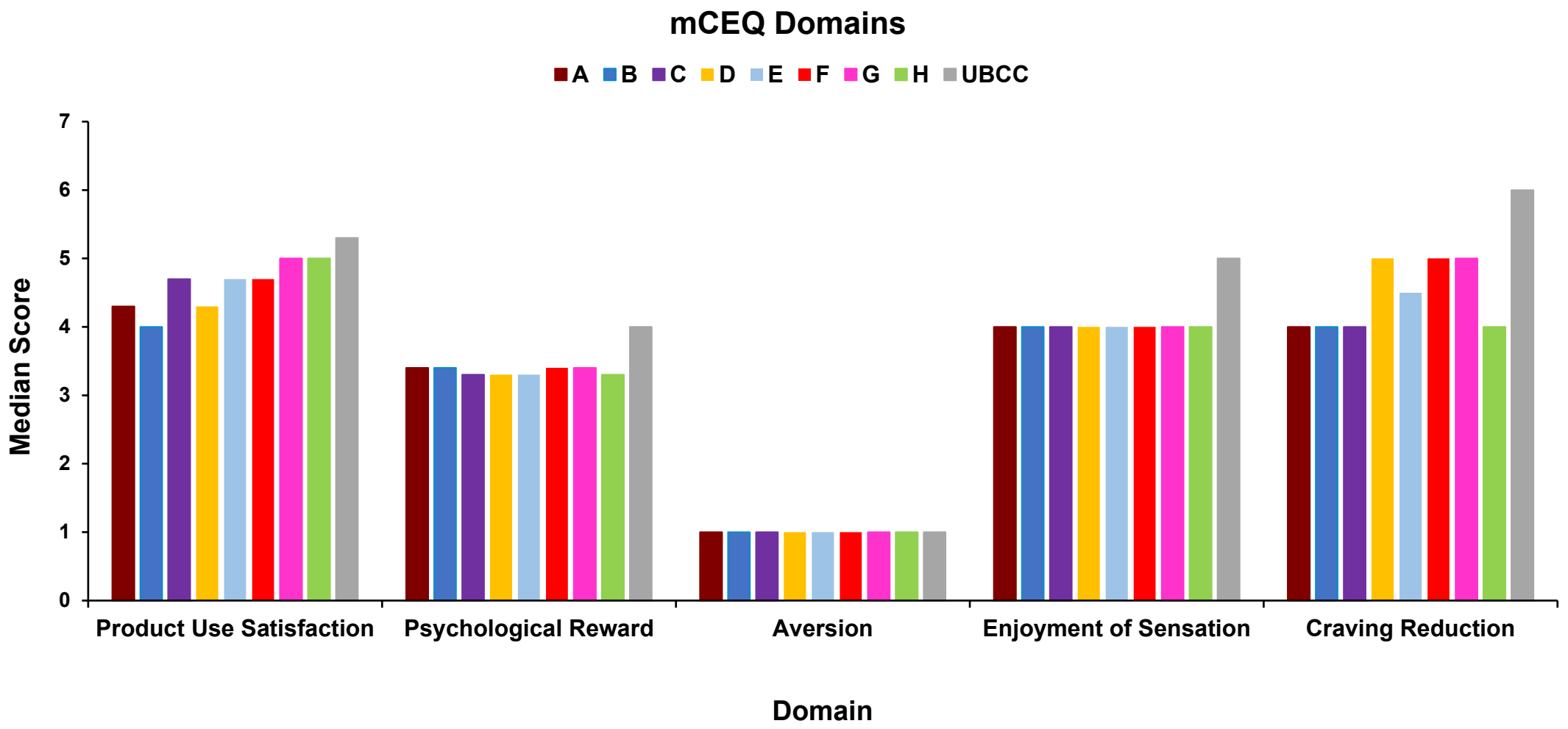


Subjective Measures-Direct Effects of Product





mCEQ Domains



Adverse Experiences (AEs)



NO Serious Adverse Experiences (SAEs)

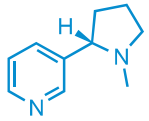
Five product-emergent AEs

Four mild / One moderate

- Headache
- Brain fog
- Dizziness

All product-emergent AEs were resolved by end of study

Conclusions



Use of the four representative prototypes resulted in lower nicotine exposures compared to UBCC; prototypes were similar in nicotine delivery



Topography parameters and device weight changes were similar across the eight-product portfolio

Device weight changes were statistically similar between the morning PK session and the afternoon topography sessions



Median scores on subjective responses were generally lower than UBCC



AEs were mostly mild, resolved by study completion, and indicate the prototypes were generally well-tolerated



Nicotine delivery and subjective responses suggest the **prototypes may be acceptable alternatives to cigarettes**

THANK YOU!