

# What Are the Cardiopulmonary Responses to Electronic Nicotine Delivery Systems and Cigarettes?

## STUDY DESIGN

Observational challenge study before and after 15 minutes of nicotine product use

### Three groups compared:

Exclusive **Electronic Nicotine Delivery Systems (ENDS)** Users  
n = 164



Exclusive **Cigarette** Users  
n = 117



Controls  
n = 114



## RESULTS

### After Product Challenge, ENDS Users Showed

#### Greater Increases vs Controls in

|                       |   |
|-----------------------|---|
| Adjusted Systolic BP  | 5.6 mm Hg vs 2.3 mm Hg, $P = .001$            |
| Adjusted Diastolic BP | 4.2 mm Hg vs 2.9 mm Hg, $P = .003$            |
| Heart Rate (HR)       | 4.8 beats/min vs - 1.3 beat/min, $P = < .001$ |

#### Greater Increases vs Controls in

|                            |                                      |
|----------------------------|--------------------------------------|
| Brachial Artery Diameter   | - 0.011 cm vs - 0.006 cm, $P = .003$ |
| Time-Domain HR Variability | - 7.2 vs 3.6, $P = .003$             |
| FEV <sub>1</sub>           | - 4.1 vs - 1.1, $P = .005$           |

#### Greater Increases vs Controls in

|                              |   |
|------------------------------|---|
| Metabolic Equivalents (METs) | adj mean difference 1.28 METs, $P = < .001$   |
| 60-Second HR Recovery        | adj mean difference 2.9 beats/min, $P = .008$ |

Results Were **Similar** Between **ENDS** and **Cigarette** Users

ENDS users had acute worsening of blood pressure, heart rate, and heart rate variability, as well as vasoconstriction, impaired exercise tolerance, and increased airflow obstruction after vaping compared with control participants.