CSD00804 CAMEL SNUS MOUTH-LEVEL EXPOSURE STUDY: DESCRIPTION OF STATISTICAL METHODS USED

Primary Objective and Endpoints

The objective of this study was to evaluate the mouth-level exposure (MLE) to selected tobacco constituents from three Camel Snus (CSNUS) varieties (Frost, Spice and Original) in adult consumers.

Endpoints of this study include MLE per pouch, MLE per day, and proportion removed of the following tobacco constituents:

1. Nicotine
2. N'-nitrosonornicotine (NNN)
3. 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)
4. N'-nitrosoanabasine (NAB)
5. N'-nitrosoanatabine (NAT)
6. Benzo[a]pyrene (B[a]P)
7. Arsenic
8. Cadmium
9. Chromium
10. Lead
11. Nickel.

Sample Analysis

All snus samples were analyzed at Labstat International, ULC (Kitchener, ON, Canada). Analyte content was reported on a mass per pouch "as received" basis.

Statistical Analysis

Subject Population and Excluded Subjects

A total of 56 CSNUS consumers were enrolled, and 54 participants completed the study. Two participants chose to discontinue the study for personal reasons. There were three varieties of CSNUS in the study. Each subject was to use only one variety. One of the participants who completed the study deviated from instructions by using both Original and Spice CSNUS varieties during the collection period, and was excluded from the subject group, leaving a total of 53 subjects for data analysis.

Among the 53 subjects, 25 used Frost, 16 used Spice and 12 used Original variety.

Determination of Variety Baseline

Camel Snus products were purchased at retail locations near each participating central location facility (six locations) to determine the variety baselines of constituents. Three replicate test samples were measured for each variety at each location. The average of three replicates was treated as an observation from a location. Descriptive statistics (number of observations, arithmetic mean, and standard deviation) were calculated for observations by variety for each constituent. The average of observations over the six locations was used as the baseline level of a variety, for each tobacco constituent, respectively. The variety baseline constituent level (variable name is VBASE in the dataset) represents the amount of a constituent in an unused pouch.

Number of Pouches Used

The study lasted 7 days for each subject. The total number of pouches used by a subject during the 7 days of the study was calculated as the sum of the number of used pouches collected by the subject during the study and the number of pouches the subject reported they used but did not collect (TPN variable).

The number of snus pouches used per day (SPPD variable) was calculated by:

$$\boldsymbol{SPPD = TPN \div 7}.$$

Assessments of MLE on each Subject and Variety Groups

Mouth-level exposure per pouch provides an estimate of the amount of constituent removed from a pouch during consumption. MLE per pouch (EPP variable) to a tobacco constituent is estimated by determining the difference between the constituent level as measured in unused and used product. That is:

$$EPP = VBASE - RESULT,$$

where RESULT variable is the constituent amount per pouch value from the analysis of used pouches from a subject and VBASE is the variety baseline constituent level.

Mouth-level exposure per day (EPD) was calculated by combining MLE per pouch and the total number of pouches used per day according to the following:

$$EPD = EPP \times SPPD.$$

The proportion of a constituent removed from a pouch during use (percent change from baseline, PCCFBL) was calculated as the MLE per pouch divided by the variety baseline constituent level and is given by:

$$PCCFBL = (EPP \div VBASE) \times 100\%$$

The above calculations were performed for the variety that corresponds to the product used by the subject.

Statistical Comparisons

Descriptive statistics were calculated for MLE per pouch (EPP), MLE per day (EPD) and Proportion removed (PCCFBL) by variety and overall. The Tukey-Kramer honestly significant difference test ($\alpha = 0.05$) was used to compare the significant differences among the three varieties on EPP, EPD and PCCFBL from the subjects' data. The same comparison method was used to compare constituent level observations among the varieties from analysis of unused pouches.