Temporal effects of milk protein palate cleansers on capsaicin mouth burn reduction

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Abstract
Sucrose and fat are established palate cleansers that can reduce capsaicin-induced mouth burn. Studies have suggested that milk may also reduce capsaicin mouth burn in individual milk components, namely protein, have not been addressed. New membrane technologies now allow these milk protein fractions (micellar casein concentrate (MCC) and serum protein isolate (SPI)) to be manufactured. The objective of this study was to compare water, 10% sucrose solution, skim milk, heavy cream, MCC and SPI as palate cleansers for reduction of capsaicin mouth burn using time-intensity (TI) and a trained panel. A gradient permeability ceramic microfiltration system was used to generate 95% serum protein removed micellar casein concentrate (MCC) and serum protein isolate (SPI) from pasteurized milk. A trained descriptive analysis panel (n=8) evaluated the TI of the mouth burn of a 1.3 ppm capsaicin solution (10 mL) using a computer interface and the following protocol: the stimulus was placed in the mouth for 15s and expectorated. The intensity of mouth burn was recorded for 5 min. A 10 min rest was enforced between samples. The entire experiment was replicated three times. Relative mouth burn reduction (RMR) was calculated to compare the difference in palate cleansers. Heavy cream, MCC, and SPI were more efficient in reducing capsaicin burn than water (p<0.05). Sucrose solution and skim milk were also more effective than water (p<0.05), but not to the extent of heavy cream, MCC or SPI. This study provides new insights on the role of milk proteins in reducing the oral burn sensation of capsaicin.

Statistical analysis: Relative mouth-burn reduction (RMR) (Nasrawi and Pangborn, 1990) was calculated by using area under the curve for each palate cleanser divided by area under the curve of stimuli within rinse. ANOVA (XLSTAT, Pairs, France) on the mean RMR of each palate cleanser was used to determine differences in palate cleansers for capsaicin burn reduction. The smaller the RMR, the more efficient the palate cleanser.

Result & Discussion
Figure 2. TI profiles of capsaicin burn and capsaicin burn reduction by DI water, skim milk and 10% sucrose solution.

Figure 3. TI profiles of capsaicin burn and capsaicin burn reduction by MCC, SPI and heavy cream.

Table 1. Mean area under the curve and relative mouth-burn reduction for different palate cleansers capsaicin (Cap) burn.

Table 2. Percent compositions of skin milks, SPI and MCC and heavy cream.

Conclusion

Future work

Formulate palate cleansers to specific protein, fat and lactose loads using milk fat and high purity lactose, MCC, SPI as ingredients and test the proposed mechanism of capsaicin burn reduction, such as switching the serving order of capsaicin stimuli and palate cleanser or serving a mixture of capsaicin and palate cleanser.

Develop a low fat and low sugar protein beverages/drink to make the consumption of capsaicin enriched food more enjoyable to general population.