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BOOK of ABSTRACTS

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297 - IN NOSE-SPACE ANALYSIS THROUGH PROTON TRANSFER REACTION MASS SPECTROMETRY: INVESTIGATING VARIABILITY IN FLAVOR RELEASE AND PERCEPTION DURING CHEWING GUM CONSUMPTION

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Keywords: nose-space analysis, chewing gum, in vivo flavor analysis, PTR-MS

Introduction: (Limit of 400 characters)

Proton Transfer Reaction Mass Spectrometry has been described as particularly suited to provide “in vivo” on-line flavor monitoring during food consumption [1]. In the last years, the technique has been applied to different food matrixes [2-4]. Due to analysis rapidity and high sensitivity, the technique has become a reference tool for the investigation of the complex phenomena related to flavor perception [5].

In this work we describe a PTR-MS based approach to measure in-vivo nose-space VOCs concentration during chewing gum consumption coupled to discontinuous time intensity sensory evaluation.

Methods: (Limit of 400 characters)

Two different studies were conducted on chewing gums to monitor respectively differences in aroma release due to two different gum ingredients formulations and the effect of physiological parameters (oral cavity volume, salivary flow and papillary count), gender and ethnicity in flavor perception. Sensory evaluation on flavor intensity and sweetness was performed simultaneously with nose-space analysis with two different PTR-MS machines (PTR-ToF-MS and PTR-QiTOF-MS, Ionicon Analytik, Austria). A total of 40 panelists participated in the two studies.

Results: (Limit 900 characters)

In the first study, a significant difference in total aroma release (p .value < 0.05 ANOVA) was observed between the different chewing gum formulations. In particular, it was observed that these differences were compound dependent and that PTR-MS signals are associated to a high variability reflecting panelists' physiological differences. In the second study, ethnicity was found to have a significant effect on both in nose-space concentration and sensory perception. For different mass peaks associated to mint flavor compounds, Chinese panelists exhibited higher levels than European ones (p .value < 0.05 Welch's t-test) generally after 90 seconds of consumption and after the gum was removed from the mouth. The same trend was found in sensory perception both for flavor and sweetness attributes. No differences were found between panelists of different gender in both flavor release and perception.

Conclusions (Limit of 400 characters)

Real time mass spectrometry analysis by PTR-MS can detect and monitor in-vivo volatile organic compounds release during food consumption.

The results of the studies suggest a multimodal effect of aroma release on both flavour and sweetness intensity. Individual differences due to physiological, biochemical and physiocochemical phenomena may have a relevant effect in aroma perception and thus in sensory flavor perception. Although, it cannot be excluded a cultural bias due to an ethnocentric experimental environment, results suggest that higher in-nose concentration in Chinese judges may explain their higher flavor and sweetness perception.

Novel Aspect: (Limit of 150 characters)

Real time direct injection mass spectrometric analysis coupled with dynamic sensory methods is a powerful tool to investigate flavor perception mechanisms and highlight physiological and cultural biases.

References

- Biasioli F., Gasperi F., Yeretzian C., Märk T.D., Trends in Analytical Chemistry, , 30, 968–977 (2011).
- Romano A., Cappellin L., Ting V., Aprea E., Navarini L., Gasperi F., et al., International Journal of Mass Spectrometry, 365–366, 20–27 (2014).
- Heenan S., Soukoulis C., Silcock P., Fabris A., Aprea E., Cappellin L., Märk T.D., Gasperi F., Biasioli F., Food Chemistry, 131, 477 (2012).
- Fiches G., Saint-Eve A., Jourden S., Déléris I., Brunerie P., Souchon I., Flavour and Fragrance Journal, 31, 31-40 (2016).
- Avison J., Journal of Agricultural and Food Chemistry, 61, 2070-2076 (2013).

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