

## P101 RAPID EVAPORATIVE IONISATION MASS SPECTROMETRY (REIMS) FOR FOOD AUTHENTICITY TESTING

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The quality, safety and authenticity of food are of principle interest for society and are regulated by legislation. Food fraud is used to encompass deliberate and intentional substitution, addition, tampering, or misrepresentation of food, ingredients, packaging or false statements for economic gain. Due to their high market value, meat and fish products are often targets for species substitution, adulteration, mislabelling and questions raised about geographic origin or means of production. Absence of a declared species or presence of an undeclared species would raise doubts about the claimed provenance of the product and some cuts of meat are more valuable than others. Testing food is one of the key ways of checking whether food businesses are complying with food law. Current methods used for determination of species and adulteration (e.g. ELISA, genomics, chromatography, spectroscopy or mass spectrometry) are time consuming, can be costly and typically located in a laboratory some distance from the producer and retailer. Rapid Evaporative Ionisation Mass Spectrometry (REIMS) combined with multivariate statistical analysis (Principal Component Analysis and Linear Discriminate Analysis) is an emerging technique for near real time characterization of tissues with no requirement for sample preparation [1,2]. Samples are analysed by direct cutting of the surface of the sample using hand-held sampling devices powered by an electrosurgical RF-generator; a monopolar cutting electrode (the iKnife) or bipolar forceps. The resulting "smoke" or aerosol generated is transferred to the mass spectrometer via a Venturi air jet pump-based ion transfer apparatus mounted in the orthogonal position relative to the atmospheric interface of a quadrupole time of flight mass spectrometer. Although mass spectra acquired from food samples, including a range of different fish and meat species or from different cuts of meat, look similar, the profile of the lipid components has been shown to be useful for classification purposes using multivariate statistical methods. Using these spectra, training samples were used to classify the reference groups to build PCA/LDA models. The models were verified with cross-validation and independent test sets. We present data that demonstrates the potential capability of the REIMS technique to accurately discriminate meat muscle samples from different species and for detection of offal in processed meat products. Results are provided immediately using prototype "real-time recogniser" software, which will be launched at ASMS in June 2016.

[1] J. Balog et al., *Analytical Chemistry*, 82, 7343-50 (2010)

[2] J. Balog et al., *Science Translational Medicine*, 5, 194ra93 (2013)

**Keywords:** Rapid Evaporative Ionisation Mass Spectrometry (REIMS), food fraud, speciation, Xevo G2-XS QToF, multivariate statistical analysis