FIELD DEPLOYABLE ION TRAP MS FOR DIRECT AND SPME MS AND MS/MS ANALYSIS: BEYOND THE LABORATORY

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INTRODUCTION

- **An innovative field-deployable MS, with an Atmospheric Pressure Chemical Ionization Interface** has been used to monitor histamine concentration in fresh fish.
- **The instrument** (1) is fully integrated into a chassis, without external pumps or gases, weights approximately 17 kg and has better than unit resolution over a 2000 Da range.

This study demonstrates the quantitative analysis on a deployable mass spectrometer for a preliminary quality assessment screening of fresh fish. The transportability allows potential out-of-the-lab, on-site screening.

In this work we demonstrate the flexibility of a miniature MS for direct targeted quantitative analysis of food products.

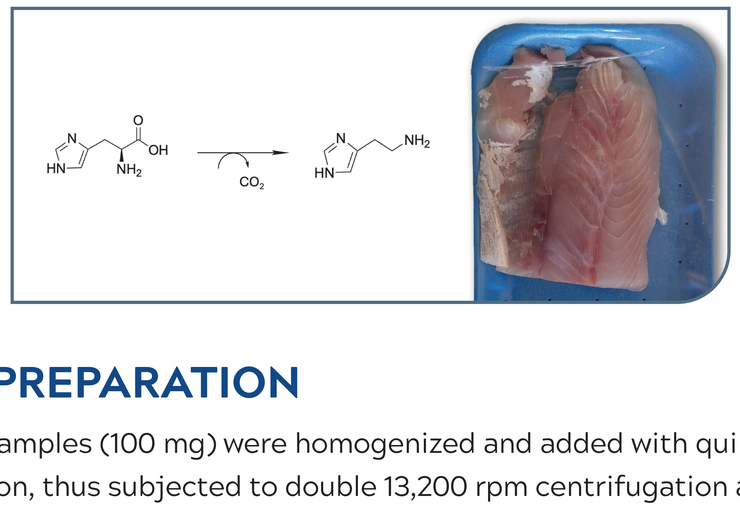
INSTRUMENTATION

All mass spectrometry experiments were carried out on a MT Explorer 30 (MTE30, MassTech Inc., Columbia, MD, USA) coupled to a modified Direct Sampling Atmospheric Pressure (DSAP) source equipped with APCI modules.

EU reference methods for histamine in fish are by HPLC/MS (2).

FORMATION OF HISTAMINE IN FRESH FISH MEAT AND ITS TOXICITY

Histamine Toxicity (Scombroid Poisoning) The European Union's (EU) regulation on histamine in fish and fishery products sets a level of 100 mg/kg to maximum 200 mg/kg for fish (3). Histamine toxicity is one of the main causes of foodborne illness related to fish consumption. It is formed from the breakdown of the amino acid histidine by bacteria on the skin or in the viscera of fish and in the marine environment.

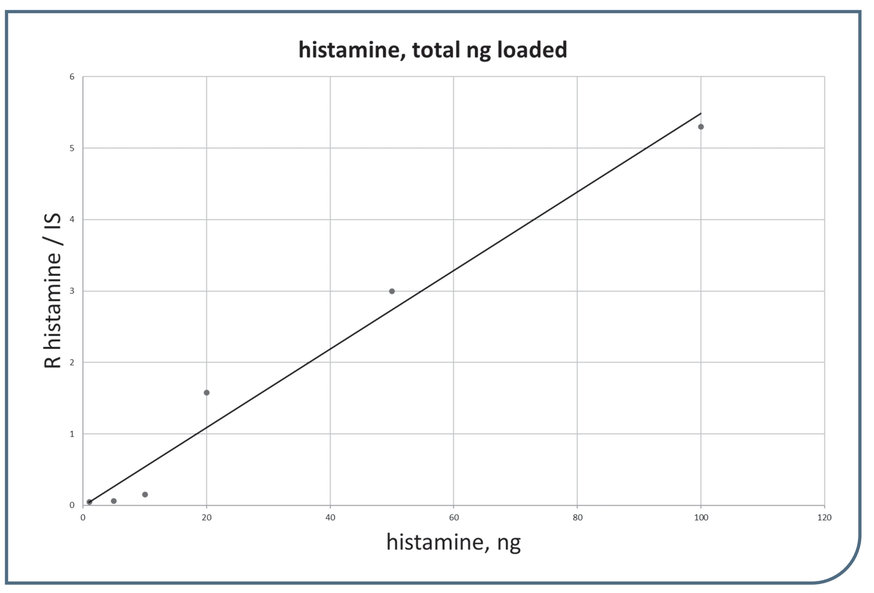


SAMPLE PREPARATION

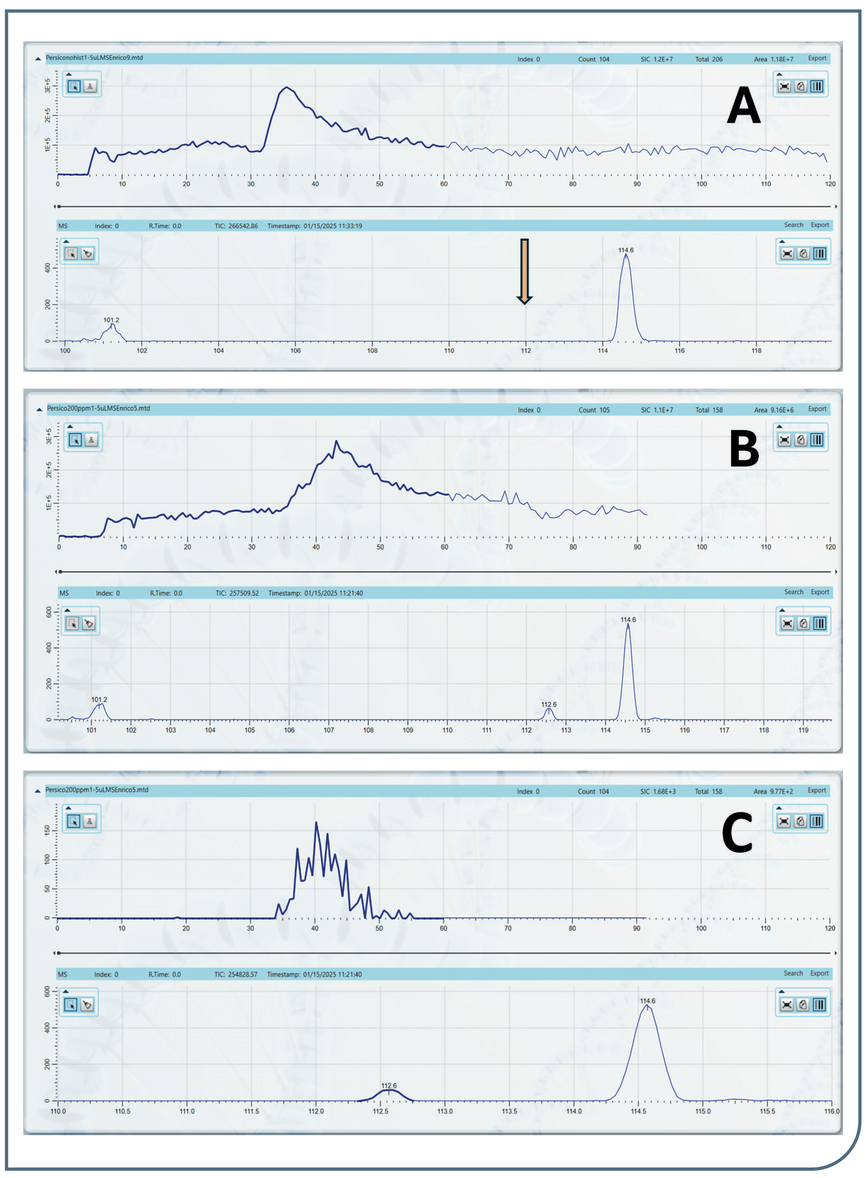
The fresh fish samples (100 mg) were homogenized and added with quinaldine internal standard solution, thus subjected to double 13,200 rpm centrifugation at 4°C to obtain a clarified supernatant. After centrifugation, samples are filtered and deposited on the instrumental disposable glass sample holder for thermal desorption.

Supernatant solutions were prepared by spiking histamine at concentrations of 20, 200, and 2000 ppm in fish samples.

RESULTS



Histamine peak area vs. ratio with its internal standard, quinaldine, 2 mL of 1-100 ng/mL solutions. 20 ng is the method's LOQ.



A: *Fish sample with no histamine addition. No ions are present at m/z 112 (protonated molecular ion). Upper trace TIC profile after thermal desorption. Lower trace mass spectrum of molecluar ion region.*

B: *Fish sample spiked with 200 ppm histamine.*

C: *Trace of m/z 112 for the fish sample in B and expanded mass spectrum.*

REFERENCES

(1) MT Explorer 30 Mass Spectrometer - MassTech Inc. Columbia, MS, USA

(2) Malle P., et al. J. AOAC Internat. 1996, 79, 43-49. Duflos G., et al. J. AOAC Internat. 1999, 82, 1097-1101.

(3) COMMISSION REGULATION (EC) No. 2073/2005 of 15 November 2005 amended with No. 1019/2013.

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