



Mass Spectrometry
& Allied Topics

Room 337

Baltimore Convention Center
Baltimore, MD

Also visit us @ Booth 323
June 1 - 5, 2025

**2nd
June**

MONDAY
7:00-08:15 AM EDT

MASSTECH 

Breakfast Seminar

**3rd
June**

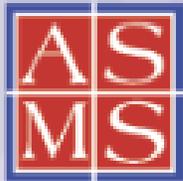
TUESDAY
7:00-08:15 AM EDT

Is my sushi fresh?

Scombroid fish poisoning, or histamine fish poisoning

Enrico Davoli SRA Instruments

Università di Torino, Torino and Istituto Mario Negri, Milano



73RD CONFERENCE ON MASS SPECTROMETRY AND ALLIED TOPICS

BALTIMORE

Sgombridi



Thunnus alalunga

Thunnus thynnus

Katsuwonus pelamis

Thunnus albacares

Thunnus obesus

Scombridae

Temporal range:

Middle Paleocene–present



Yellowfin tuna, *Thunnus albacares*

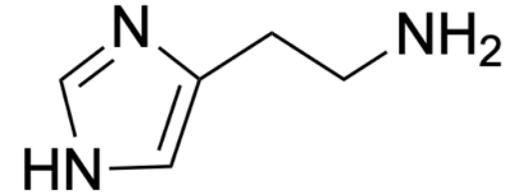
Scientific classification

Domain:	Eukaryota
Kingdom:	Animalia
Phylum:	Chordata
Class:	Actinopterygii
Order:	Scombriformes
Suborder:	Scombroidei
Family:	Scombridae Rafinesque, 1815

The Scombrotxin - histamine

What is

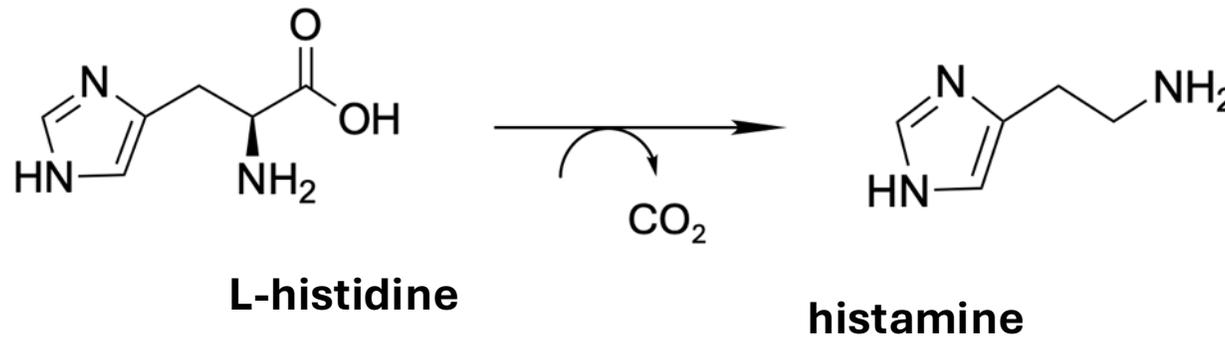
Histamine is a biogenic amine that derives from histidine decarboxylation. It is involved in biological processes like immune response, gastric secretion and neurotransmission.



$C_5H_9N_3$, MW = 111

Formation

L-histidine decarboxylase
using vitamin B6 as co-factor



Histamine Toxicity (Scombrototoxin fish poisoning)

It is formed from the breakdown of histidine by bacteria on the skin or in the viscera of fish and in the marine environment. **Histamine toxicity is a major cause** of foodborne illness associated with fish consumption. It is **heat stable toxin**.

The **European Union** regulates histamine levels in fish and fishery products, setting acceptable concentrations between 100 mg/kg (ppm) and a maximum of 200 ppm.

In the **United States**, the Food and Drug Administration (FDA) considers fish samples containing 35 ppm or more of histamine to be adulterated. The FDA has established a maximum allowable limit of 200 ppm for histamine in fish.

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PRESENCE IN FISH

- Scombridae – (tuna, mackerel, chub mackerel, Atlantic bonito, little tunny)
- Clupeidae – (sardines, herrings)
- Engraulidae – (anchovy)
- Coryphaenidae – (dolphinfish)
- Pomatomidae – (bluefish)
- Scomberesocidae – (saury)



DIRECT ANALYSIS IN FISH



MassTech MT Explorer 30

- **ATMOSPHERIC PRESSURE INTERFACE**
- **MS e MS/MS**
- **Mass range: 35-2.000 Da**
- **Mass accuracy: 0,3 Da**
- **weight: 17 kg**
- **Dimensions: 20 x 30 x 33 cm**
- **Power: 220 V or battery (250 W max)**

SAMPLE PREP

Fish samples (100 mg in 1 mL water)

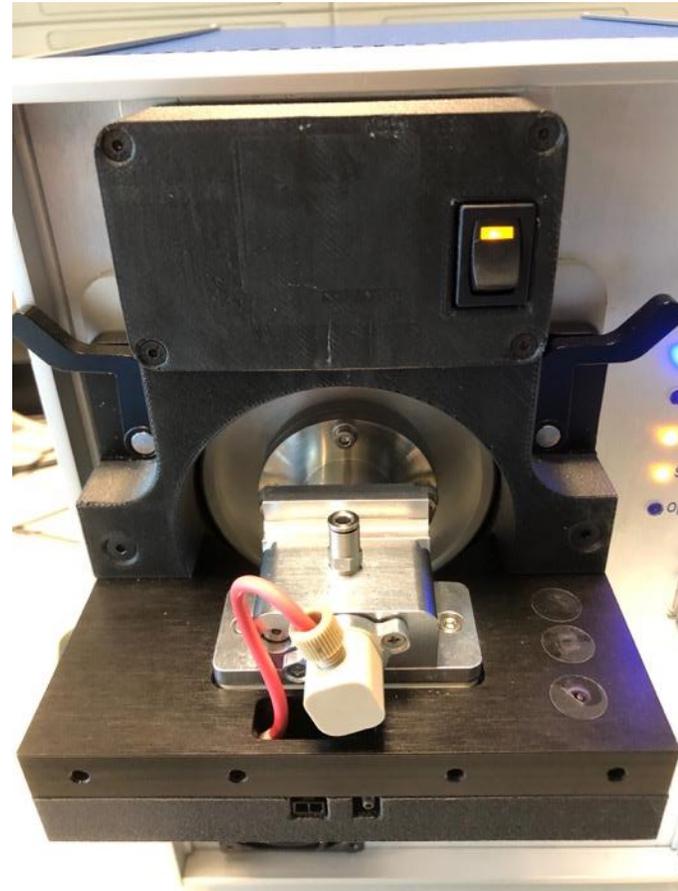
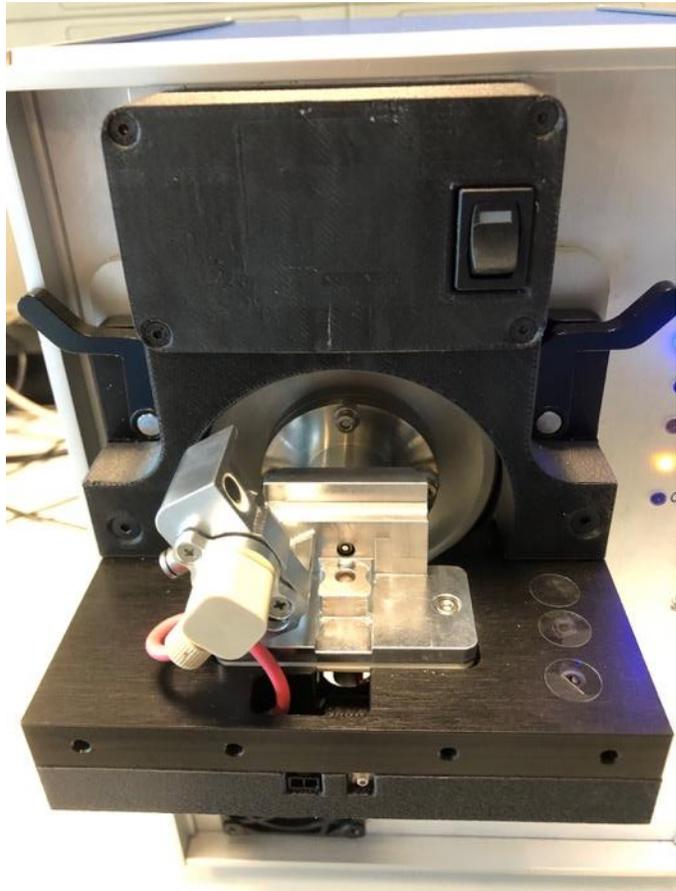
- homogenized
- added with internal standard solution (quinaldine)
- centrifugation at 4°C
- filtered, PTFE, 0,2 um

2 µL are deposited on the instrumental disposable glass sample holder for direct thermal desorption

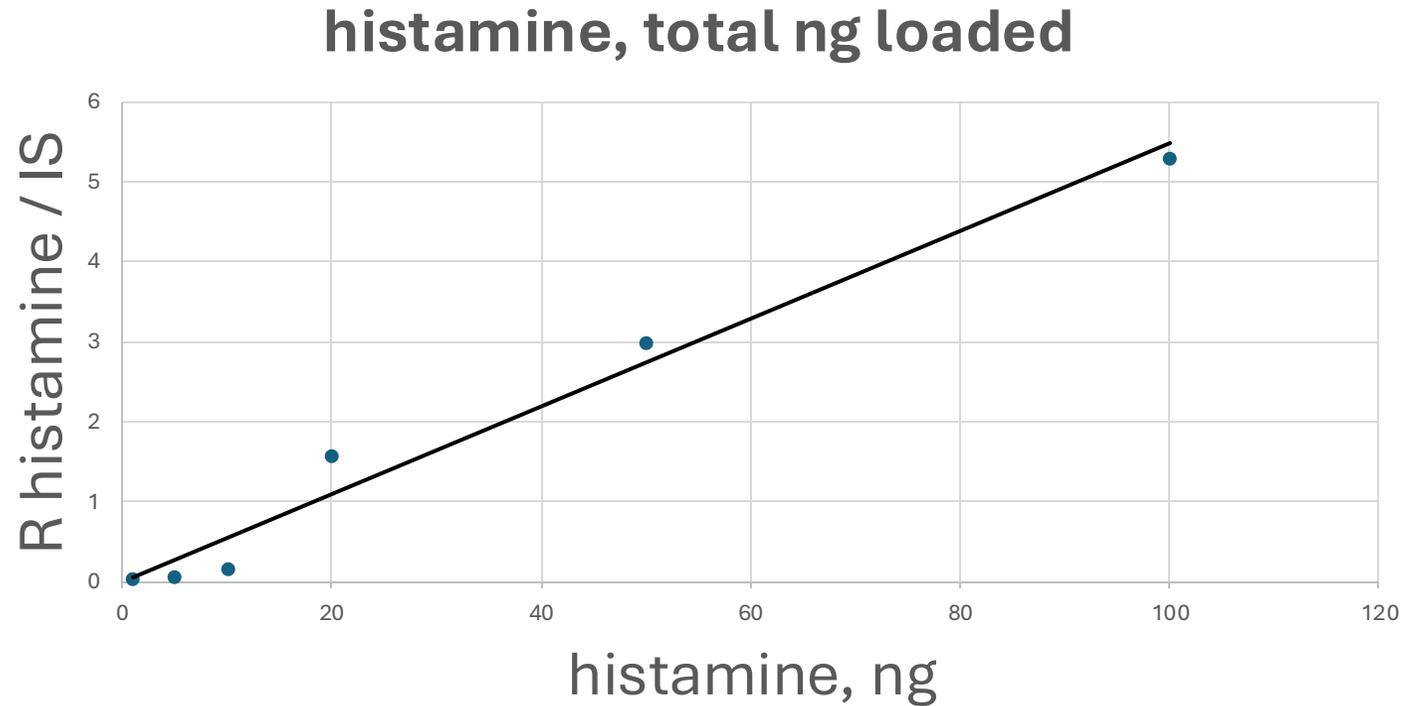
EU reference methods for histamine in fish are HPLC/MS

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

SAMPLE INTRODUCTION



DIRECT QUANTITATIVE ANALYSIS



1 ng LOD, 20 ng are the LOQ. In fish samples 5 ppm LOD, 100 ppm LOQ

REAL SAMPLE ANALYSIS

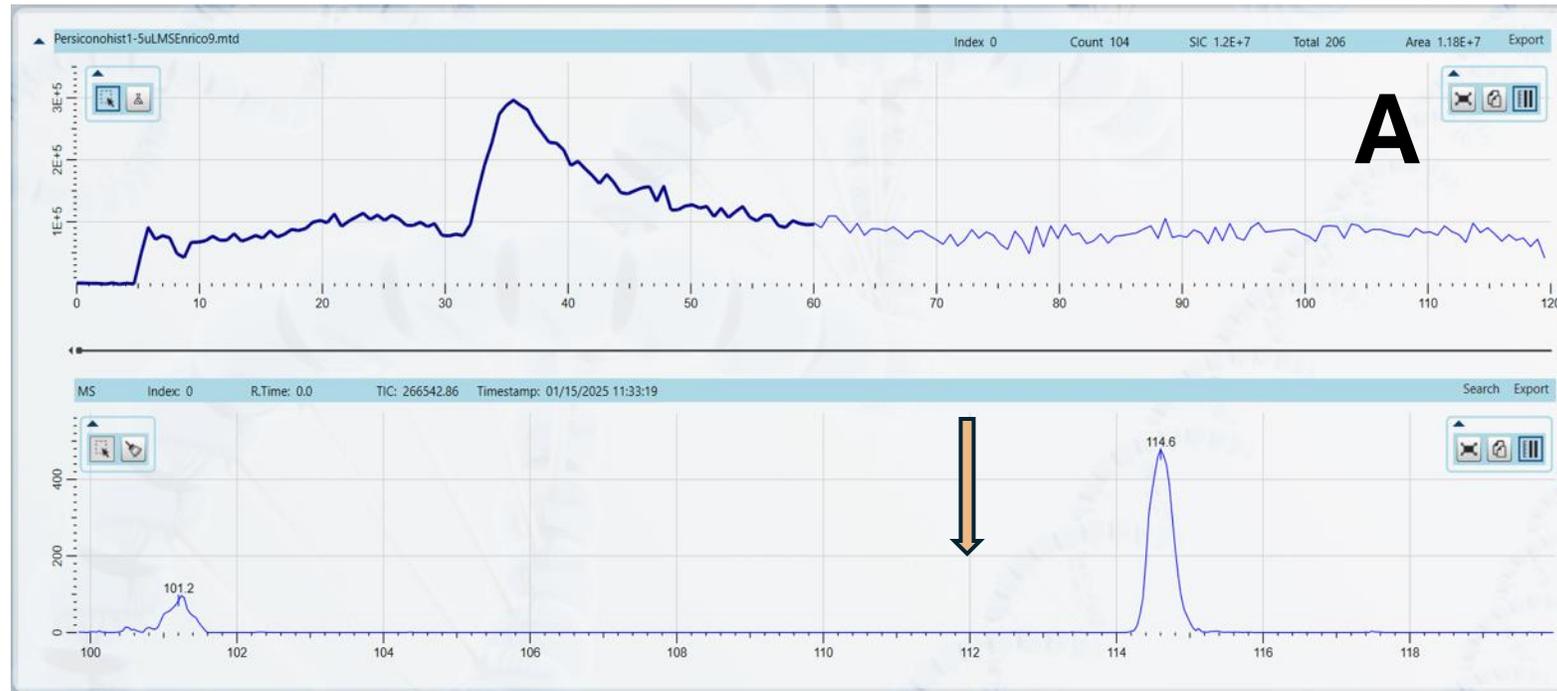


→ 2 samples

A: no histamine added

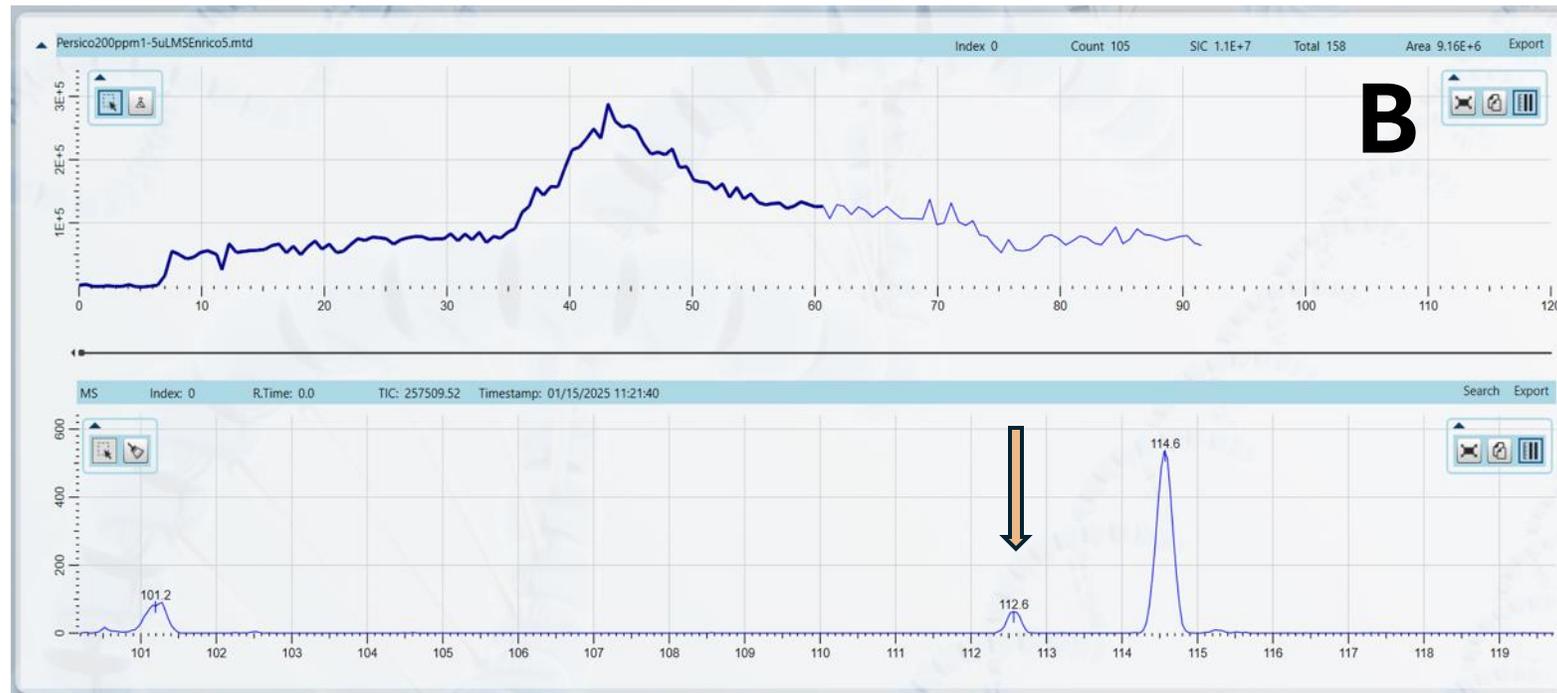
B: added with histamine
@ 200 ppm

REAL SAMPLE ANALYSIS



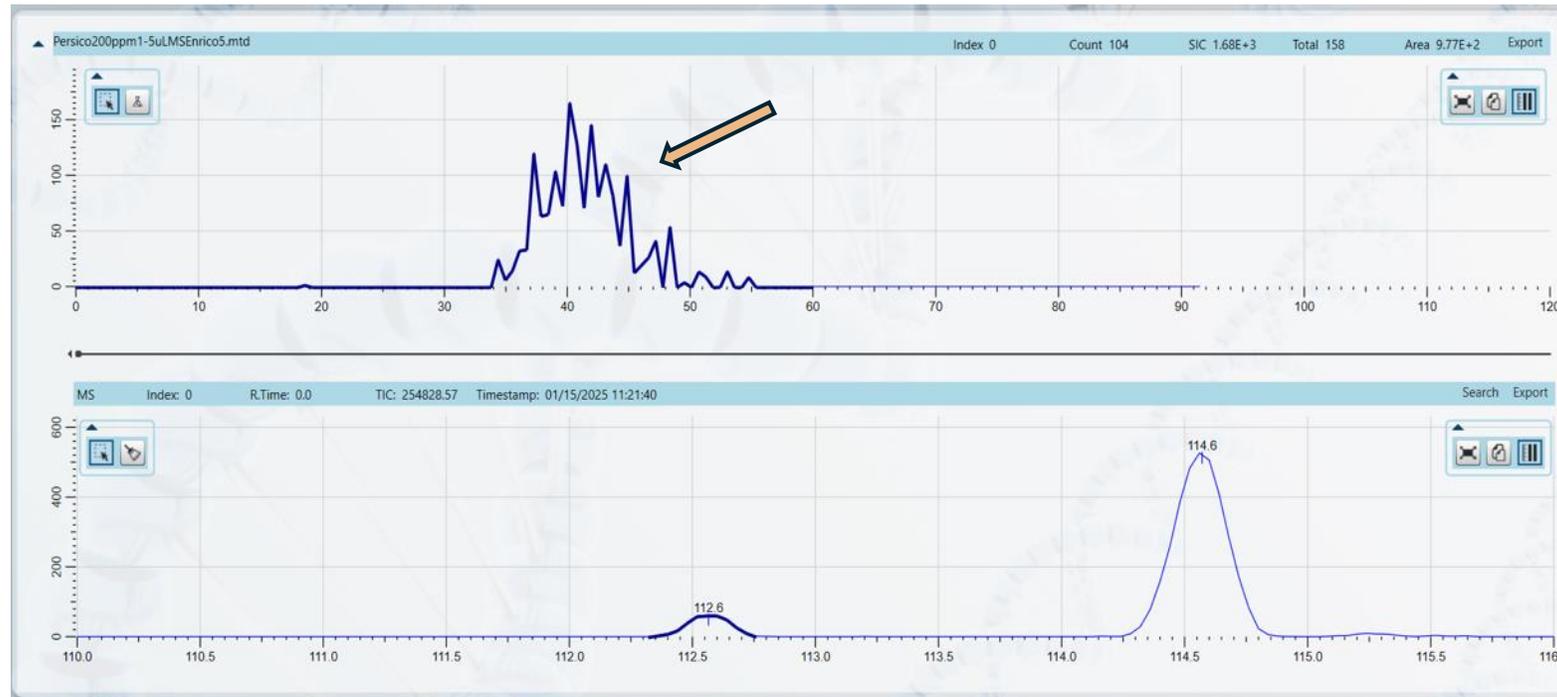
No histamine added

REAL SAMPLE ANALYSIS



200 ppm histamine added

REAL SAMPLE ANALYSIS

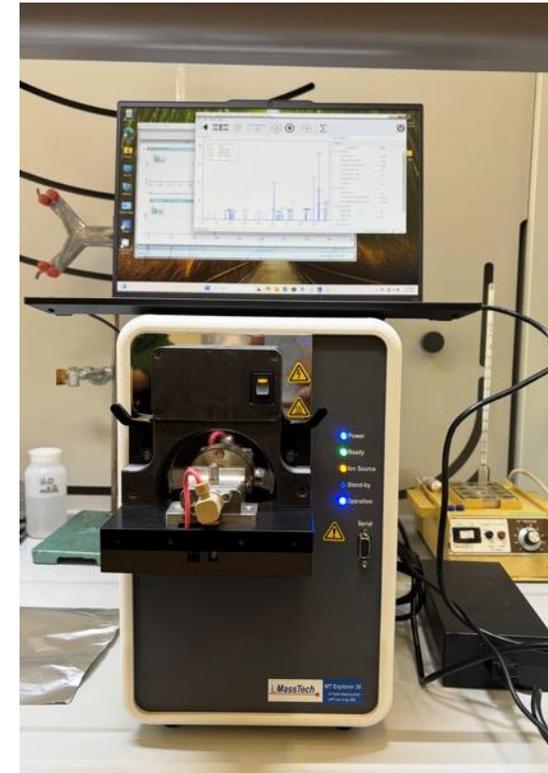


XIC of 200 ppm histamine added

HAVE YOU CONSIDERED USING A
PORTABLE/DEPLOYABLE SPECTROMETER?

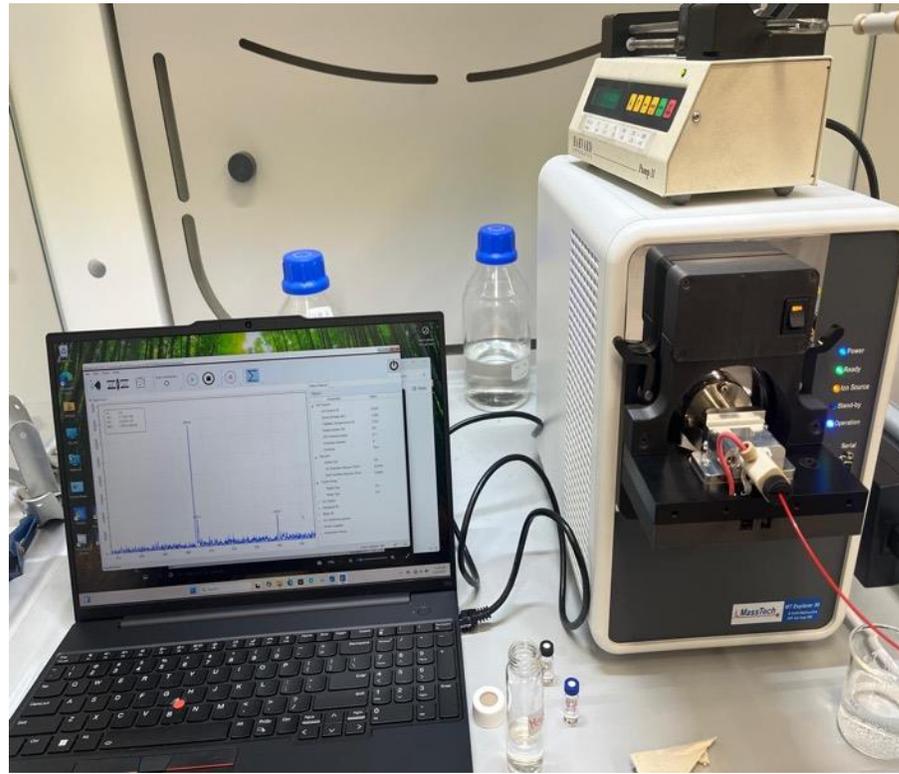


A TRASPORTABILE / DEPLOYABLE MS UNDER THE HOOD FOR HAZARDOUS SAMPLES



UNFI – APCI - ANALYSIS OF CHEMOTHERAPEUTIC DRUGS

A TRASPORTABILE / DEPLOYABLE MS UNDER THE HOOD FOR HAZARDOUS SAMPLES



UNITO - ESI - DIRECT LIQUID APCI - ANALYSIS OF TOXIC COMPOUNDS

A TRASPORTABILE / DEPLOYABLE MS

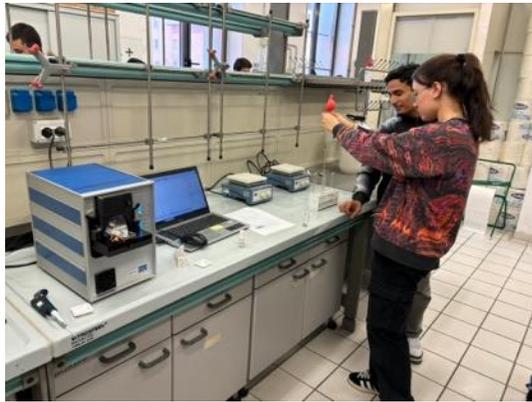


CORALS EMISSIONS AT THE AQUARIUM



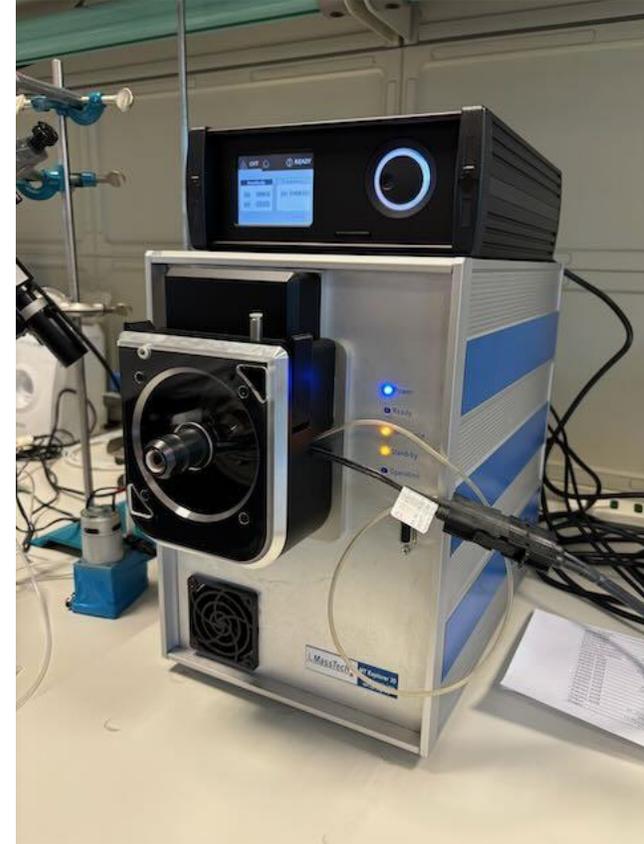
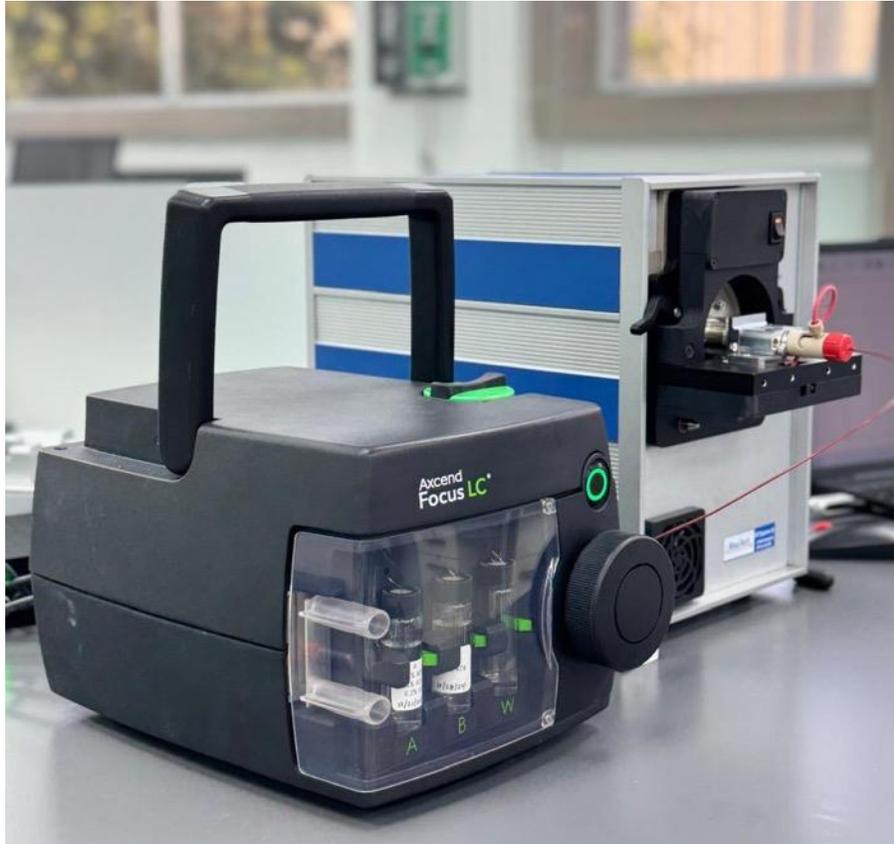
RUNNING SAMPLES AT 41st IMMS CONFERENCE

A TRASPORTABILE / DEPLOYABLE MS



TEACHING LAB MS COURSES

A TRASPORTABILE / DEPLOYABLE MS



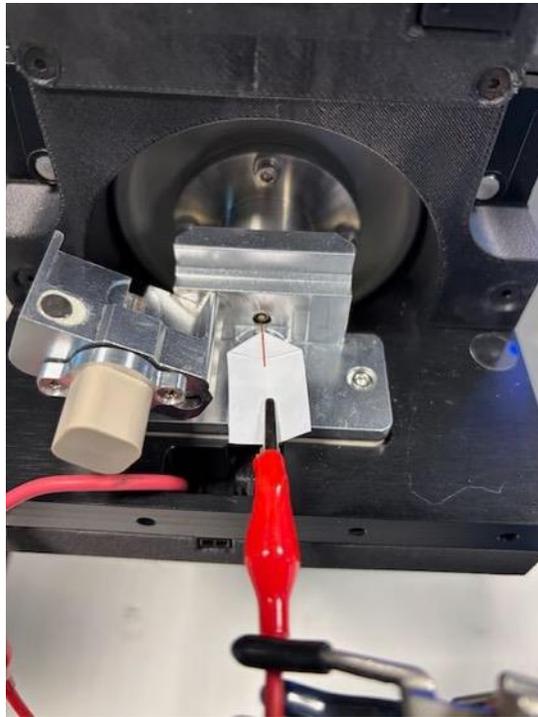
INTERFACING WITH COMMERCIAL INSTRUMENTS

A TRASPORTABILE / DEPLOYABLE MS

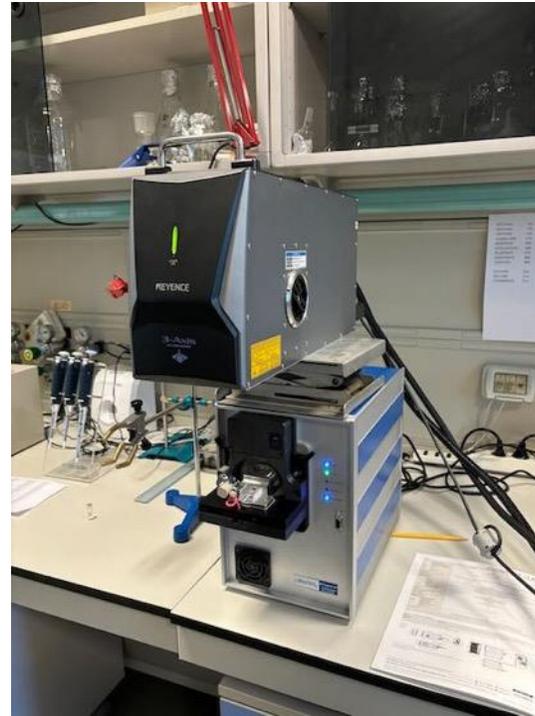
TEST YOUR IDEAS



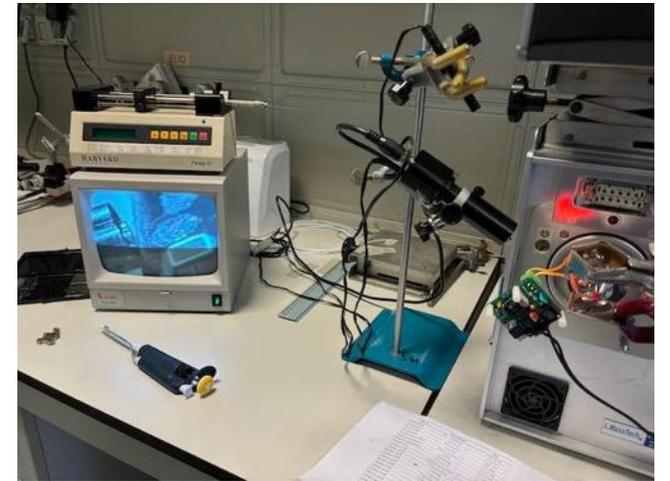
BARRIER DISCHARGE



PAPER SPRAY

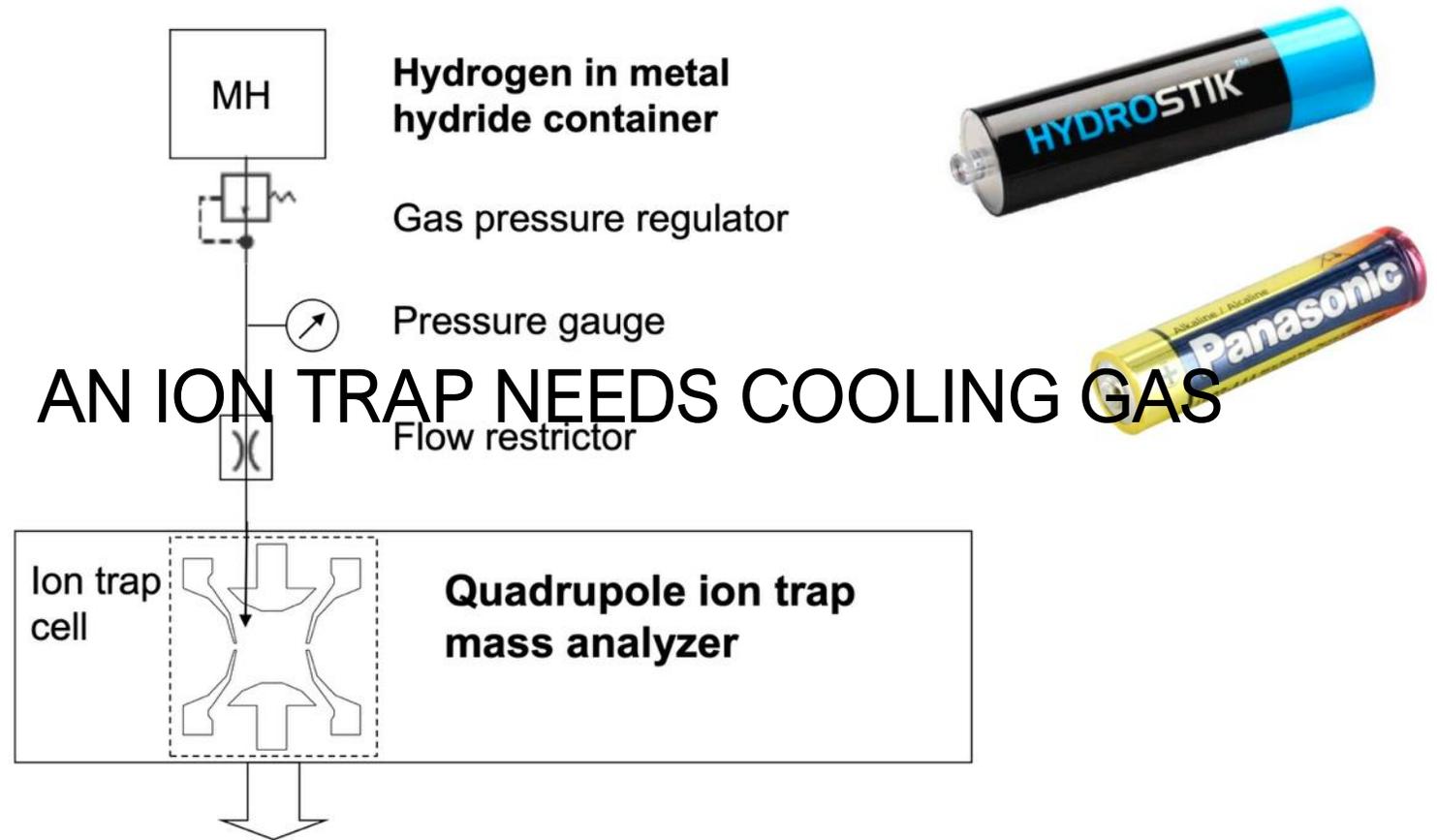


MALDI



POST DESORPTION UV PHOTO

A miniature MS. In the near future at home ?



A miniature MS. In the near future at home ?

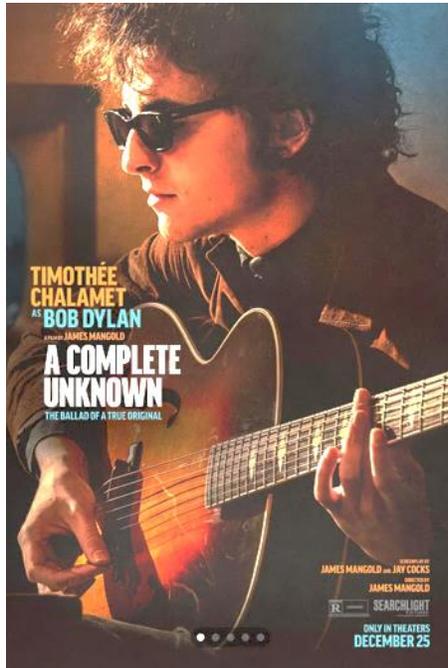


A miniature MS. In the near future at home ?

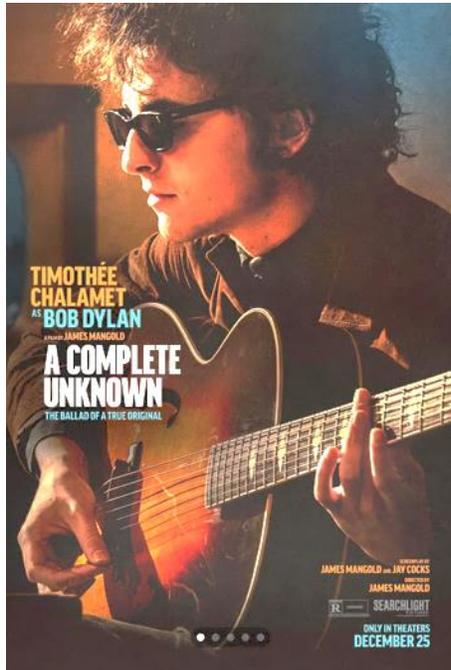


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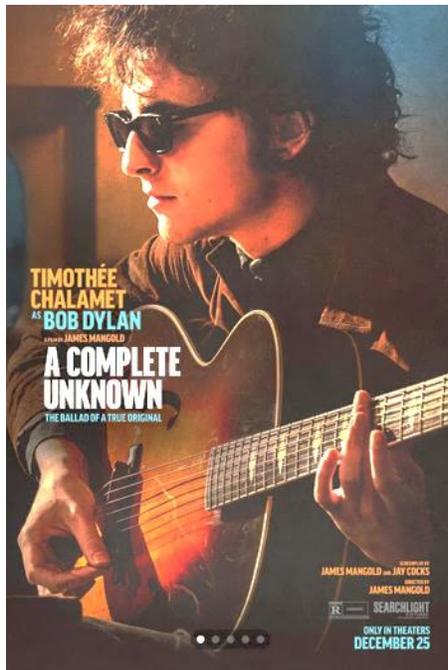
A miniature MS. In the near future at home ?



A miniature MS. In the near future at home ? For The Times They Are Changin’



A miniature MS. In the near future at home ?
For The Times They Are Changin'
And you'd better start swimming or you'll sink like a stone





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FARMACOLOGICHE
MARIO NEGRI · IRCCS



UNIVERSITÀ
DI TORINO

MASSTECH 

UNIVERSITA' DEGLI STUDI
DI MILANO

BICOCCA

Thanks to:

Prof. Francesco Saliu, UNIMIB

PhD candidate Tommaso Gatti

Dr. Alice Passoni

SRA Instruments S.P.A.

MassTech Inc.


INSTRUMENTS
ANALYTICAL SOLUTIONS

A SPECIAL
THANKS TO
VLADIMIR





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FARMACOLOGICHE
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Thank you!

Visit me at ThP303


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ANALYTICAL SOLUTIONS



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JUNE 1 - 5, 2025

BALTIMORE, MARYLAND

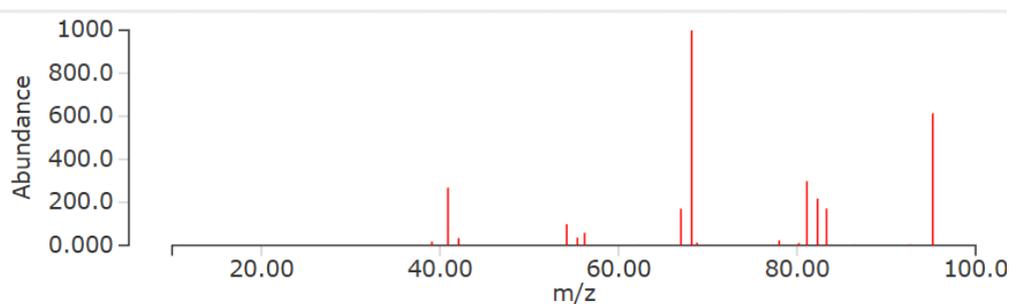
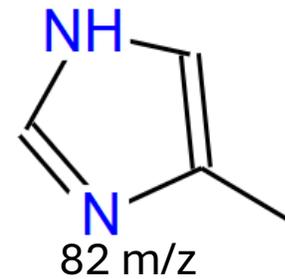
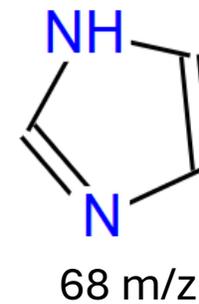
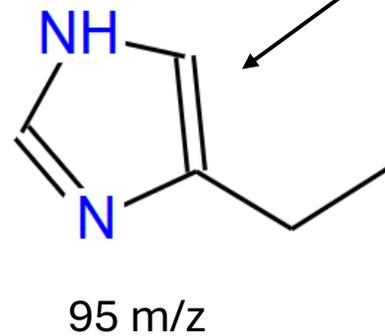
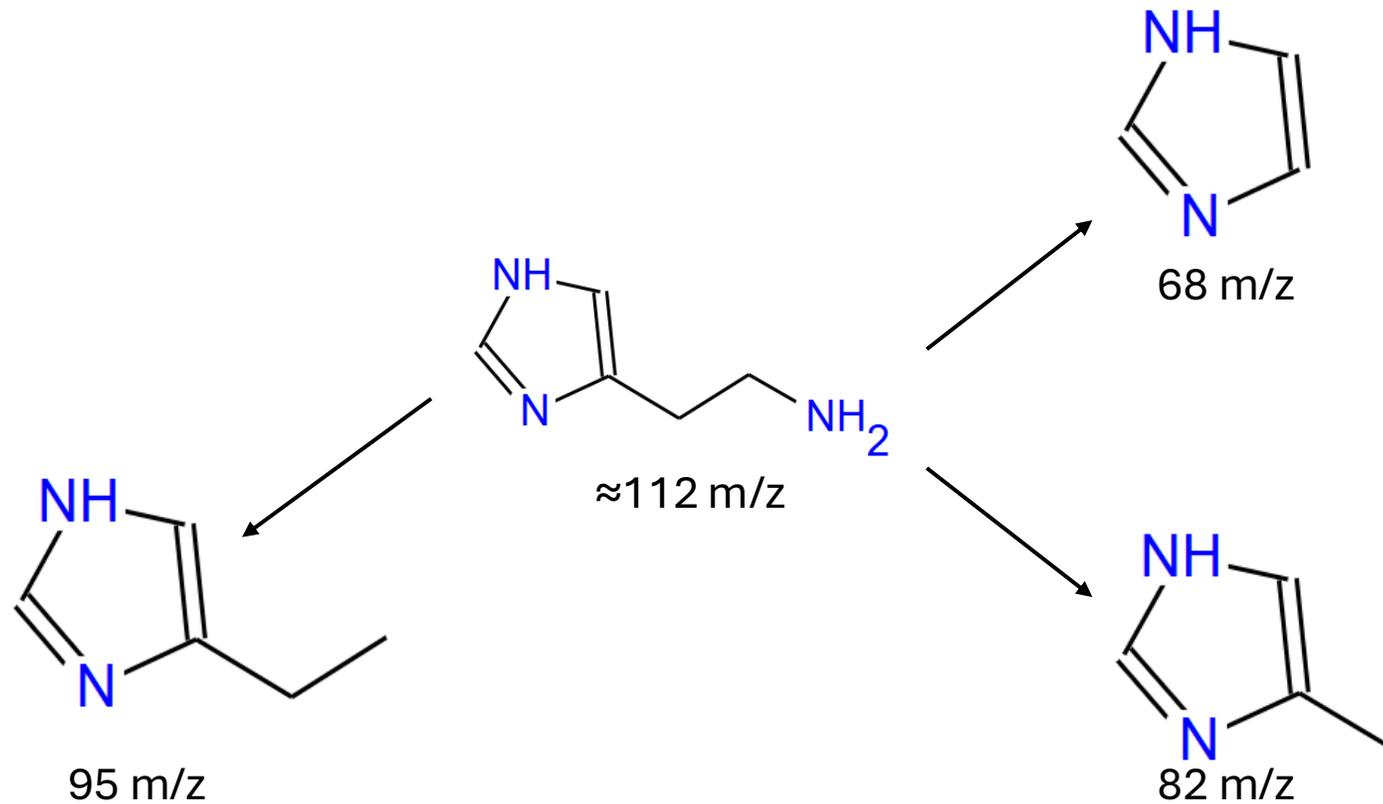
Short Courses
MAY 31 & JUNE 1

#ASMS2025

Questions about MS/MS ?

- Only preliminary results
- Internal standard issues

MS/MS FRAGMENTATION



Preliminary MS/MS analysis

Histamine 10 ng						Histamine 20 ng					
Ampl% (V)	P.I.	D.I.	microscan	Inject time		Ampl% (V)	P.I.	D.I.	microscan	Inject time	
MS		113		3	20	MS		112,6		3	20
MS/MS	3	113	95,5	3	40	MS/MS	3	112,6	95,5	3	40
MS/MS	6	113	95,5	3	40	MS/MS	15	112,6	95,5	3	40
MS/MS	10	113	95,5	3	40	MS/MS	3	95,5	68,4	3	40
MS/MS	15	113	95,5 - 82,2	3	40						
MS/MS	3	95,5	68,4	3	40						
Histamine 5 ng											
Ampl% (V)	P.I.	D.I.	microscan	Inject time							
MS		112,5		3	20						
MS/MS	3	112,5	95,5	3	40						
MS/MS	3	95,5	68,4	3	40						