



Simultaneous Determination of Vit B₂, Vit B₆, Niacin, Caffeine and Taurine by HPTLC/UV/FLD and HPTLC/ESI-MS



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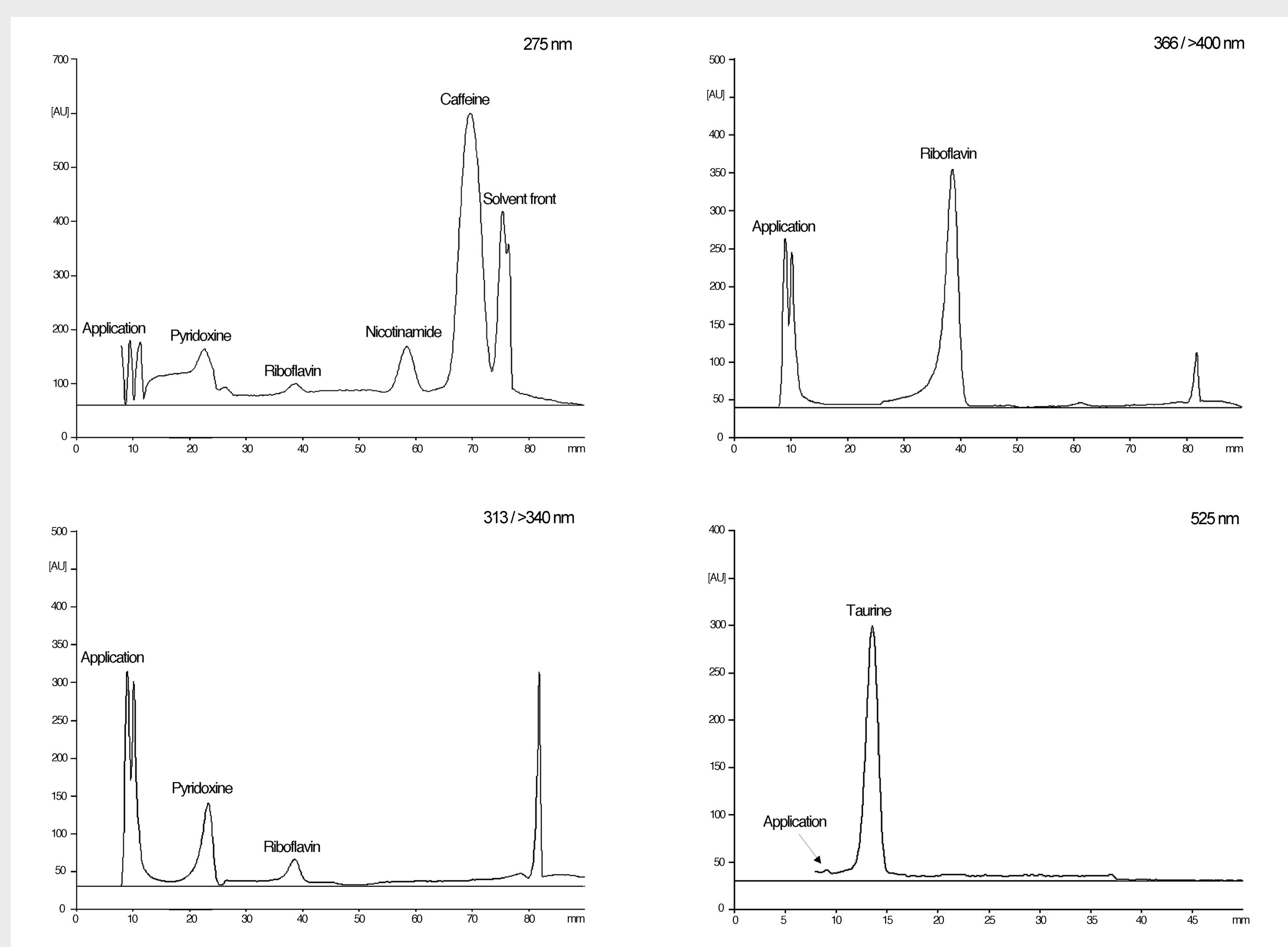
Introduction

In the last ten years the so-called “Energy Drinks” and “Sport Drinks” have gained popularity between students, athletes and active persons for its energy-giving properties. This industry had a global growth over 17 % during 2004 corresponding to 2410 millions of liters and it is expected that the global energy drinks consumption will reach about 4100 million liters in 2009. The usual composition of these drinks is based on water-soluble vitamins, carbohydrates, glucuronolactone, caffeine and taurine. The objective of this work was to develop a high-throughput analytical method to detect simultaneously riboflavin (vitamin B₂), pyridoxine (vitamin B₆), nicotinamide, caffeine and taurine by HPTLC/UV/VIS/FLD with mass confirmation via HPTLC/ESI-MS.

Method

Sample preparation was simple, i.e. just degassing for 20 min in an ultrasonic bath. Chromatography was carried out on 20 x 10 cm HPTLC plates. Solutions of samples and the standard mixture were applied with Automatic TLC Sampler IV (ATS IV) from CAMAG (Muttenz, Switzerland). Multiple detection was easily performed via multi-wavelength scanning using the Scanner 3 (CAMAG).

Results

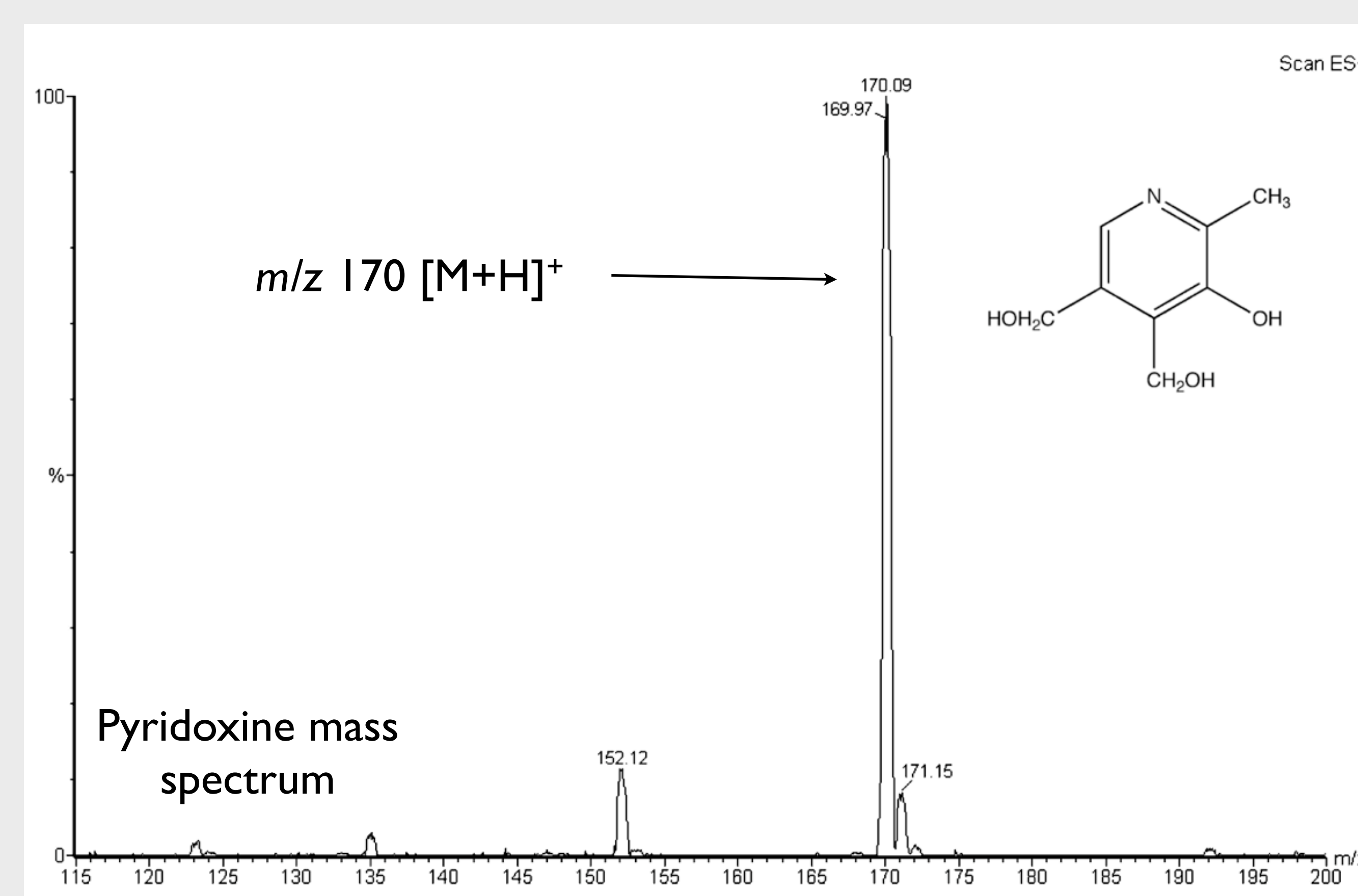
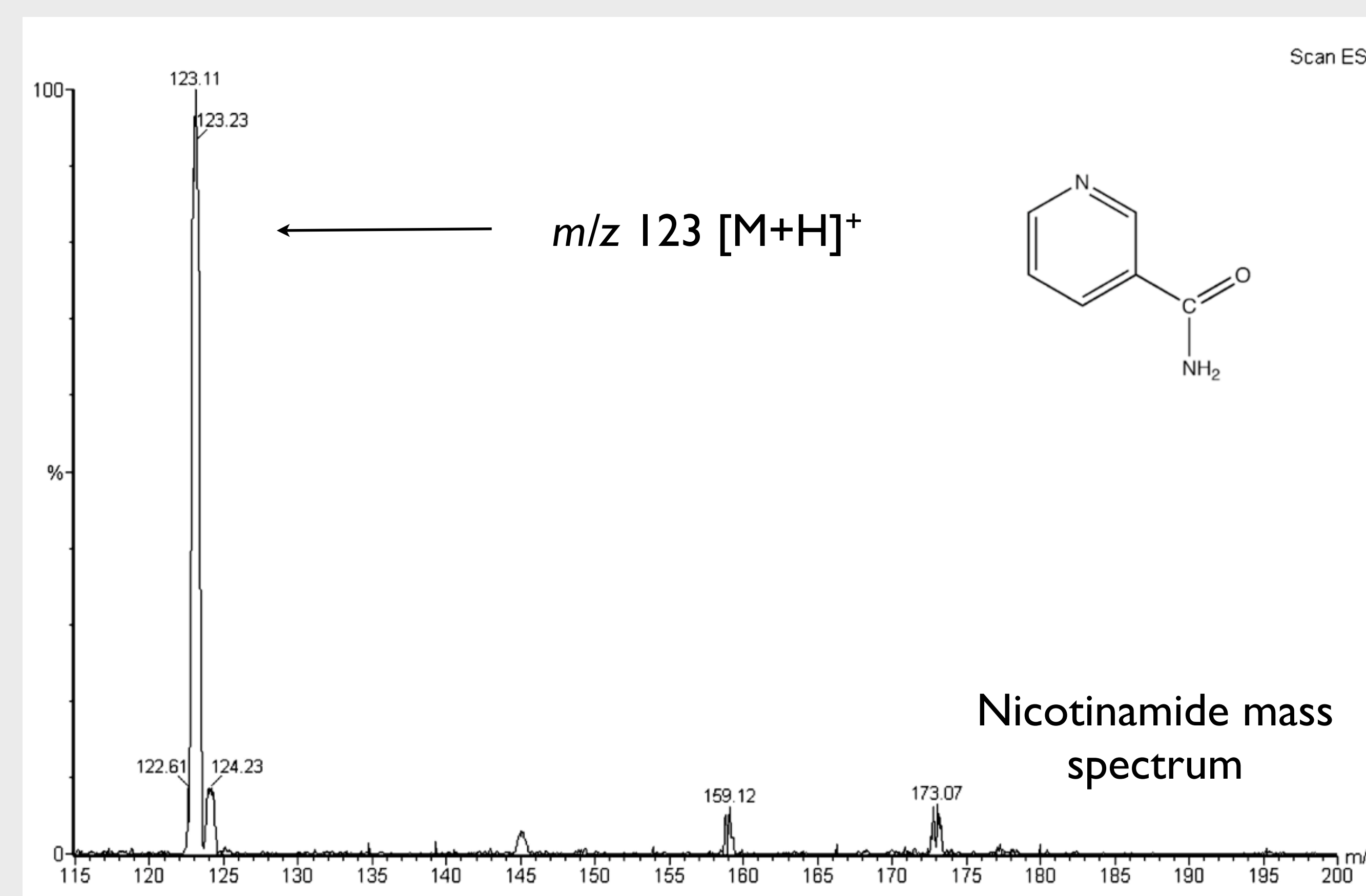


Multiple detection (UV, Vis and FLD) of the same sample track

Calibration plots showed regressions with determination coefficients (r^2) > 0.999. The recoveries of the five compounds at three different levels were between 81 and 106 % with RSD range from 0.5 to 7.4%

HPTLC/ESI-MS

The compounds mass spectra were obtained using a plunger-based extraction device for HPTLC/ESI-MS [1] which employment was recently demonstrated in food [2] and trace analysis [3].



Examples of mass spectra obtained directly from the compound band

Conclusion

Simultaneous low-cost monitoring of the riboflavin, pyridoxine, nicotinamide, caffeine and taurine content in beverages like energy drinks is enabled due to the immense flexibility of HPTLC regarding detection.

The compounds online identification via HPTLC/MS gives a reliable approach to ensure correct peak identification.

References:

- [1] H. Luftmann, Anal. Bioanal. Chem. 2004, 380:964-968.
- [2] M. Aranda and G. Morlock. J. Chromatogr. A (submitted)
- [3] G. Morlock, W. Schwack, Anal. Bioanal. Chem. 2006, 385:586-595.

Thanks to CAMAG, Merck, ChromAn and University of Concepcion as well as Chilean Government for support granted.