Fusing Atmospheric Pressure ECD (AP-ECD) with nanospray to track Post-Translational Modifications with a "standard" mass spectrometer

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Abstract

One concern of current mass spectrometry is the difficulty of analyzing labile Post-Translational Modifications (PTMs) with traditional collision induced dissociation (CID). In contrast to traditional CID, electron capture dissociation (ECD) and its related technique, electron transfer dissociation, offer direct identification and localization of labile PTMs but generally require specialized mass spectrometers. Using a modified PhotoSpray™ photoionization lamp we have recently added the capability of performing ECD to our nanospray CID Q-ToF. The modified AB Sciex PhotoSpray™ source was interfaced with a QStar XL Q-ToF so that ions from a nanospray emitter could be exposed to photoelectrons generated from acetone to induce electron capture dissociation. With the photoionization lamp off, and no photoelectrons present, ionized peptides were admitted into the MS as in traditional nanospray - allowing conventional high sensitivity LC-MS. When the photoionization lamp was on, the resulting photoelectrons caused ECD in source. C- and z-type fragment ions were admitted into the mass spectrometer, allowing high sensitivity LC-AP-ECD- MS. AP-ECD is also able to produce fragment ions with labile PTMs retained, allowing for both sequencing and localization of the PTMs, equivalent to modern ECD or ETD available on specialized instruments. The new AP-ECD source can be incorporated in-line on any atmospheric pressure ionization instrument; in fact, switching to this source has enabled our Q-ToF MS to identify labile modifications on peptides at the fmol level with no need for ion trapping.