PERFORMANCE CHARACTERISTICS OF A NEW ESI-TOF MASS SPECTROMETER

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Protein identification has been aided by the advent of mass spectrometers that are able to generate, detect and fragment singly and multiply charged ions. Quadrupole time-of-flight (Q-TOF) instruments of higher resolution using data dependent scans have provided some improvement in accurate mass measurement. These performance enhancements, however, have not enabled routine accurate mass measurements with an error of less than 5 ppm. One reason is the inability of many TOFMS designs to effectively maintain stable mass measurement conditions throughout multiple LC/MS runs. The introduction of an internal reference mass enables mass measurement correction, but this has proven to be difficult to implement with micro- and nanoflow ES techniques. This work demonstrates that a prototype atmospheric pressure ionization (API) orthogonal acceleration (oa)-reflectron TOF mass spectrometer provides stable, accurate mass measurements to within 5 ppm in most cases.

Mass measurement accuracy was assessed for a prototype ESI-TOF. This mass spectrometer is being designed to produce accurate mass measurement without the need for software corrections or a co-introduced internal standard. The instrument features a low thermal expansion flight tube and thermally regulated high voltage control electronics for improved mass stability. It also features a low-noise high-speed analog-to-digital converter (ADC) that extends the dynamic range for accurate mass measurement by eliminating mass measurement errors associated with time-to-digital converter (TDC) dead time. The data from the prototype API oa-reflectron TOF demonstrate that mass accuracy of +/- 5 ppm is currently possible without use of an internal standard. This instrument shows promise as a useful tool for microflow LC-ES-TOF MS characterization of peptides and protein digests.