Fundamental Studies of Enhanced-Fluidity Liquid Chromatography – Electrospray Ionization Mass Spectrometry of Proteins and Protein Complexes.

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Recent advances in analysis of proteins have increased the demand for more efficient techniques to separate intact proteins. Enhanced-fluidity liquid chromatography (EFLC) involves the addition of liquefied CO2 to conventional liquid mobile phases. The addition of liquid carbon dioxide enhances diffusivity and decreases viscosity while maintaining mixture polarity, which typically results in reduced time of analysis.

EFLC will be described for the separation of proteins and peptides under a range of retention mechanisms. EFLC mobile phase are readily compatible with electrospray ionization. The sensitivity of detecting proteins increases using EFLC-MS compared to conventional LC-MS. Furthermore, the charge distribution of a measured protein can be readily shifted to lower or high average charge states based on operating conditions.

The application of this hyphenated method will be illustrated for the detection of proteins of interest for disease detection and as active pharmaceutical compounds.