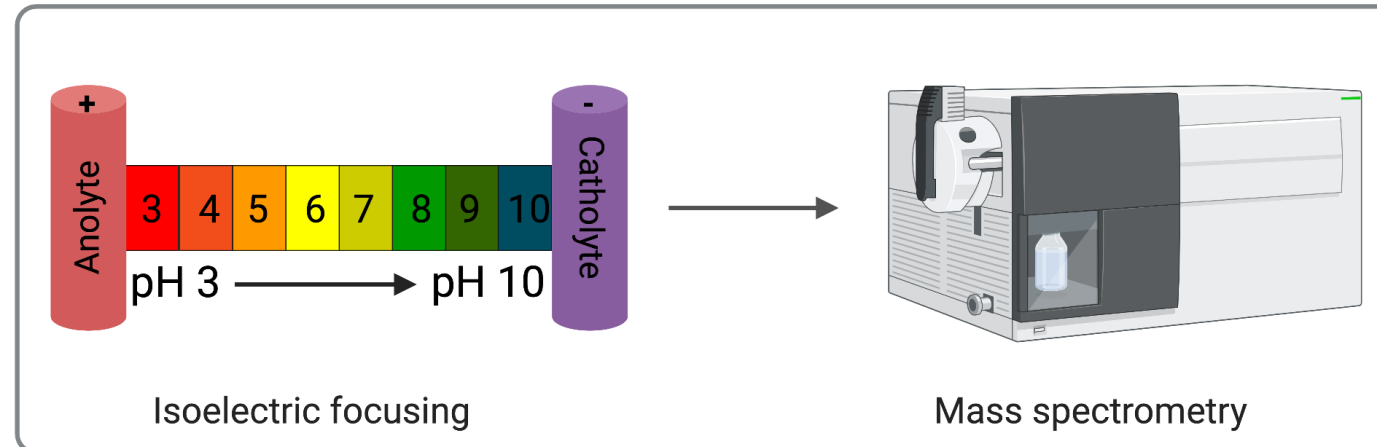
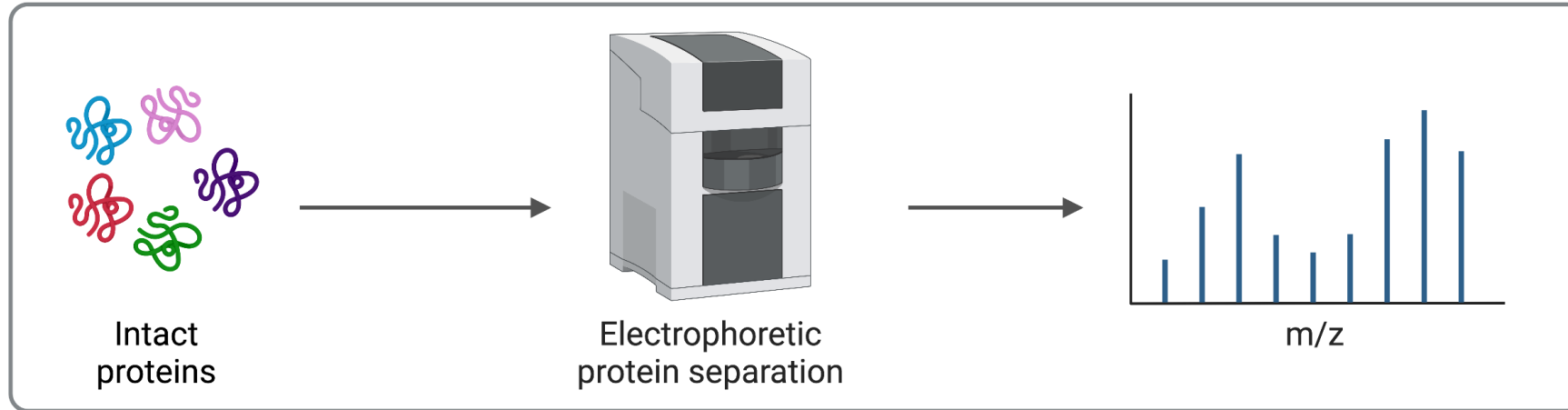


Design of a capillary isoelectric focusing electrospray ionization-mass spectrometry interface for high resolution proteoform analysis

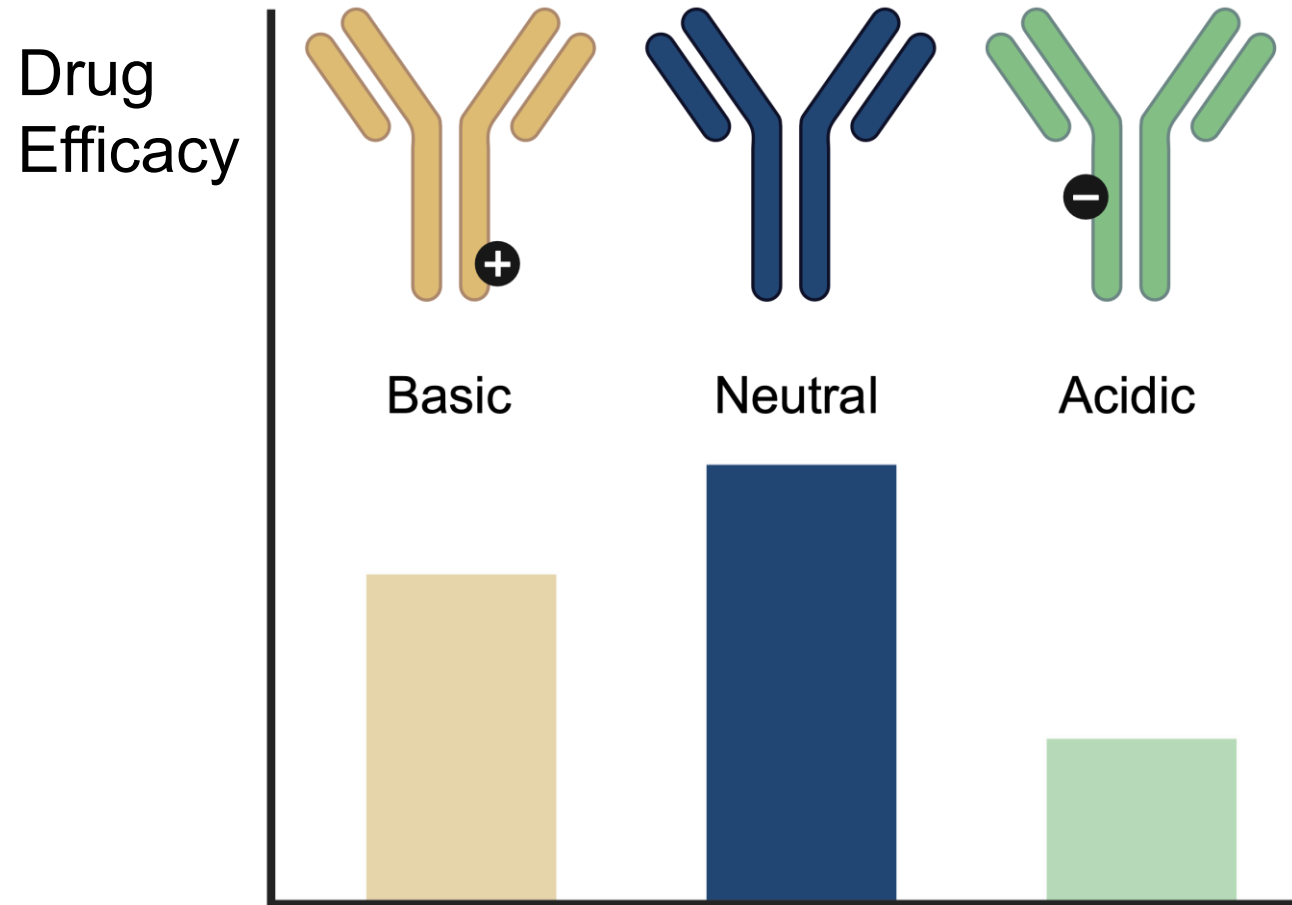
Caitlin M. Kerr, PhD

PhD Advisor: Dr. Matthew Champion

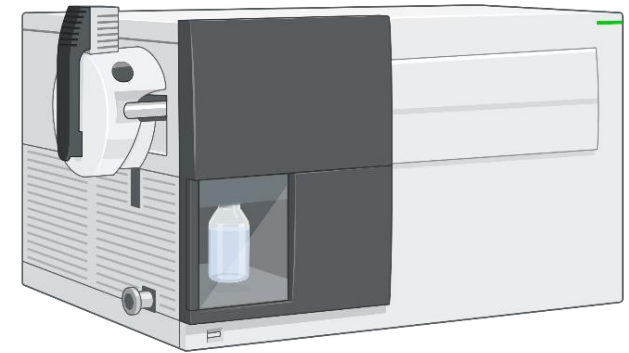
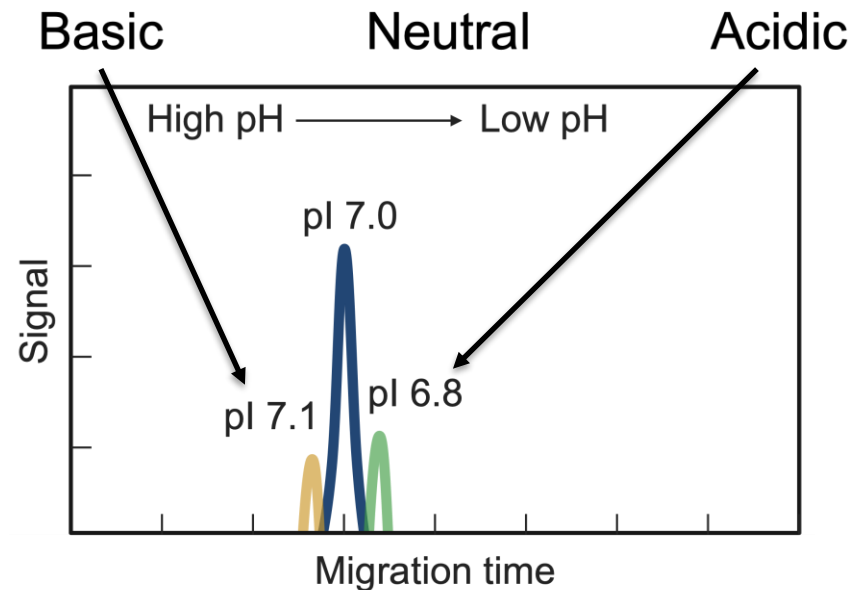
Using electrophoretic separations coupled to mass spectrometry



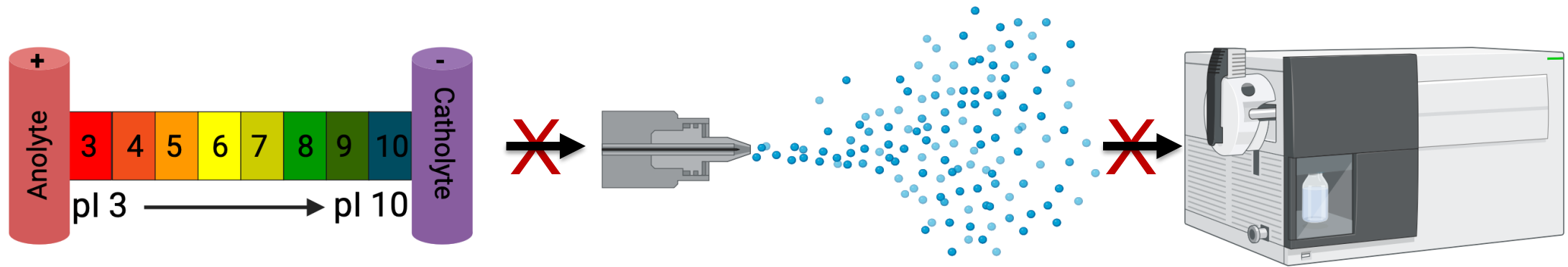
Protein charge variants alter function and are difficult to characterize



Protein charge variants can be separated with cIEF



cIEF coupled to mass spectrometry is a compromised process

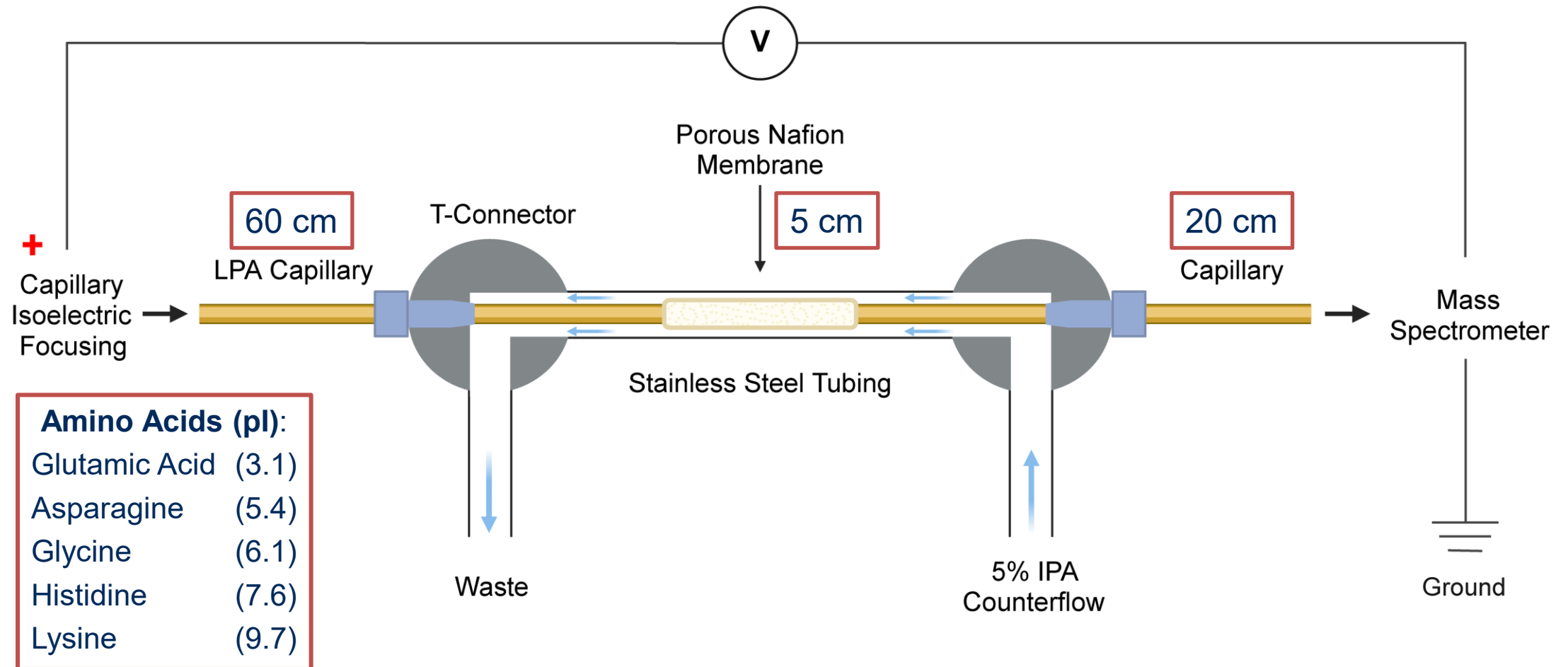


- ① Capillary Isoelectric Focusing ② Electrospray Ionization ③ Mass Spectrometry

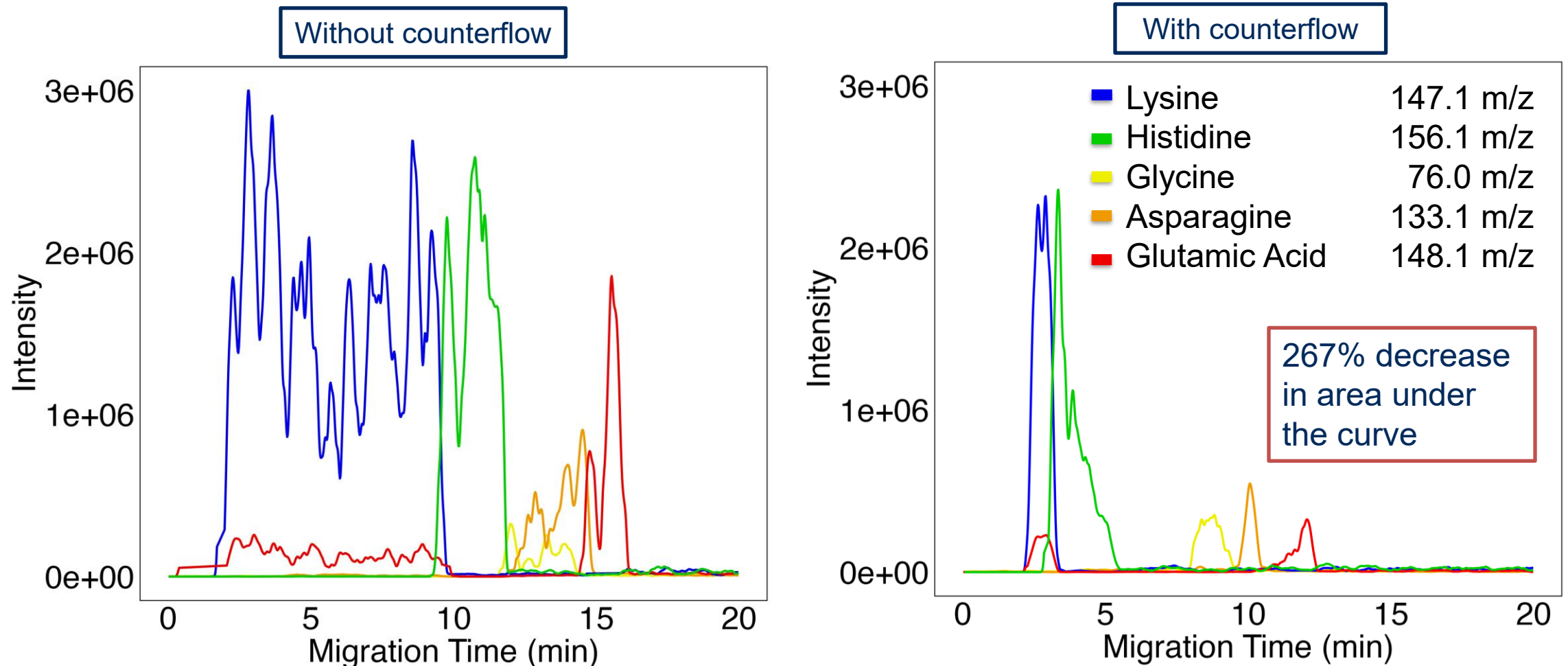
Issues with cIEF-MS:

- Ionization suppression
- Mass spectrometry contamination

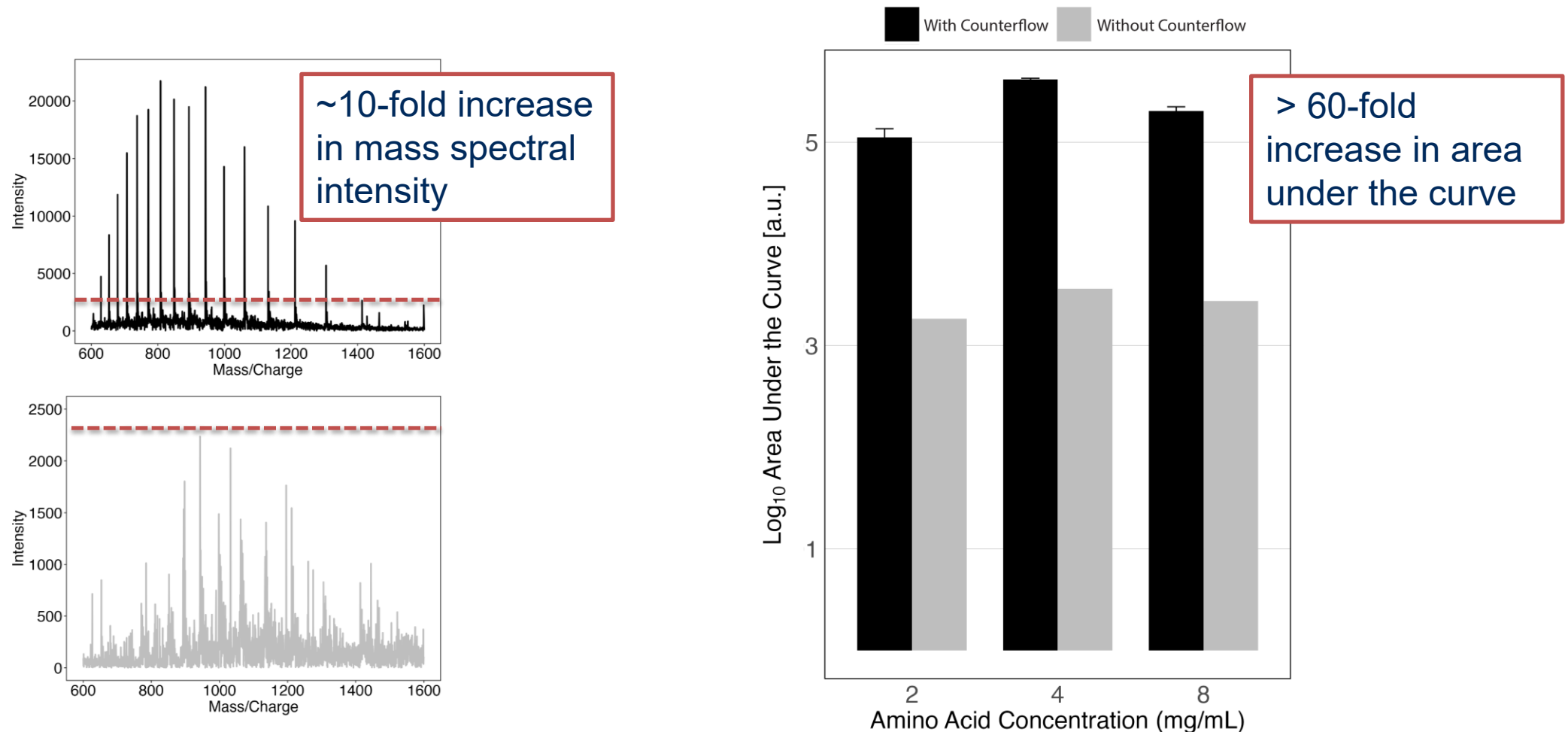
The interface reduces ampholyte concentration prior to MS



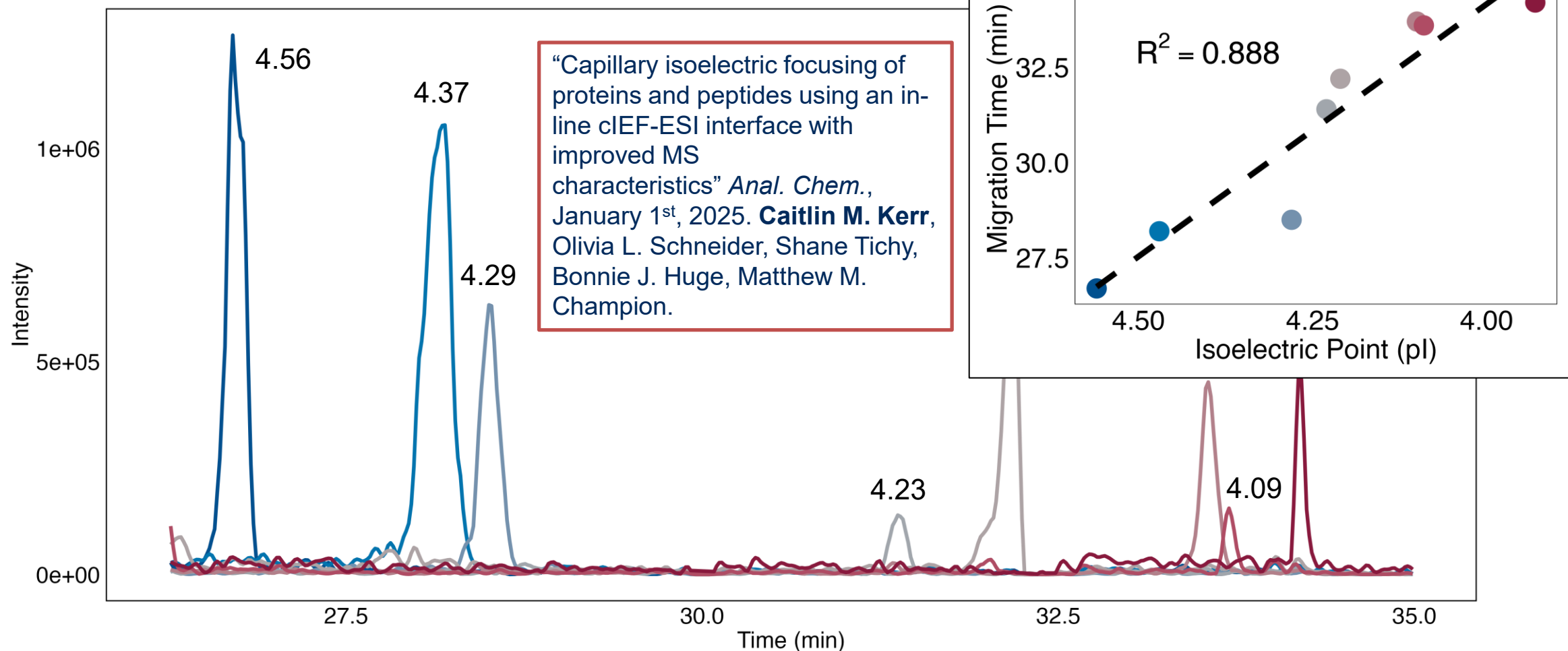
Extracted ion electropherograms of amino acid ampholytes signal with the counterflow decreases



Interface increases the electropherogram area under the curve and mass spectra intensity of myoglobin



High resolution cIEF-Nafion-MS of bovine serum albumin (BSA) peptides



CIEF-Nafion-MS conclusions

- Conclusions
 - The interface reduces the amino acid concentration prior to MS
 - The interface decreases ionization suppression
 - The amino acids can be optimized for high pI protein separations
 - BSA peptides can be separated with high resolution
 - The interface can be applied to clean up/desalt other analytes

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 - Dr. Shane Tichy
 - Bristol Myers Squibb
 - Dr. Tara Enda
- Some images created on Biorender and R Studio



Group: Dr. Taylor Lundgren, Dr. Daniel Hu, Hannah Marietta, **Dr. Bonnie Huge**, Dr. Sadie Schultz, **Sacheela Wanigasinghe**, Dr. Matthew Champion, Dr. Simon Weaver, and Christine DeRosa, **Olivia Schneider**, Dr. Bruce Mousseau, and Elizabeth Chang. Not Pictured: Angela Good, Emily Bravo, Anna McCartan

Questions?