Characterizing the Protein-Antibody Interactions Involved in Ovarian Cancer Detection

Prof. Rebecca Whelan

Ovarian cancer is responsible for approximately 14,000 deaths in the United States each year. A blood test for a protein called CA125 is used to diagnose ovarian cancer, follow patient response to treatment, and monitor patients for cancer recurrence. Considering its importance in making serious clinical care decisions, surprisingly little is known about how the CA125 test works. The Whelan lab uses bioanalytical chemistry to probe the interactions that underlie the CA125 test.

In this project, a student will work with a current member of the Whelan lab to study the interactions of CA125 with the antibody molecules that recognize CA125 in the clinical test. CA125 protein subdomains will be expressed and purified. Samples containing CA125 and antibodies in known ratios will be prepared. Nanoliter volumes of these samples will be analyzed using capillary electrophoresis, a high-resolution separation method that detects molecules at different times depending on their size. CA125/antibody complexes (if they have formed) will be readily detectable. Knowledge of which subdomains of CA125 are detected in the clinical test will help us identify regions missed by the current test and build a foundation for our ultimate goal: a more reliable test for early-stage ovarian cancer.

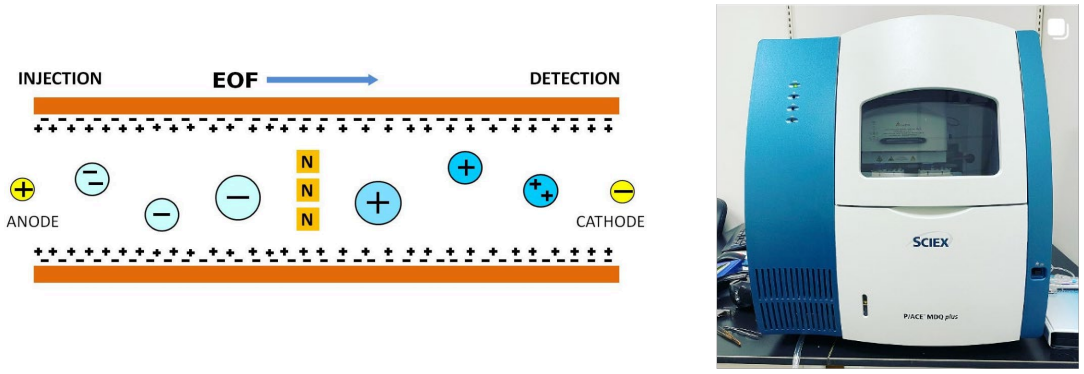

Figure showing the principle of capillary electrophoresis (CE) and an instrument used to perform CE

Skills that will be gained include cell culture; protein expression and purification; operation of a capillary electrophoresis instrument; safe, ethical, and well-documented laboratory practices; troubleshooting; working collaboratively; and communicating with expert and lay audiences.

Relevant references from the Whelan lab:

1. Weaver, Whelan, et al. *Anal. Meth.*, **2022**, *14*, 1103-1110. doi.org/10.1039/D1AY02145A
2. Schuster-Little, Whelan, et al. *Analyst,* **2021**, *146*, 85-94. doi.org/10.1039/D0AN01701A
3. Felder, Whelan et al. *Molecular Cancer* **2014**, *13*, 129. doi: 10.1186/1476-4598-13-129