

Characterizing Peptide-Antibody Interactions for Disease Detection

Jane Lin

2nd Year Biology major with a concentration in Bioengineering

Mentor: Serra Elliott

Faculty Advisor: Dr. Patrick S. Daugherty

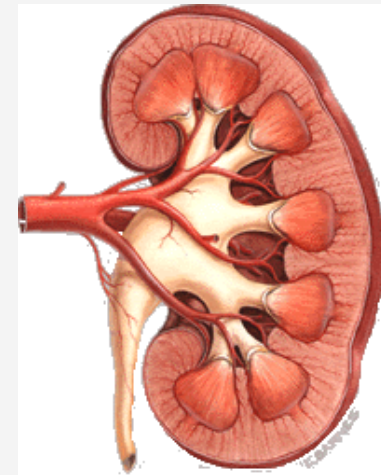
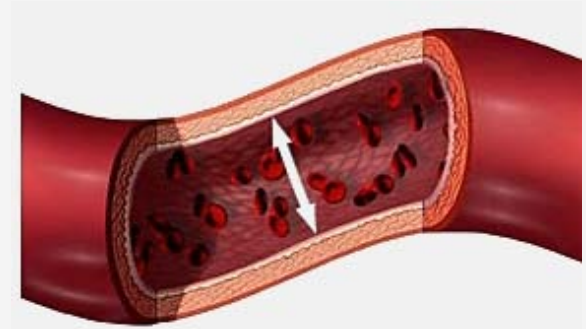
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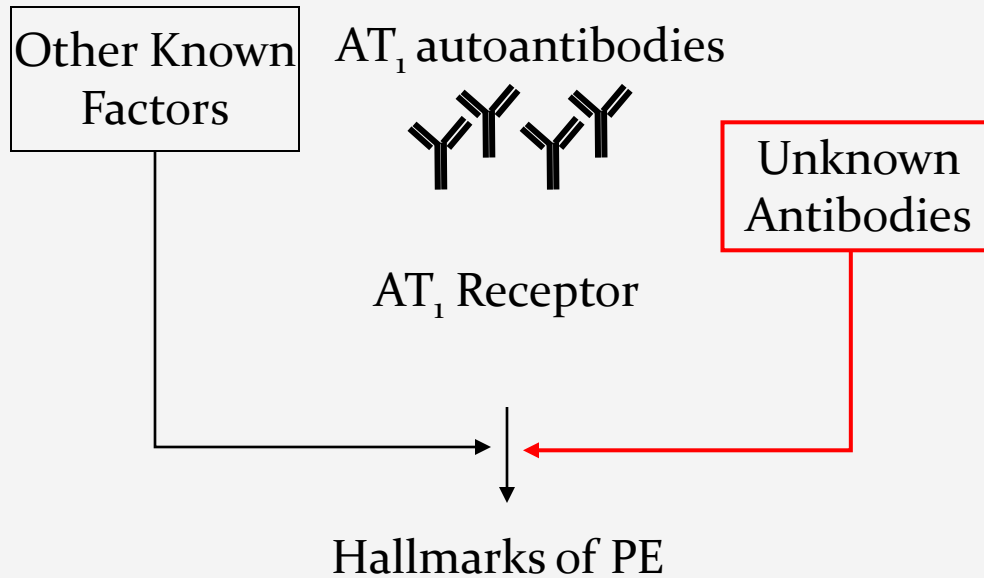
08/29/13

Pre-eclampsia (PE) is One of the Top 5 Leading Causes of Maternal Death

- $\approx 5 - 8\%$ pregnant woman (1)
- Advanced conditions:
 - HELLP syndrome
 - Seizures
- Treatment: Delivery of baby



Potential Role of Immunological Component in Pathogenesis



- Poor Diagnostic Tool
 - Clinical test is lengthy and complicated
 - Normal-outcome pregnancies & Other diseases



Hypertension

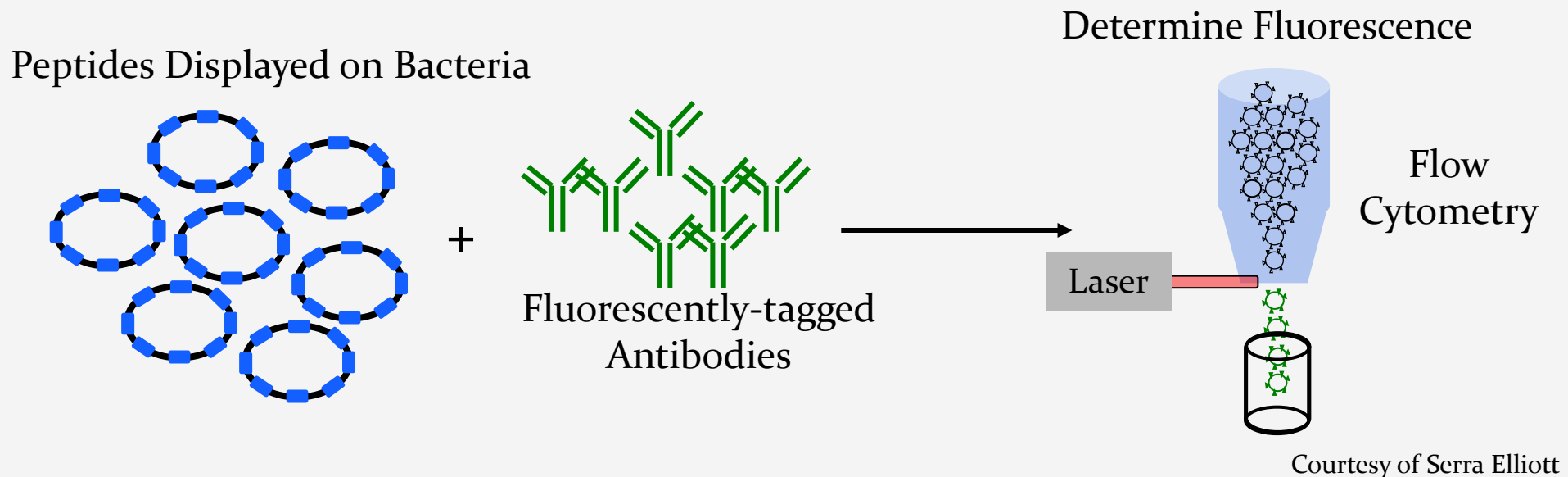


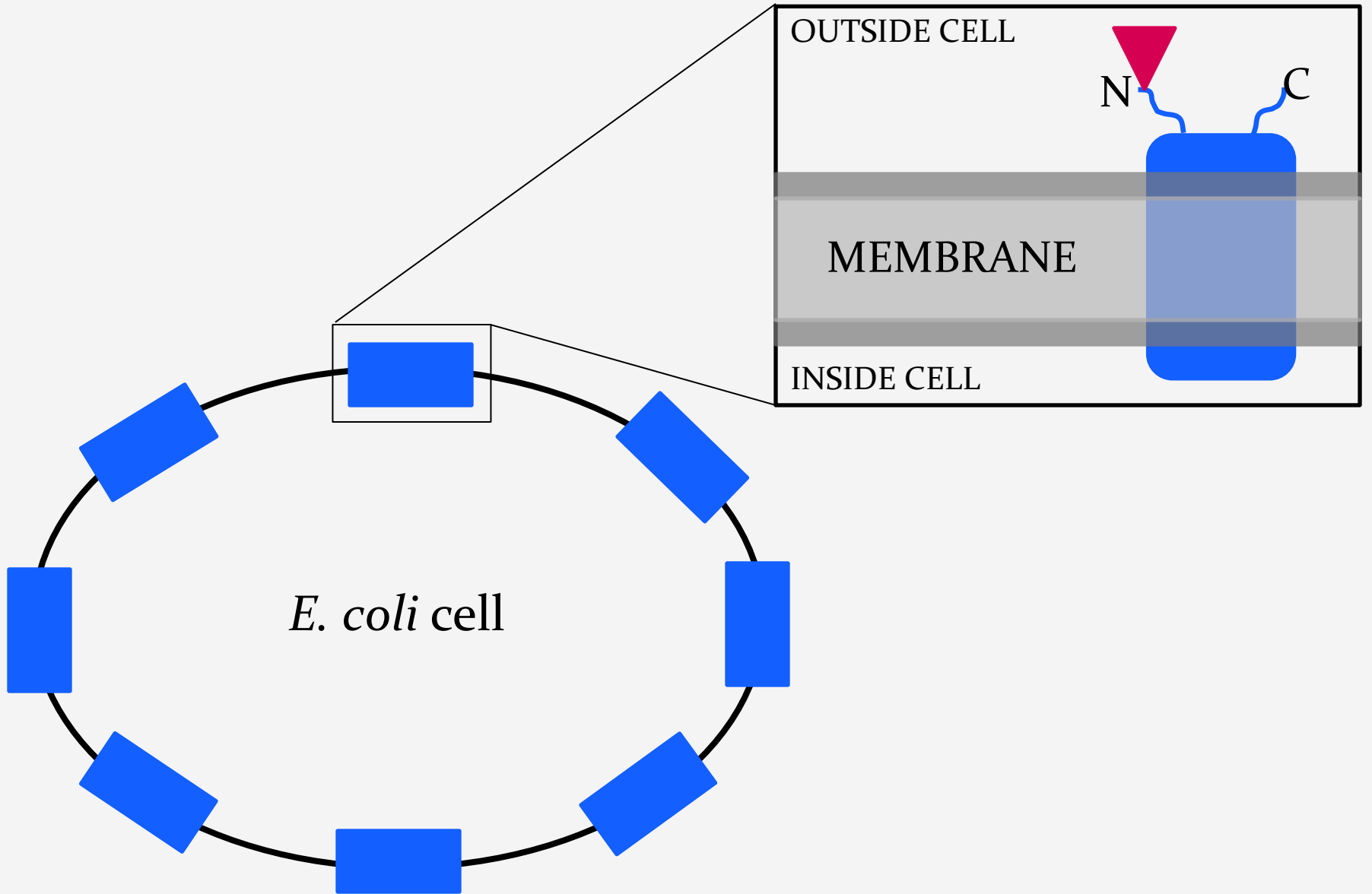
Proteinuria

Hypothesis: Additional PE-specific antibodies exist and could serve as effective biomarkers

Antibody Detecting Peptides for Diagnostics

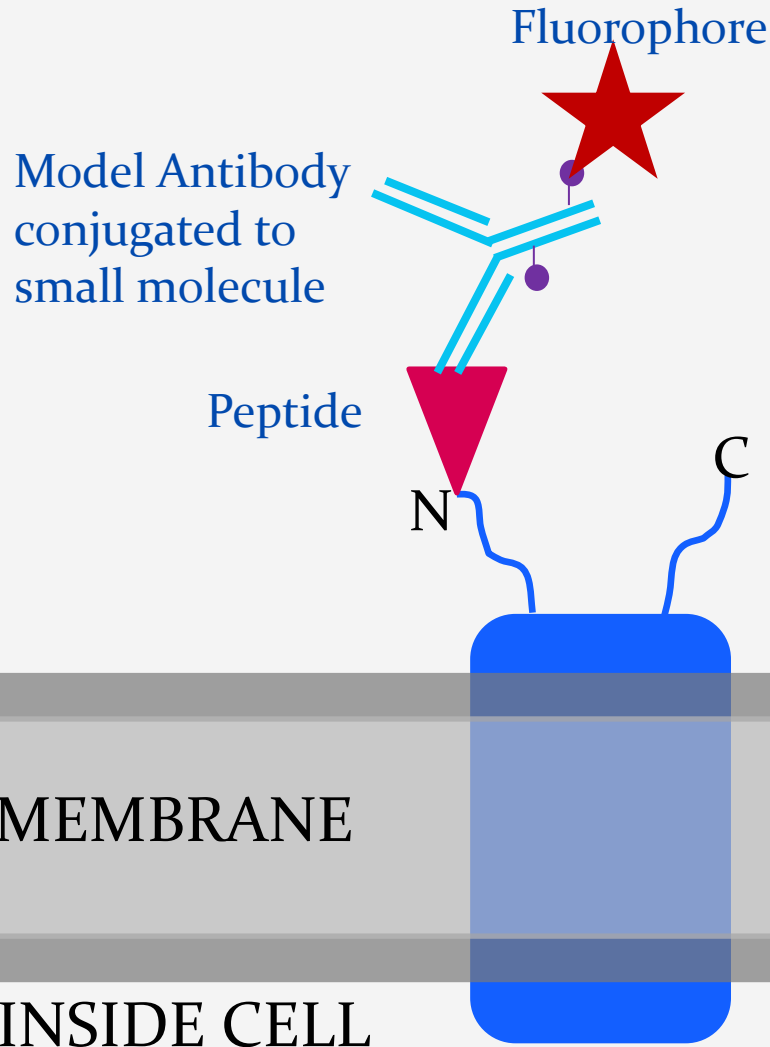
- Fluorescence signal = peptide-antibody binding
 - peptide expression and target concentration
- Accuracy of a peptide-antibody interaction to differentiate between PE and Normal-outcome





Model Antibody

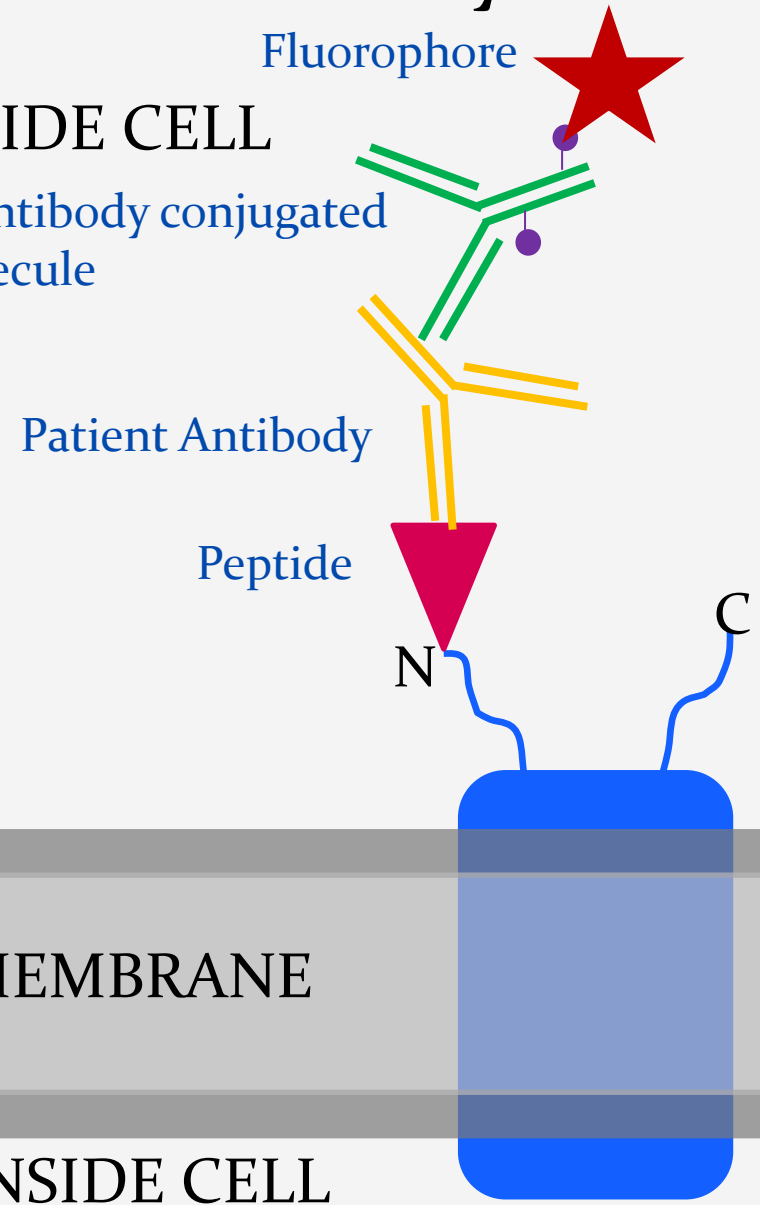
OUTSIDE CELL



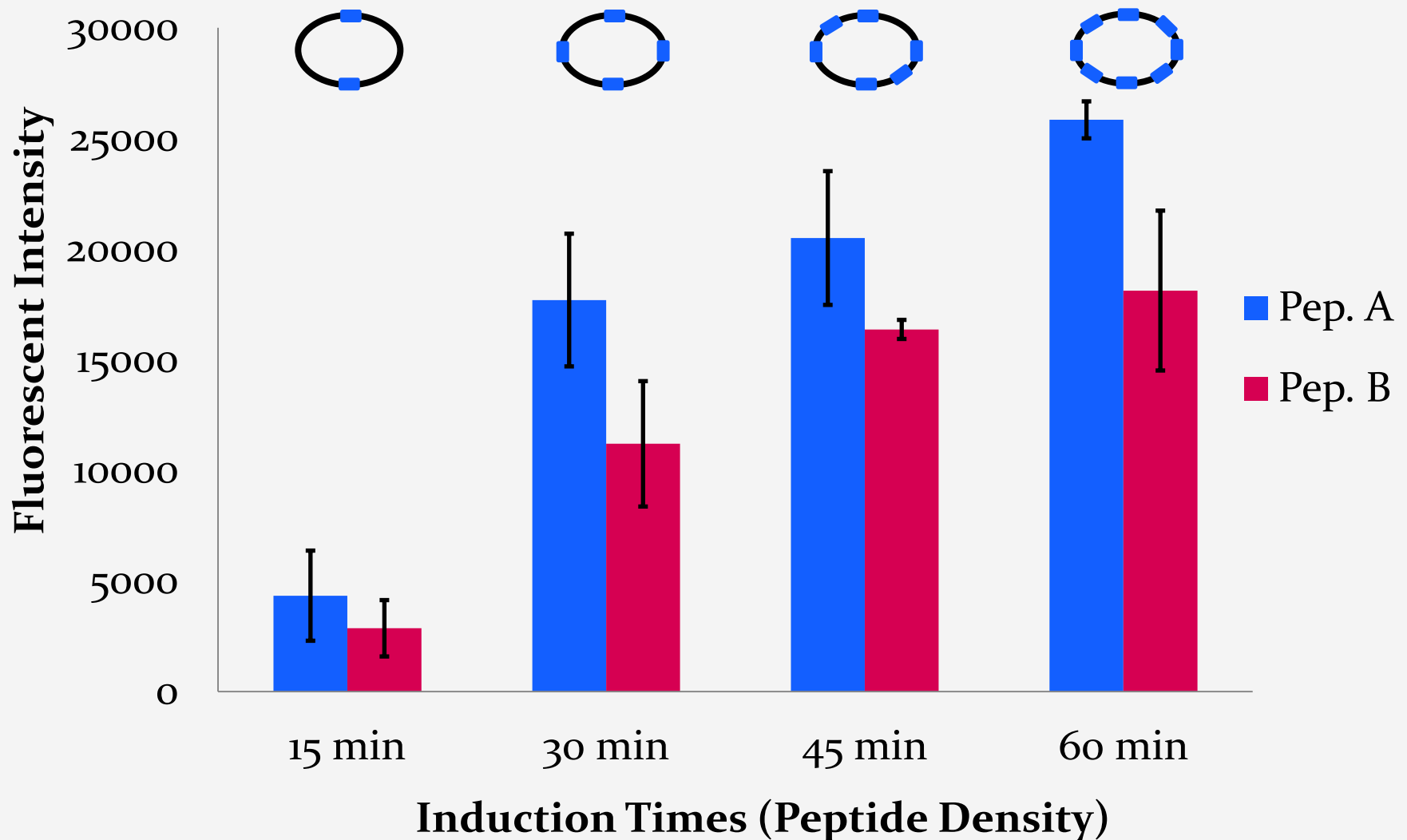
Patient Antibody

OUTSIDE CELL

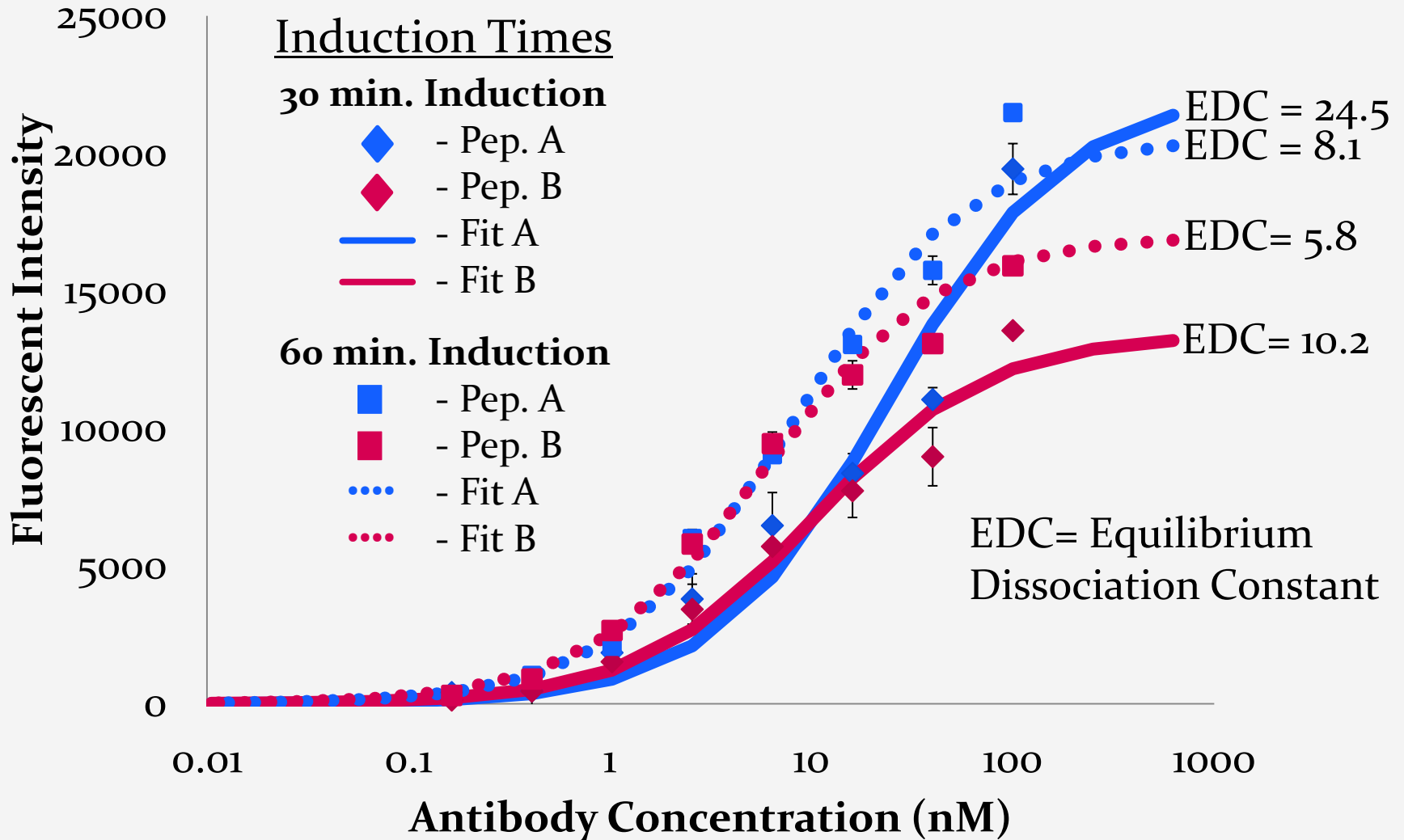
Secondary Antibody conjugated to small molecule



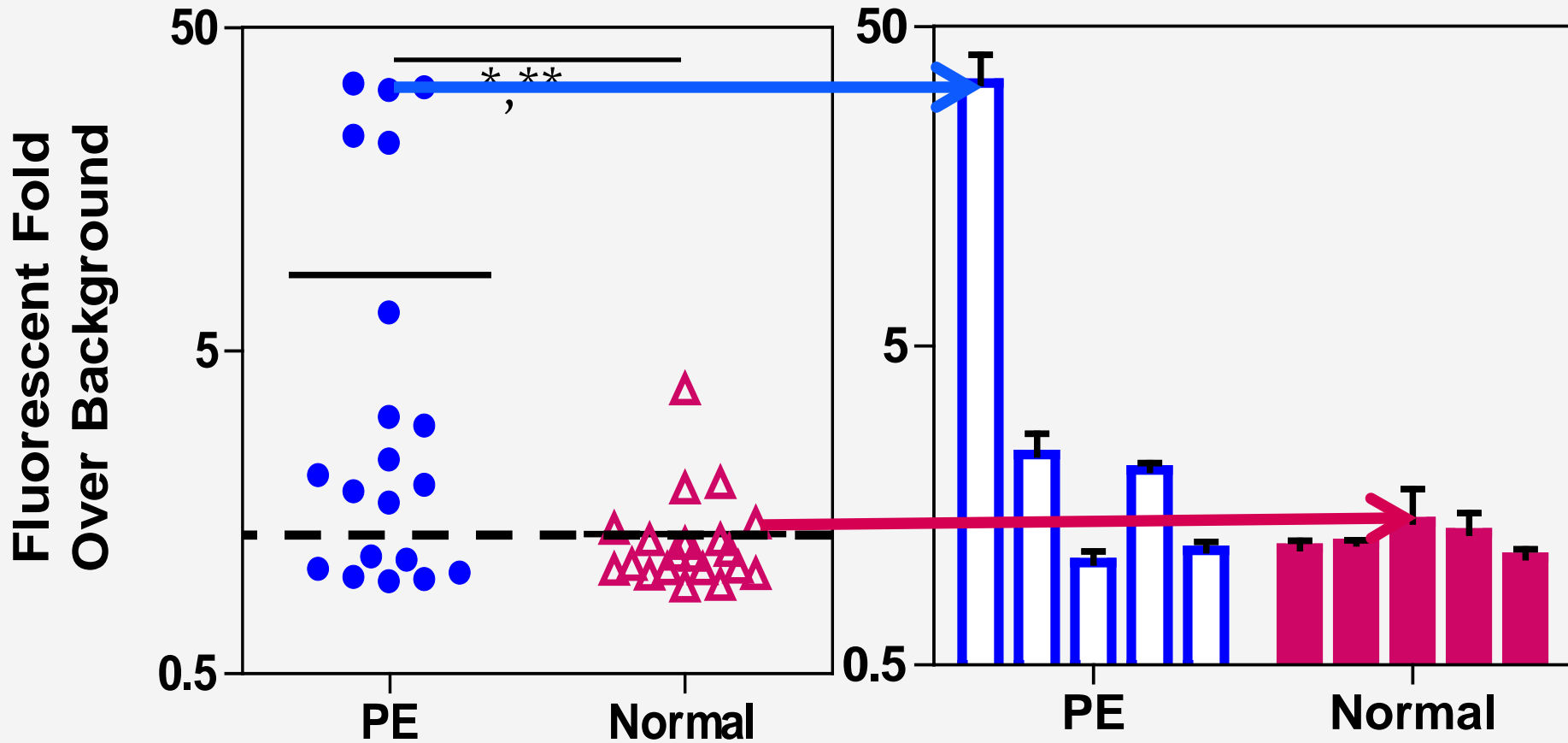
Fluorescent Signal Increases with Peptide Density



Peptide Density Also Affects Apparent Binding Affinity



Mean Fluorescent Fold of PE Patients Indicates Higher Reactivity with Peptide

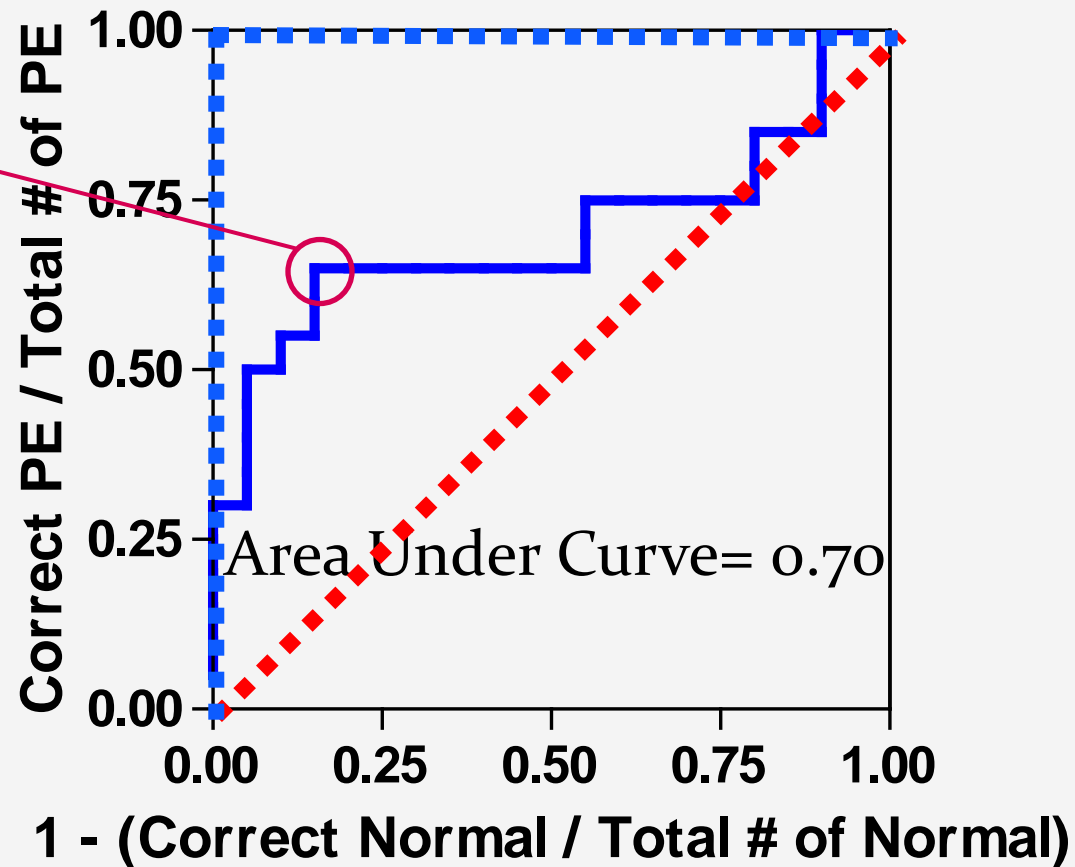


*t-test, **U-test $p < 0.05$

Receiver Operating Characteristic (ROC) Curve Determines Overall Peptide Diagnostic Efficacy

$$\frac{\text{Correct PE}}{\text{Total \# of PE}} = 0.65$$

$$1 - \frac{\text{Correct Normal}}{\text{Total \# of Normal}} = 0.15$$

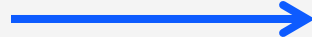
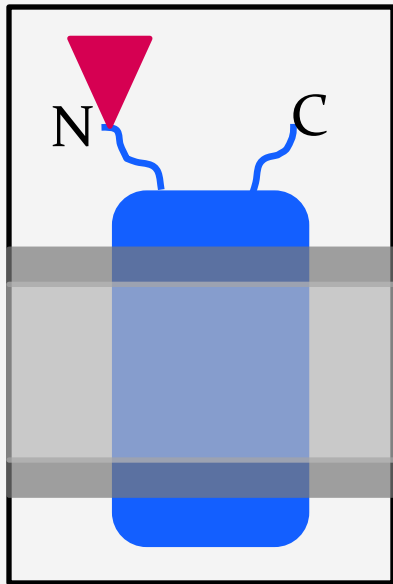


Peptide Has Potential Use as a Diagnostic Tool Specific to PE

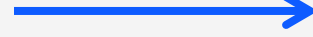
- Direct correlation between peptide density and fluorescence intensity
- Peptide density affects cell-surface binding affinity
- Area under ROC curve indicates fairly high diagnostic efficacy



Future Prospects for PE Patients



(?????????)



Number of
Maternal Deaths
and Premature
Births

Acknowledgments

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Daugherty Group



EUREKA!

EARLY UNDERGRADUATE RESEARCH
AND KNOWLEDGE ACQUISITION