

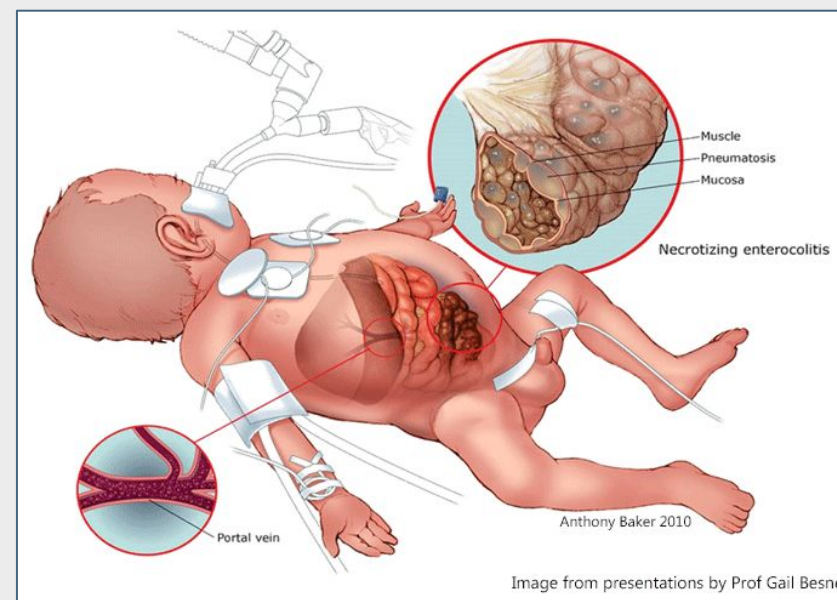
# Team B6: NEC-Detect, A Point of Care Device for Necrotizing Enterocolitis (NEC) Detection in Preterm Infants

Deborah Asfaw, Rony Garcia-Vivas, Zoe Sokol, Katherine Tom, Eitan Traum and Brooke Wunderler

Advisors: Dr. William Bentley and Dr. Sara Molinari (Fischell Department of Bioengineering), Dr. Rose Viscardi (University of Maryland Medical Center NICU)

## Clinical Background

- Necrotizing Enterocolitis (NEC):** GI disease that affects the intestines of preterm infants
  - Incidence: 7-10%
  - Mortality rate: 30-50%
- Rapid disease progression (death can occur 24-48 hrs after onset of first symptom)
- No diagnostic test for NEC is being used clinically



A better way to detect NEC in preterm infants that provides faster detection and lowers the mortality rate

## Concept Design & Design Requirements

- Formic Acid**, a short chain fatty acid found at elevated levels in stool samples of preterm infants with NEC
- Potassium Permanganate (KMnO<sub>4</sub>)**, reagent that produces a color change reaction with Formic Acid found in infant stool for the colorimetric assay

Design Requirements	
Category	Specification
Duration of Test	Time for test + result ≤ 45 minutes
Centrifuge	<ul style="list-style-type: none"> <li>Capable of 12,000 Gs</li> <li>13 cm x 13 cm x 10 cm</li> </ul>
Sterility	Able to be stored in clean, bacteria-free environment
Ease of Use	Can be done without training

## Bioethical Implications

- Accurate diagnosis & appropriate interventions
- Equitable access across healthcare settings
- User-friendly interfaces for diverse healthcare professionals

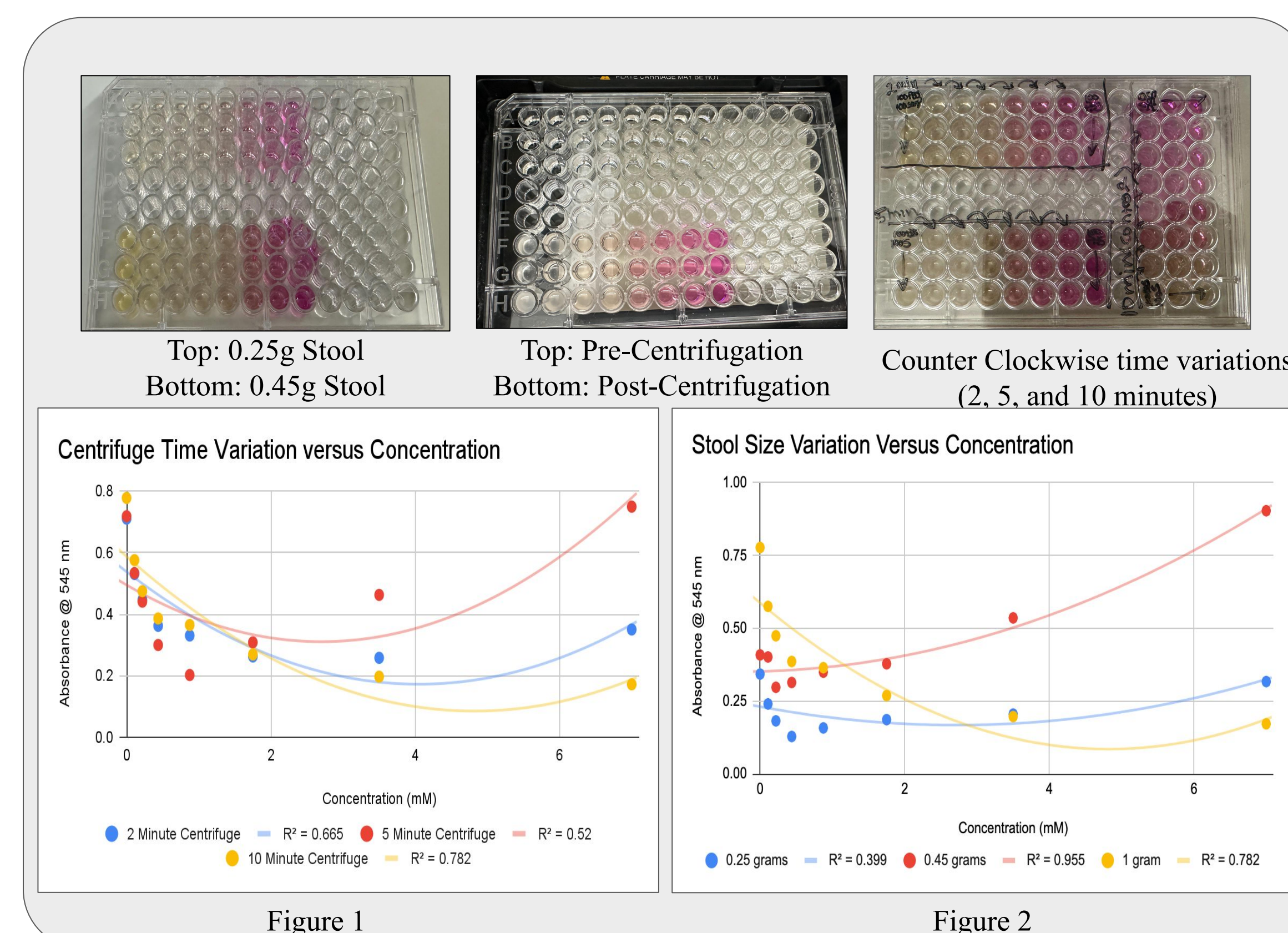
## Acknowledgements

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## Kit Overview



## Assay Testing



## Results & Conclusions

### Assay Testing Results:

- KMnO<sub>4</sub> to be added after centrifugation to avoid absorption by the stool
- A 0.2 g to 0.5 g stool sample is sufficient to record an accurate result (Fig. 2)
- Formic Acid is released from the stool with 2 minutes of centrifugation at 12,000Gs (Fig. 1)
- A 22 minute waiting period is required for reaction stabilization to attain a clear result

### Filter Testing Results:

- Utilization of gauze & addition of pressure component to allow fluid flow

## Future Work

- Develop positive control testing to validate kit assay components
- Conduct clinical trials to validate efficacy and reliability in diverse patient populations
- Refine the design of kit components to optimize manufacturability
- Convert centrifuge to battery power