Team BELI: Investigation of Gut Motility Throughout the Menstrual Cycle

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Introduction

- Studies have been structured around male anatomy and physiology, disregarding female representation. Today, females are still underrepresented in health literature.
- Research indicates sex disparities in diagnosis and treatment efficiency, particularly in gastrointestinal diseases, with limited options for females despite higher prevalence.
- Connecting gut motility and menstruation symptoms will help physicians and females to understand more about menstruation, which will hopefully increase the accuracy and efficiency of female diagnosis.
- **Research Question:** How does gut motility change throughout the different phases of the menstrual cycle, specifically during hormonal fluctuations found throughout the menstrual phase, ovulation, and mid-luteal phase?
- **Hypothesis:** Transit time, an indicator of gut motility, will increase as estrogen levels rise, leading up to ovulation. Transit time will also increase as progesterone levels rise during the luteal phase.

The Smart Underwear Device

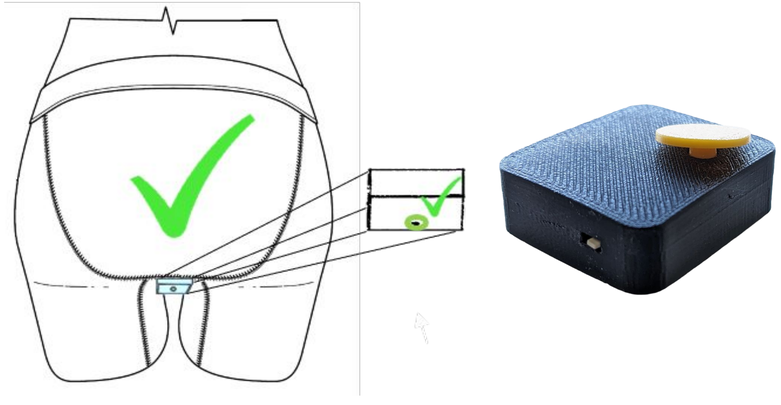

Figure 1. Wearing location of the Smart Underwear Device and close-up of the Smart Underwear Device. The Smart Underwear device will be used to measure flatus frequency, volume, and composition. It is approximately the size of a quarter and is completely non-invasive. The device can be comfortably worn over several days and is activated via a switch.

Methodology

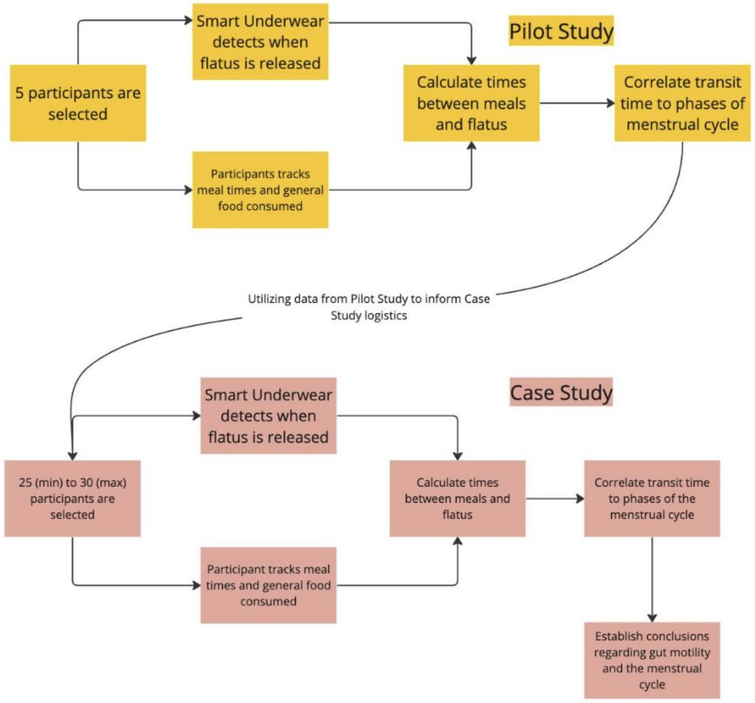

Figure 2. Methodology Flowchart

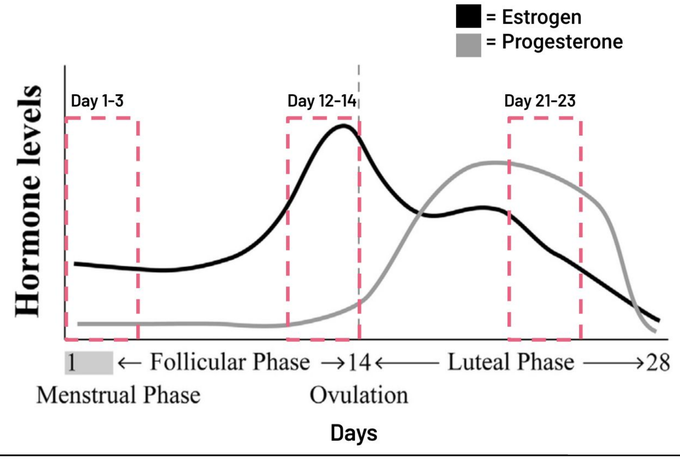

Figure 3. Graph showing days the participants will wear the device over three-time intervals across one month. The first interval, Days 1-3, is in the menstrual phase when estrogen are higher than progesterone levels. The second interval, Days 12-14, is the tail end of the follicular phase when estrogen levels are at their highest. The third and final interval, Days 21-23, falls at the end of the luteal phase when progesterone levels are higher than estrogen levels.

Illustrative Data

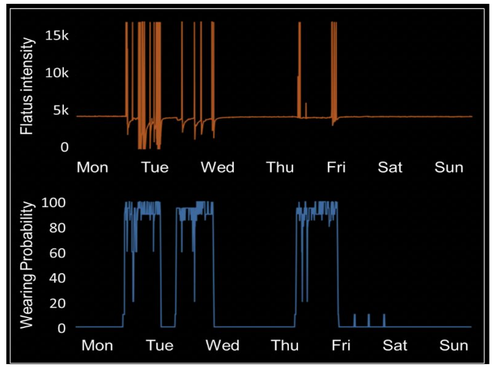

Figure 4. Top graph: shows sample data of the intensity and frequency of flatulence in a single participant wearing the device for one week. Each spike represents one flatulence. Bottom graph: shows how much the participant wore the device on each day.

Next Steps

- Incorporating luteinizing hormones
- Obtaining IRB approval to use LH to get more specific time frames for ovulation
- Increasing our sample size to 25 participants for the case study and increasing the number of menstrual cycles studied for each participant.

Future Goals

- Extend the scope of the field to utilize a qualitative device, such as the Smart Underwear device, to more accurately diagnose gastrointestinal symptoms.
- The ability for females to quantify their gastrointestinal symptoms during different phases of the menstrual cycle to help identify the causation of their symptoms, thus providing more accurate diagnoses.
- Utilize our findings and efforts to raise awareness about the gap in knowledge regarding female health in other communities.

Acknowledgements

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References

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