

Pilot study shows **Blue Food Colouring in Muffins** provides a non-invasive, objective measure of gastrointestinal function in people across the autism spectrum.

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Background

Autism-linked gastrointestinal (GI) distress, involving severe constipation, reflux, bloating, and pain are common and yet objective GI assessments for people across the autism spectrum are currently lacking. Moreover, because people with profound autism may be non-verbal or otherwise unable to communicate their symptoms, gastrointestinal symptoms remain under-reported with negative impacts on quality of life for these individuals and their caregivers.

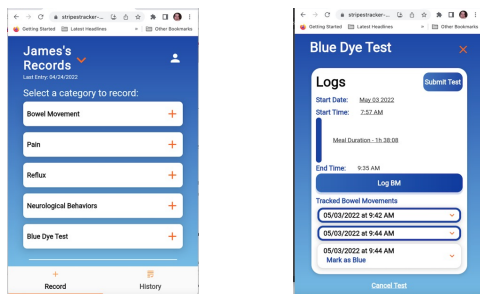
Objectives

Our goal was to run a pilot study of a non-invasive, home-based objective measure of whole gut transit time and lag phase, two measures relevant to gut motility/function. To quantify whole-gut-transit-time and other, co-occurring symptoms prospectively, we developed a web application, 'Stripes Symptom Tracker' based on a caregiver-assisted questionnaire (Margolis et al. 2019). Stripes Symptom Tracker works on an account system, allowing multiple caregivers to log symptoms.

Methods

- Participants were recruited through the Phelan-McDermid Syndrome Foundation patient advocacy group.
- Blue muffins were prepared by a professional baker (Naked Tart Bakery in Charlotte) and shipped to consented families.
- Telemedicine appointments were arranged for each household for muffin consumption in case of complications.
- Blue Dye Test: Consume the blue muffins after an overnight fast. Blue muffins match nutritional composition used for scintigraphy.

Caregiver-assisted Stripes Symptom Tracker



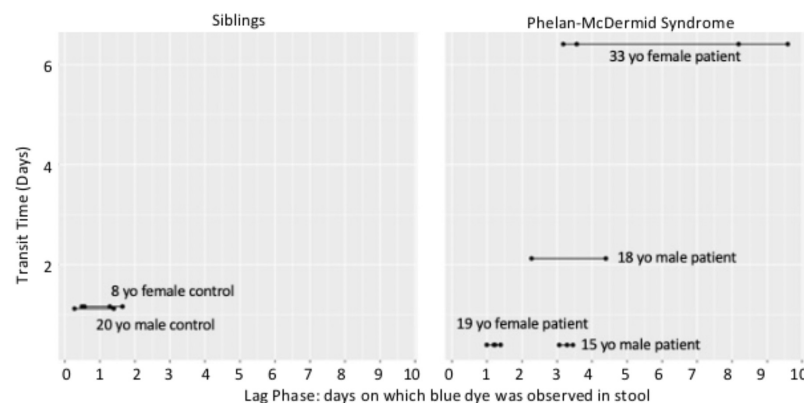
Eat Blue Muffins

Track BMs

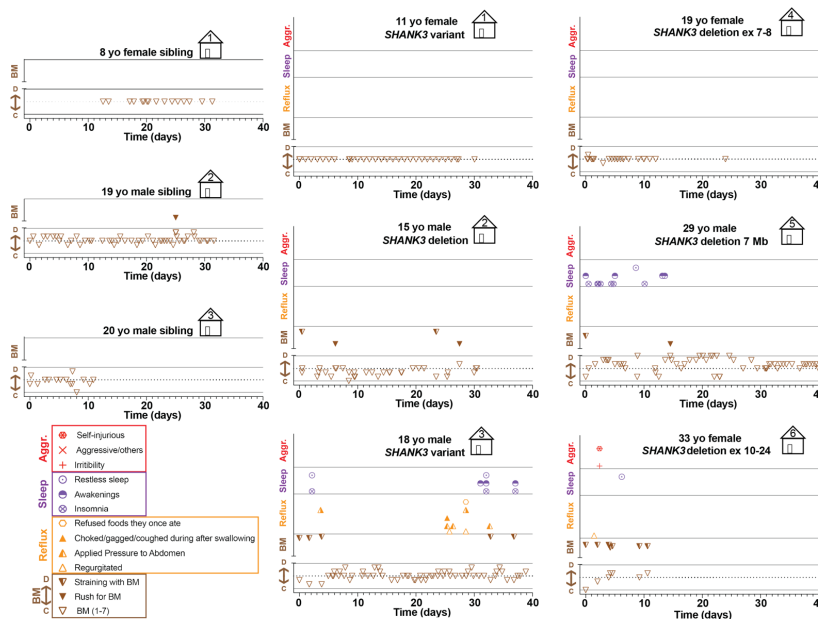


Results

Caregivers were able to detect blue dye in bowel movements in ten of eleven cases, even when whole gut transit and lag phase were prolonged, taking 3+ days for transit and 6 days for lag phase.



Straining with bowel movements was reported in four of the six patients. Irritability/aggression and sleep disturbances co-occurred, were periodic, and more prevalent in older patients.



Conclusions

- Pilot data indicate that blue dye in muffins is a feasible way to detect delayed transit as well as altered lag phase dynamics.
- The Stripes Symptom Tracker facilitates prospective collection of symptoms in real time and reveals dynamics of how symptoms cluster with each other and change over time.

Future Directions

- Muffins do not serve the patient population with gastrostomy tubes and so new methods of adding dye to standard meal still needs to be explored for this population.
- Based on these pilot data, we next plan to validate these measures in a larger population of people across the autism spectrum to better understand autism-linked GI distress and provide tools for identifying helpful interventions.

Acknowledgements

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Conflict of Interest: Drs. Moshiree and Dallman named in provisional patent 63/283,665.

These results have been accepted for publication with additional authors Elizabeth Davidson and Calliope Holingue in a special issue of Seminars in Neurology dedicated to gastrointestinal symptoms that are common in neurological conditions.

