

Introduction

- Autism Spectrum disorder (ASD) is a varied set of neurobehavioral changes characterized by distinct, repetitive behaviors along with impaired socialization and communication.
- Gut dysbiosis may be present in patients with ASD.
- Previous research has shown a 50% regression of neurological symptoms post-intestinal microbiota transplant in children 2 years post-transplant.
- Early treatment using a family member donor may improve outcomes in older patients with ASD.
- The purpose of this case study was to examine the effect of fecal matter transplant (FMT) on the gut microbiome in a 19-year old adolescent with ASD using a sibling donor.

Methods

Fecal matter from a healthy sibling (15-year old sister as donor) was infused via colonoscopy into the subject's gastrointestinal tract following a protocol approved by FDA as an Investigational New Drug. Fecal samples were collected at baseline (patient and donor) and then from the patient at week 5, and month 3 and 6. Metagenomic Next Generation Sequencing was performed on fecal samples, where DNA samples were extracted and normalized for library downstream fabrication using Shotgun methodology.

Discussion

- This is the first case demonstrating implantation of microbes from a familial donor (sister) to an adolescent patient (brother) with ASD.
- FMT yielded marked improvements in the patient's gut microbiome.
- Patient experienced improvements in ASD core symptoms, including aggression.
- Previously non-verbal patient has now said "mama" and "baba."
- Childhood Autism Rating Scale (CARS) testing is underway but given recent nature of the implant and subject's age (19 yrs.), substantial changes are not yet expected.
- Although early in clinical assessment, this case demonstrates the disappearance of an overabundant microbe (*L. animalis*) and restoration of phyla and species missing or in low numbers in the patient with ASD when compared to his sister.

Results

Patient and donor microbiome comparison



Post-FMT Changes in Gut Microbiota

- Compared to baseline, Relative Abundance of phylum Proteobacteria decreased from 49% to 1.3%.
- Over the 6 months, Relative Abundance of phylum Actinobacteria increased from 0.012% to 2.5%, specifically genus *Bifidobacterium* (0.0% to 1.9%).
- Species *Lactobacillus animalis*, absent in the donor, disappeared in the patient (58% to 0.0%).
- Shannon Index of bacterial diversity significantly improved (2.2 to 6.2), almost matching donor (6.7).

