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Fecal Microbiota Transplantation (FMT) What is the Future of Fecal Transplantation? Questions to be Asked

Aziz Koleilat*

Department of Pediatrics, MUGH, Beirut Arab University, Lebanon

***Corresponding author:** Aziz Koleilat, Department of Pediatrics, Makassed University General Hospital, Beirut Arab University, Beirut, Lebanon, Tel: 009613231717; E-mail: drkoleilat@gmail.com

Opinion

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Abbreviations: FMT: Fecal microbiota transplantation; CD: *Clostridium difficile*; FT: Fecal transplant; NCD: Non communicable diseases.

Introduction

Fecal microbiota transplantation (FMT) is the transfer of stool from a "healthy" donor to a recipient believed to harbor an altered colonic microbiome resulting in disease [1].

The goal is to restore eubiosis, or a "healthy" microbiome which was distorted by diet, antibiotics, inflammations and other causes.

Often referred to as, Stool trans- plantation, Fecal transplantation, Fecal flora reconstitution, Fecal bacterio therapy, Human probiotic infusion [1-3].

The rationale of using FMT to treat disease has been validated by its successful use in treating recurrent C. difficile infection.

C. difficile occurs as a result of decreased microbial diversity in the gut, and impaired microbial community resilience and colonization resistance, most often in the setting of recent antibiotic treatment.

Large majority of patients with C. difficile achieved complete cure of infection by FMT [4-6].

Fecal transplant was first documented in the 4th century in China, which was known as "yellow soup", It was made of fecal matter and water, and was given to the patient with intestinal infections.

The Chinese medical literature mentions its use for treating food poisoning and severe diarrhea.

Li Shizhen, (The 16th century Chinese physician) used "yellow soup,""golden syrup**,"** containing fresh, dried, or fermented stool to treat abdominal diseases [2,7].

Used by German soldiers in Africa to treat dysentery during World War II. 1940. First time was described in the west, in 1958 by Ben and colleagues, who successfully treated four critically ill patients with fulminant pseudomembranous colitis using fecal enemas [8].

In 1959, another successful fecal transplant for UC (ulcerative colitis) was done by Bennet and colleagues (it was given to himself) [9].

The therapeutic potentials of FMT in non-gastroenterologic conditions being studied [10-13].

These conditions include: Auto immune disorders, obesity, increased insulin sensitivity, food allergy, metabolic syndrome, diabetes, neurological conditions,

multiplesclerosis, parkinson's disease, tumors, With promising results mainly in adults.

The future holds a lot of promise for the potential applications for FMT in obesity, NAFLD, CDI, IBD and Autisim.

A key question now arises: Could we manipulate the microbiota environment to treat or prevent obesity in humans especially children?

Can FMT play a role in pediatric IBS, inflammatory bowel disease, atopy and inflammation, autismwhich has been shown also to have a disturbed microbiome which is fairly common and difficult to treat? [14].

Does future advancement in delivery of FMT will soon allow commercial use of a capsule form of FMT with desiccated microorganisms?

Do we need all the microorganisms or can we tailor them to a specific disease? [15].

Would *Bacteroides* (human probiotics) alone be sufficient to cure patients since they seem to be key organisms these diseases? [16].

Can we optimize microbiota to prevent infections or to reconstitute the microbiota following antibiotic treatment?

If this is possible, what is the time frame for this to be needed…till now it is not clear.

Must the administration of microbiota components be matched to the host's genotype, diet, or environment!!?

Since some specific commensal bacterial species might cause disparate immune responses in different individuals.

To what extent can dietary changes optimize the intestinal microbiota, and how will this influence the immune system? [17].

Although our understanding of the microbiome and mucosal immune system is moving forward rapidly and could be explained.

The diversity of the fecal microbiota and the marked genomic variation even within well-defined bacterial species is making the design of optimal probiotic combinations challenging!!!

Eventually, with the development of probiotic combinations, fecal transplantation will be replaced by administration of probiotic consortia.

Diet has been demonstrated to alter the microbiota and enhance the ability of the microbiota to absorb calories, and this is likely to also extend to relative immune activation.

Knowing the impact of the microbiota on gut-associated immune tissues and systemic immune development, this will remain the focus research for many years to come.

Summing up all the above we can say:
Fecal microbiota transplant (FMT) has been introduced several decades ago in an attempt to restore the gut microbial balance.

FMT appears to be the most efficient method to effectively change and sustain the gut microbial composition.

Success in eliminating recurrent *Clostridium difficile* infections and restoring the gut microbial profile to resemble that of the healthy donor in this difficult to treat population is 90%.

The new gut microbiome appears to be stable in the recipients for at least 24 weeks [2].

FMT is still difficult for the pediatric scientific community to embrace andaccept this therapy as there are only sporadic reports in children.

FMT has also been used now to treat inflammatory bowel disease, especially ulcerative colitis and was successful [18].

FMT may be a treatment of many difficult diseases.
FMT could be adjuvant for the treatment of non-communicable diseases.
FMT will be the future of treatment, who knows, it may replace antibiotics!!!!! [2]

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