THE SKINNY ON FMT – GUT BACTERIA AND IMPLICATIONS FOR WEIGHT LOSS

DYAN DARGA, RN, BSN, CGRN / MANAGER OF OPERATIONS - ENDOSCOPY DEPARTMENT
EMORY JOHNS CREEK HOPSITAL - JOHNS CREEK, GEORGIA 30097

1. BACKGROUND

Fecal Microbiota Transplant (FMT) is the process of using a healthy stool specimen and transplanting it into the gastrointestinal tract of a recipient for the purpose of improved health. This procedure has gained popularity in the last 2 decades for treatment of recurrent *Clostridium difficile colitis (C-diff),* however, using stool transplants to treat GI ailments dates back to the fourth century in China.

More recently, FMT has been studied for the treatment of Crohn's disease, arthritis, metabolic syndrome, migraines, autism, fatty liver disease, anxiety, and OBESITY.

The concept behind FMT is that a change in the intestinal flora or microbiome alters the bacterial makeup which subsequently alters metabolism.

Obesity is recognized as a global epidemic with nearly 2 billion adults being overweight.

Research suggests that "gut microbiota plays an important part in how many calories we extract from our food, how we store them, and how we burn them" (Dennett, 2016).

Whole populations like the Pima Indians and Samoans, are extraordinarily fuel efficient, and prone to obesity and weight loss resistance. This was a benefit centuries ago when food was scarce but contributes to obesity today.

2. FAST FACTS

- There are 100 trillion microbial cells that inhabit the GI tract. Each person's gut flora is similar to a fingerprint.
- Individual diversity in flora composition is very large and varies by geographical location and dietary habits.
- Obesity is associated with low bacterial richness/diversity and leanness is associated with greater microbial diversity.
- Plant-based diets (high in fiber) may promote a more favorable and diverse microbiome profile.
- Probiotics enrich the intestinal flora.
- Many studies on animals have shown anti-obesity properties of probiotics.
- 90% of GI flora belong to two main phyla: Firmicutes and Bacteriodetes.
- Firmicutes = abundance causes obesity because they are so efficient at extracting energy from food.
- Bacteriodetes = abundance predisposes a lean frame.
- Microbiota is involved in the control of body weight, inflammation, and maintenance of energy levels and, therefore, plays a role in the pathophysiology of obesity (Kobyliak, 2016).

3. METHODS

A systematic review of literature from 2013 through 2016 using Cinahl Complete, Pub Med, and Academic Search Premier databases was conducted.

Search terms included: Fecal transplant, weight loss, obesity, microbiome, probiotic, resistance, animal studies and mice studies.

The majority (10/13) of the articles used were peer reviewed.

Exclusions were articles earlier than 2011 or those of non-English language.

4. PROBIOTICS FOR WEIGHT LOSS

- Saccharomyces boulardii, (Florastor)
- Lactobacillus rhamnosus GG, (Culturelle)
- Enterobacter halii,
- Akkermansia muciniphila,
- Lactobacillus gasseri

All have been shown to have an active role in decreasing weight gain, overall weight maintenance, effective glucose metabolism, effective energy metabolism, encouraging weight loss and decreasing fat mass:

Natural sources of probiotics include yogurt, soy beverages, miso, tempeh, sauerkraut, and kimchi. Overuse of probiotics can cause abdominal pain, bloating, and gas. Those with suppressed immune systems should avoid the use of probiotics or consult a physician before use.

The standard American diet (SAD) – high in inflammatory fats, processed carbohydrates, and low in fiber negatively impacts gut flora by shifting the balance towards the Firmicutes phylum (fat-forming bugs) and this can happen in as little as 24 hours after eating a high fat meal!

Artificial sweeteners have been linked to dysbiosis, which is an imbalance in gut flora.

5. RESULTS

The altered microbiota present in obese individuals may be predisposing them to obesity because of:

- Increased energy extraction
- Interaction with the gut-brain access leading to decreased energy output
- Influence on satiety (Gupta, et al., 2016).

Genetic differences contribute to obesity and cause variation in energy storage and expenditure (Devaraj,et al., 2013).

Studies in both animals and humans reveal that dietary modification results in rapid alterations to microbiota composition (Graham et al., 2015)

Modification of the gut microbiome may assist in the prevention or management of obesity.

Probiotics may alter the variety and distribution of the intestinal flora influencing weight maintenance and possibly even weight loss.

Fecal Transplant is another method of changing the intestinal flora and has been shown to influence energy harvest and

Many studies, though not all, provide evidence of an association between GI microbiota and obesity (Graham et al., 2015).

6. ANIMAL STUDIES - RESULTS

Mice reared in sterile environments with no gut bacteria of their own:

- Pack on the pounds after having a FMT from an obese twin
- Remain lean after a FMT from a thin twin

When allowed to cohabitate, the battle of the microbiota began:

- Microbes from the lean mice won
- Lean microbiota took up residence in the obese mice and kept them from putting on weight

7. CONCLUSIONS

Don't celebrate just yet…

Further research is needed to investigate whether dietary components that increase flora diversity may augment weight loss WITHOUT drastic energy restriction.

People will never be able to eat whatever they want and compensate with fecal transplants or probiotics, but these therapies may be able to assist with weight loss in conjunction with diet and exercise.
.FMT is proof that correction of the dysbiotic microbiota is an effective treatment modality in humans.

Overall, a balanced, robust, and diverse community of gut flora is the key to good health and a lean metabolism (Mullin, 2015).

Fecal Transplant, probiotics, and dietary modification are all methods to alter the balance of microbiota in the gut that may assist with energy metabolism and weight loss.

8. FUTURE RESEARCH

Some probiotic strains may be beneficial in the prevention and treatment of obesity but more research, using larger sample sizes, is needed (Burton-Shepard, 2015).

Canadian researchers have formulated a stool substitute from purified intestinal bacterial cultures of healthy human donors.

Future therapy may include artificial FMT capsules with defined "bacterial payloads" that target a specific disease.

Many studies in humans are currently underway to further advance the science behind the microbiome and the role it plays in obesity and many other conditions.