OBESITY AND THE CONNECTION TO THE GUT

Weight Loss

- Most weight loss programs are based on calorie in = calorie out
- Does not matter how they are dressed up
- Most of these plans being healthier foods to people who have been eating a standard refined diet
- So they lose weight
- But then gain it back
- Only 5 % maintain weight loss

Set Point Theory

- A theory from many years ago
- States that your body fights to maintain its current weight
- If you lose weight, your body will fight to get back to it “set point” – which is where you were before
- Based on observation of people re-gaining their weight
- Factors like low-functioning metabolism preventing the maintenance of weight loss not considered

Set Point Theory

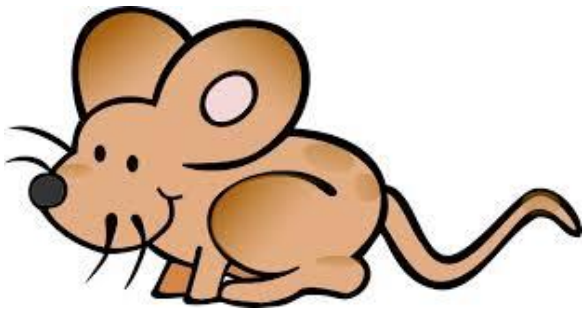
- It is also counters the thought process of people trying to lose weight
- They think their body is just a product of what they eat and the exercise they do not do
- Weight programs support this
- There is little talk that the person's body may be different and may not support "thinness"

Gut Connection

- Affect how we store fat
- Balance blood sugar
- How we respond to hormones that regulate appetite
- Affects our ability to help modulate stress
- Helps liver function
- Helps thyroid function and metabolism
- Affect digestion, nutrient use elimination of waste

Gut Connection

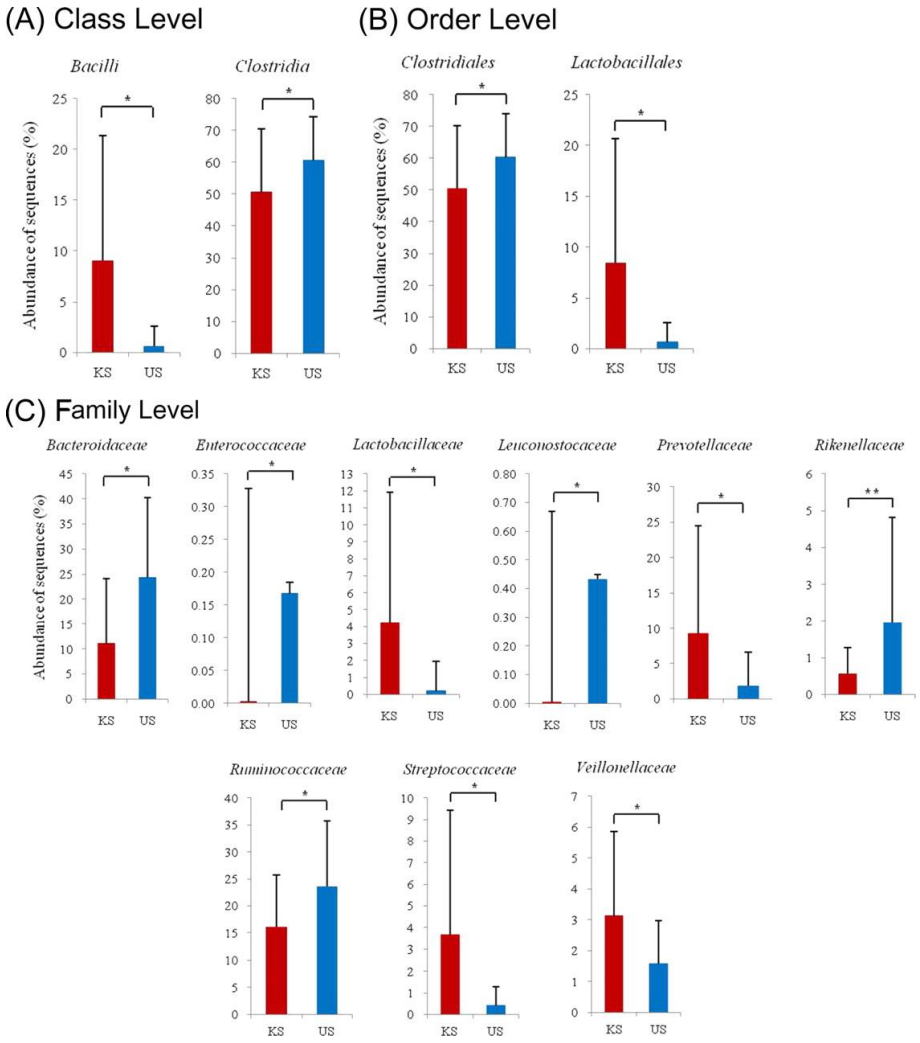
- One twin mouse study found that transferred gut bacteria from lean mice into obese mice allowed them to lose weight
- The mice that did not receive the “thin” bacteria had a less diverse gut community of bacteria (eat the same food)
- One theory suggests obese gut microbes are missing strains that help with thinness
- Lean mice had a higher amount of Bacteriodetes which are needed to digest plant fiber and starch
- Transferring 54 strains induce obese to be lean (tried different amount)
- It is not just about bacteroidetes – diversity counts, too



Study

- In a human study, comparing US and Korean twins, both identical and fraternal for lack of diversity occurred in the US obese twins vs lean twins but not a significant factor in Korean twins
- Diet was the main reason cited for the difference
- Korean diet includes more whole foods, fruits, vegetables, whole grains and legumes plus they consume kimchi virtually every day
- There are also other fermented foods in Korean cuisine

Bacterial taxa that discriminate Korean versus U.S. fecal microbiota at the class (A), order (B), and (C) family levels.



Sunghee Lee et al. Appl. Environ. Microbiol. 2011;77:7433-7437

Applied and Environmental Microbiology

Leptin and Grehlin

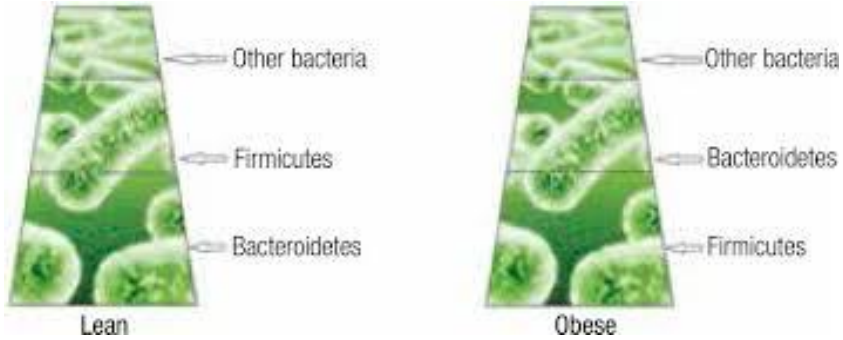
- Leptin is the hormone that determines you are “satisfied” when eating
- It helps regulates energy balance by inhibiting hunger
- Grehlin stimulates appetite
- Both are affected by h. pylori
- Having too much or too little h. pylori affect grehlin and leptin levels
- Lactobacilli play a role in limited h.pylori and maintaining balance (l. reuteri, l. salvarius, l. johnson and l. acidophilus)
- Antibiotics and our hygienic lifestyle make h. pylori too low and also affect leptin and grehlin

It Starts in Childhood

- Children who are not breast fed and delivered by caesarian are more prone to obesity and diabetes
- Studies are also documenting looking at antibiotic use in children find a correlation with higher antibiotic use and obesity rates in children
- Low dose antibiotics given to mice or livestock cause them to gain 15% more body weight

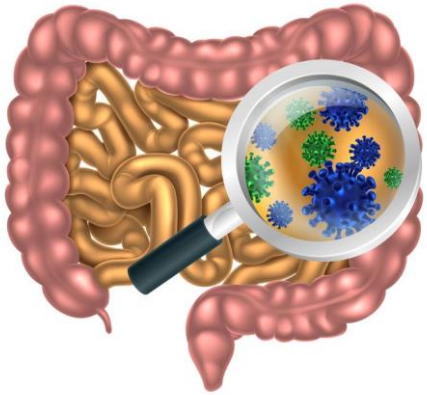
Role of Gut Bacteria

- One key role for our gut bacteria is to retrieve energy from food
- Different parts of the gut are involved with energy homeostasis, lipid metabolism and mitochondrial metabolism
- In an altered gut – seen in obese mice and humans are found to be leptin deficient
- They also have a much higher firmicutes to bacteroidetes ratio than lean humans and mice



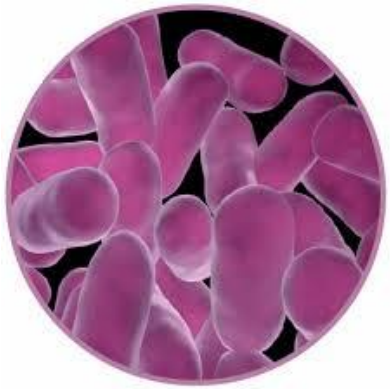
Studies

- Two current trials:
- One (in Puerto Rico)is to swab babies born via caesarean with vaginal fluids to see if this influences diversity of species and strains
- Another in Amsterdam is doing fecal transplants from lean people to those who obese
- Consider risky since it is not known what else will be transferred

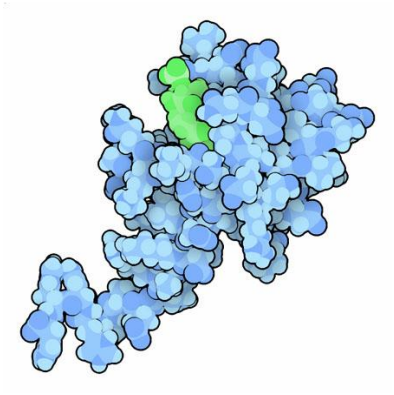


Lactobacilli

- Are firmicutes
- Some promote weight gain – l. fermentum, l.acidophilus, l. ingluviei, l. delbruecki
- L. gasseri and l. plantarum promote weight loss as did l. casei Shirota (although other l.casei strains have been neutral)
- L.paracasei helps reduce fat storage
- l. reuteri, l. rhamnosus, l. sporogenes not indicated in weight gain or weight loss
- Lactobacilli play regulatory role
- Bifidusbacteria is associated with more ATP production from carbohydrates



LPS



- The lipoprotein toxin produced by bad bacteria
- High concentrations of LPS are seen in obese humans - low levels in thin people
- High levels lead to metabolic endotoxemia which has been linked to obesity
- LPS is also a factor in the link with inflammation increasing IL-6 and TNF-Alpha in fat cells and obesity
- Mice given high level of LPS had a comparable weight gain to mice fed a high fat diet
- Both high fat and high refined carbs linked to high LPS
- Carbs with fibres lower LPS

Artificial Sweeteners

- Do they make us fat?
- Mouse studies indicate they induce glucose intolerance
- By alternating gut bacteria
- A human study look at people who did not regularly consume foods with artificial sweeteners.
- They were asked to consume artificial sweeteners for a week
- Many began to develop glucose intolerance
- In looking at the gut bacteria – researchers noted that there were two distinct types of bacteria – one group that will lead to glucose intolerance when exposed to the artificial sweeteners and another was not affected

Prebiotics

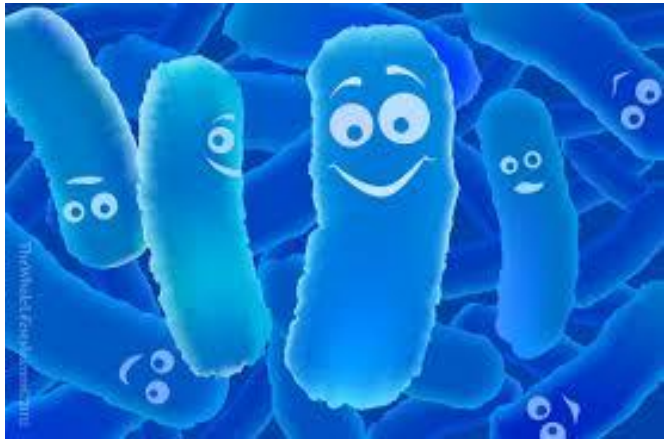
- Increase bifidusbacteria which lowers inflammation and LPS
- GOS can modulate the uptake of monosaccharides by changing their transport receptors and in turn, help with fat breakdown
- Also lowers liver triglycerides
- Inulin, FOS and GOS can promote bifidusbacteria to produce SCFA and reduce calorie intake and fat mass
- Also reduce glucose intolerance

Probiotics

- 6 week randomized control study of 60 overweight individuals taking VSL-3 probiotic lowered glucose and insulin levels but did not change weight
- Probiotic studies also show the ability for them to lower inflammation and LPS as well as support liver functions and triglyceride metabolism
- So many aspects of obesity-related functions has been observed
- But…

Bacteria

- Changing firmicute/bacteroidetes ratio and good/bad bacteria ratio is a process
- No one aspect studied is going to make a huge different and the correction takes time
- Not usually within the time frame of a study
- No study will feed people probiotics, prebiotics and other foods or supplements that help the gut



Functional Approach

- **Adrenals:** Are connected to weight gain and we have discussed the adrenal gut connection
- **High Blood Sugar:** Also related to fat storage and blood sugar is regulated by gut bacteria
- **Liver:** Plays a role with fat metabolism, storage of glucose and glucose management and the gut helps regulate liver function
- **Thyroid:** Gut bacteria produces sulfatase enzymes to convert T4 to T3 - 20% of the T4 to T3 conversion occurs in the GI tract) plus LPS affects thyroid function

What does this mean?

A good weight loss protocol would include:

a) Stress management and adrenal support
b) Liver support
c) Thyroid support
d) Steps to Good Digestion (chewing increase leptin)

However, these systems cannot function properly without a good gut health protocol

Therefore…

- Improving gut health key to a good weight loss program and may make the difference in keeping it off
- Certain strains can be helpful but are only a piece of the puzzle
- Building residential strains and increasing bacteroidetes/firmicute ratio key to building a leaner gut model
- Prebiotics essential for this
- Supporting all systems is the only way to affect a more permanent sustainable weight