

Special Feature from your Editor Dave Joffe, Pharmacist, FACA

I had a chance to speak with Dr Witherly at the Weight Management Food and Dietary Supplements conference in Phoenix last week and he had some fascinating things to share with me.

He let me know that he had just spent four months looking over 4000 pages of recent data on what makes us fat. His goal was to explain why weight loss is so tough and what to do about it He also wanted to include some new nutritional compounds that might help.

The Etiology of Obesity: Latest Concepts in Nutritional, Psychobiological and Sensory Factors of Energy Regulation.

Steven Witherly, PhD

According to Dr Witherly, Neuroscience and Appetitive research have advanced greatly in the last ten years, some highlights of this research include

- ✂✂ Energy is the brain's first priority; movement second.
- ✂✂ Peptides have parallel functions in the body (gut) and the brain.
- ✂✂ Oral and gut signals are integrated in the nucleus tractus solitarius then put into "engrams".
- ✂✂ Glucoreceptors are everywhere in the brain and body (major brain fuel).
- ✂✂ Food induces pleasure, learning and permanent sensory/pleasure memory patterns.
- ✂✂ The Orbital frontal Cortex is the major integrator of food and sensory satiety and pleasure (MFB). The brain loves dietary fat...and yet we keep saying eat less fat. This will NEVER work. Fat increases brain pleasure, we have a taste for fat and blood endorphins rise after a fat meal. So the more we reduce and the faster we lose weight the more the brain counteracts with reduced pleasure to the environment and increased pleasure for food seeking behavior.
- ✂✂ Brain responds to and can detect all three macronutrients [gut also].
- ✂✂ The taste for fat and umami compounds (MSG) adds to sensory pleasure.
- ✂✂ The Gut can sense all the same taste compounds as the tongue (vast sensory sheet)
- ✂✂ Monoamine systems and peptides systems may be regulated separately in the brain.
- ✂✂ Food evokes arousal via norepinephrine, serotonin and dopamine release.
- ✂✂ Opioid peptides play a special role in prolonging a good meal. Sweet+fat+salt combos are the best opioid releasers (like French fries).
- ✂✂ Blood glucose assists in generating a food memory (fat is best).
- ✂✂ Satiety is controlled by only half a dozen peptides; while dozens of peptides stimulate appetite.
- ✂✂ Approximately 75 to 90 neurochemicals are involved in eating and satiety. One of the most recent ones found is Ghrelin and its opposite (CCY23A). Ghrelin, secreted by the stomach, makes you hungry when you don't eat, it also controls fat storage and growth hormone secretion.
- ✂✂ Food deprivation lowers dopamine and opioid release; alternate disruptive dietary behaviors ensue.
- ✂✂ The Brain is hardwired with many redundant pathways for regulating food intake. Change one and the brain will compensate rapidly.
- ✂✂ During dieting, leptin signals the brain to make food more pleasurable and other activities less attractive. This built in survival mechanism thwarts the good intentions of many dieters.
- ✂✂ Dieting reduces the pleasure derived from the surroundings. Changes in leptin levels and other hormones direct one's attention to food-based signals when losing weight.
- ✂✂ Many obese patients have a lower number of dopamine (or pleasure) receptors. Eating is a way to increase the pleasure from these down regulated receptors.
- ✂✂ The central melanocortin system is now well established as a fundamental regulator of food intake and bodyweight in rodents and humans, as reported in *Science*.
- ✂✂ People eat for a certain amount of pleasure; when deprived, one usually overcompensates.

8 body systems must be addressed to reduce body weight:

1. **Reduce Intake of Food:** caloric restriction is an absolute necessity. You can't lose weight on exercise unless one turns into a marathoner. Exercise, however, does upregulate satiety systems. Low Carb diets work by

killing the appetite. With low insulin levels fat cells cannot enlarge.

2. **Gastrointestinal:** to reduce weight we must increase fullness via specialized nutrients, delayed gastric emptying and reduced transit time. Undigested food in lower G.I tract helpful. All parts of GI tract are shown to regulate satiety—from the mouth to the colon. Some nutrients and fibers and amino acids are effective here.
3. **Reduce Fat and Carbohydrate absorption.** Reduction of fats and/or complex or simple sugars is useful in losing weight. Many natural items are available that safely reduce absorption. Also, new food ingredients are available to reduce digestion as well. Major new players now exist with pharmacological activity. One can now block starch, glucose, maltose, sucrose, fats and certain fatty acids.
4. **Fat cells:** Obesity is normal and inevitable given our Paleolithic genes, lack of exercise and calorically dense food. High Fructose Corn Syrup and computer games don't help much either. Where fast food goes, obesity follows. As Roll' s has said: "cheap and fatty food coupled with no exercise and thrifty genes—in this environment you just have to gain weight". Reducing FFA influx into the cell while increasing the outflux is the goal. Several natural compounds can do both. HPLC diets very effective here. This is an exciting area with new herbal components.
5. **Metabolism:** reduction of body weight encourages metabolic efficiencies. We must lower set point and increase BMR and thermogenesis from food. Enhanced thyroid and or adrenaline output is also useful. Natural compounds are now available to address this key issue.
6. **Muscle metabolism:** Key role in using stored fats and the upregulation of leptin and decrease of insulin resistance. Macronutrient mixes with fatty acid structures can influence muscle metabolism. Exercise is very useful.
7. **Insulin:** major lipogenic peptide. Must prevent (1) wild swings and (2) elevated levels; and (3) increase efficiency of insulin already present. Nutrients and herbs can address all three effectively.
8. **Brain Neurochemistry:** Dieting invokes negative changes in mood and activity. Three systems must be addressed: (1) Cravings for food, (2) Appetite control, (3) Enhanced pleasure of eating. Certain amino acid and nutrients ameliorate these conditions but must be taken properly and constantly.

Use of Nutritionals, Herbs, Supplements and or Exercise to enhance correct body weight

- ✍✍ My theory is that we eat to a quantum of pleasure, and if we eat less food we have less pleasure and you will need to make up for this or the weight loss will fail. The mechanism involves leptin and endorphins and serotonin and dopamine secretions. You must boost these up as the calories fall. One can use nutrients or herbs or exercise or combinations of these.
- ✍✍ The fat cell is very active and highly regulated and secretes about 12 substances. One key in weight loss is to understand how the fat cell reacts to changes in diet and exercise and if there are nutrients that can reduce influx of fatty acids
- ✍✍ New research suggest the cortisol response to stress play a role in obesity, especially in women. Excess cortisol increases appetite and increases fat storage.
- ✍✍ New research demonstrates that as one gains weight, tissues become oxidized and, in turn, obesity gets worse. Using antioxidants in high amts. will help in some conditions associated with the obese state but will it help reduce weight? The study has not been done.
- ✍✍ Body systems and weight loss: Based on my research, the best weight loss occurs when at least 4 to 5 systems mentioned above are addressed with vitamins, minerals or herbs.
- ✍✍ New research on satiety now shows that big volumes of thick shakes with fiber is very effective in promoting weight loss. If this can be combined with low glycemic starches then the insulin spike which promotes fat storage can be reduced. Cold Smoothies are very popular and useful for weight loss regimens.

✂✂ Salt, fat and sugar cause the greatest increases in food pleasure and promote fat at the same time. Low carb works by reducing insulin and increasing glucagon, which promotes fat loss. However, not everyone can handle the low carb as it is very disruptive to serotonin and dopamine levels. We now know that obesity can't be cured and diets must be tailored to what works best—then this individual must stay on them for life.

✂✂ Several new nutritional compounds may be effective for weight loss. Garcinia, rhodiola, chromium salts, CLA, Ginseng seed extract, konjac root powder, Relora, citrus aurantium, and green tea all have good clinical efficacy. The exotic fat called “diacylglycerol oil” from Kao or ADM has been shown to reduce body fat when ingested. Fibers that slow gastric emptying seem to increase satiety by reducing ghrelin secretion.

Conclusion:

Obesity is a normal but chronic condition based on our ancestral genes designed to store food efficiently we evolved in sugar and fat poor environment and our genes can't cope with plenty..

Humans are very homogenous and studies show that the world is now more overweight than underweight.

Diets do work. Dieter's must find a program that works for them based on the 8-point program outlined above—and then stay on the rest of their lives. Programs with prepackaged food, shakes or smoothies for meals (volumetrics) and support groups works best.

Since food is addicting, food products must be treated as such—all foods that promote relapse must be completely eliminated or cravings will continue and bingeing will result.

Steven Witherly, PhD, Graduated with a BS in Dietetics and MS in Food Science from UC Davis and received his PhD in Human Nutrition from Michigan State University. Steve has worked with Carnation, Nestle and Nutrilite as Director of R&D. He is currently Vice President of R&D for Herbalife International. He has written over 20 papers on food science and nutrition and lectures worldwide in the areas of food perception, human nutrition, and dietary supplements.