August 15, 2017

Dear Regina,

Welcome to BioMarketing Insight's monthly newsletter.

We have a new look to our newsletter. Love to receive your feedback.

Last month I covered "How Will Incorporating Artificial Intelligence Deliver Better Healthcare?" If you missed last month's article, click here to read it. . This month we'll cover part one of a two part series on the topic of obesity and this month is entitled, "Can't Stop Eating? Maybe Your Brain is Telling You to Eat."

Read on to learn more about this topic and other current news. The next newsletter will be published on September 15th, 2017.

We encourage you to share this newsletter with your colleagues by using the social

Please email me, Regina Au, if you have any questions, comments, or suggestions.

Sincerely,
Regina Au
Principal, New Product Planning/
Strategic Commercial Consultant
BioMarketing Insight

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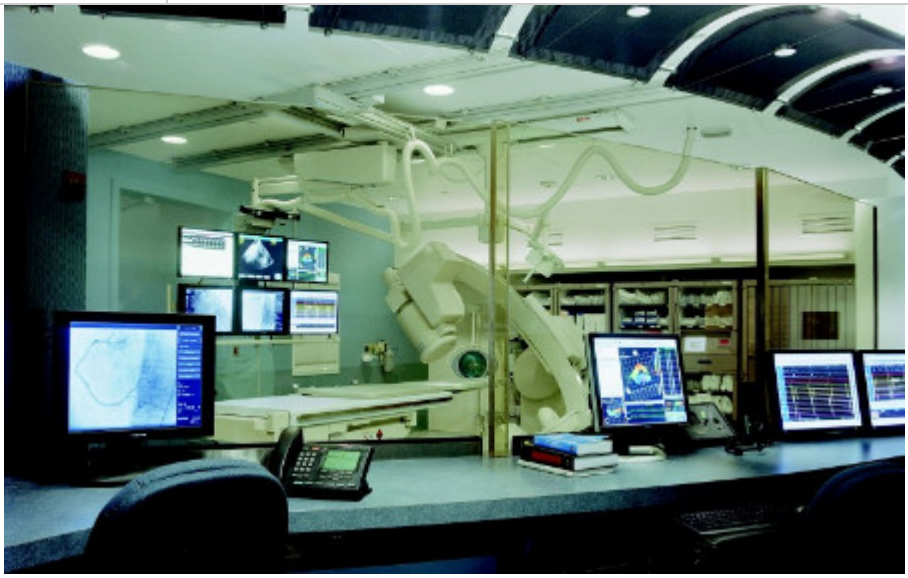

Developing a Product? Commercializing a Product?

If you are developing a product and have not conducted the business due diligence to determine commercial viability or success, contact me for an appointment. For successful commercial adoption of your product or looking to grow your business, contact me for an appointment.

For more information on our services, click on the links below:

Product Development
Market Development
Marketing Strategies

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Innovation Navigation: Road Map from Idea to a Successful Company

I am pleased to announce that I will be speaking at The Boston Entrepreneur's Network (ENET) meeting on Tuesday, September 19th, 2017, from 6:00 - 8:45 PM at Pivotal Labs,

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Why Our Microbiome is Important to Our Physiology and Diseases

I am pleased to announce that my article entitled "Why Our Microbiome is Important to Our Physiology and Diseases" was published in the International Journal of Clinical Pharmacology & Pharmacotherapy. This article reviews the results of the Human Microbiome Project and the factors that affect our microbiome in relation to our healthy state and dysbiosis or disease state. To read the article, click here.

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Immunooncology: Can the Right Chimeric Antigen Receptors T-Cell Design Be Made to Cure All Types of Cancers

I am pleased to announce that my article on "Immunooncology: Can the Right Chimeric Antigen Receptors T-Cell (CAR-T) Design Be Made to Cure All Types of Cancers and Will It Be Covered?" has been published in Journal of Pharmaceutics. This article reviews the mechanism, design and administration of CAR-T cells, and whether payers will pay for this new technology. To read the article, click here.

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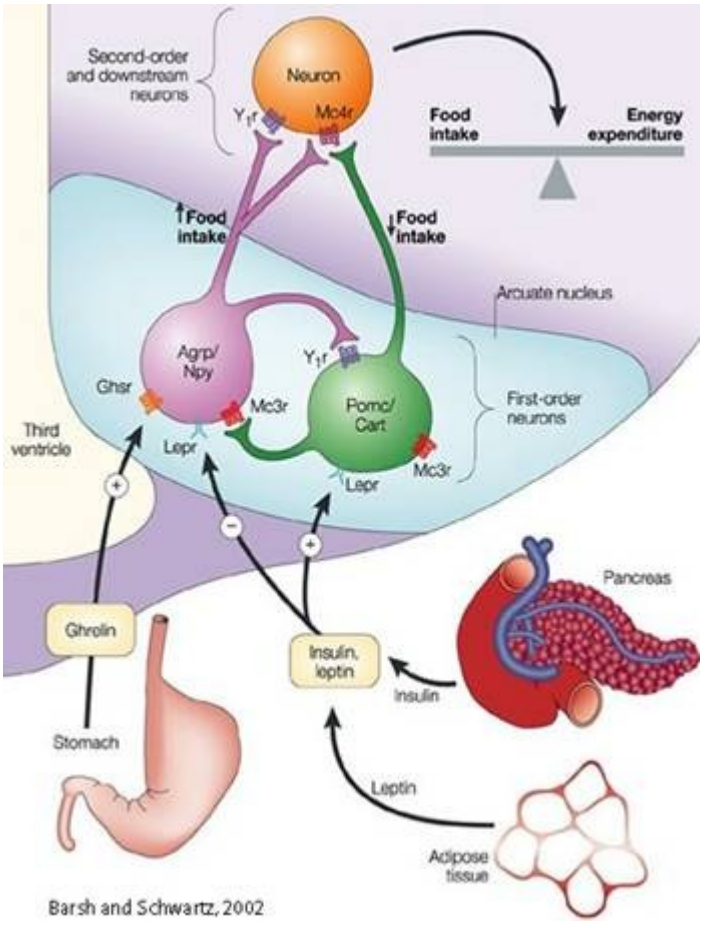

Can't Stop Eating? Maybe Your Brain is Telling You to Eat

Ever wonder why some people can't stop eating and become overweight or obese, no matter how hard they try? Some would say that this person can't lose weight because s/he lacks the willpower to stop eating.

Scientists from the Beth Israel Deaconess Medical Center (BIDMC) believe they've discovered why some people even when they feel full, want to eat more, and the answer may lie deep in the brain, specifically, in your neurons.

turn into glucose or sugar and are absorbed by your organs, liver, adipose tissue, muscle and brain, to give a supply of energy and some of it is storage as a reserve in the form of glucogen.

Our body needs to maintain homeostasis, i.e. the optimum balance, of glucose to survive. When we eat, insulin levels are increased to store glucose and the hormone leptin is released as a feedback mechanism to tell the body that it is full. When the body is hungry and needs food for energy, insulin levels drop and the hormone ghrelin is released to tell the body it is hungry.

What is happening in the brain that causes people to eat even when they are full? It has been well-documented that food-associated visual cues in television commercials and on highway signs can contribute to overeating. But how do these external signals trigger cravings and influence behavior?

Scientists from BIDMC have identified a pathway where neurons that drive hunger influences distant neurons that are involved in the decision of whether or not to react to food-related cues. In healthy humans, the insular cortex increases its activity in response to food cues during hunger but not following a meal. Studies suggest that this process often goes awry in patients with obesity or other eating disorders that exhibit excessive cravings. Those findings indicate that specific changes in brain activity, including increased sensitivity to food cues, may underlie these disorders - rather than a 'lack of willpower'.

There is a hunger-promoting neuron that expresses the gene for Agouti-related protein (AGRP) in the hypothalamus. The AGRP plays a role in maintaining body weight by inducing food intake and has polymorphisms that may potentially be related to anorexia. AGRP is also sometimes referred to as Agouti-Related Peptide located in the arcuate nucleus in the hypothalamus, which increases appetite, but reduces the rate of metabolism and energy expenditure. It is increased in obese subjects.

The appetite stimulating effects of AGRP are inhibited by the hormone leptin and activated by the hormone ghrelin. Adipocytes or fat cells secrete leptin in response to food intake. Leptin inhibits the AGRP/neuropeptide Y (NPY) neuron from releasing orexigenic or appetite stimulating peptides. Ghrelin has receptors on NPY/AGRP neurons that stimulate the secretion of NPY and AGRP to increase appetite (see figure above).

AGRP has been demonstrated to be an inverse agonist of melanocortin receptors,

antagonism of the MC4-R. Overexpression of AGRP in transgenic mice (or intracerebroventricular injection) causes hyperphagia (increase appetite for food) and obesity in a study. However, the exact mechanism by which AGRP inhibits melanocortin-receptor signaling is not completely clear.

BIDMC's experiments demonstrated that visual cues associated with food would specifically activate the AGRP neurons in the insular cortex of hungry mice, and that these neurons were necessary for mice to respond behaviorally to food cues. When mice have eaten until they were full, this brain response to food cues in the insular cortex was no longer present. While the mice were still full, the researchers used genetic techniques to artificially create hunger by 'turning on' hunger-promoting neurons in the hypothalamus. By activating these AGRP neurons, scientists caused the mice to once again react to visual stimuli and seek more food, and it also restored the pattern of food cue visual responses across neurons in the insular cortex to that previously seen in hungry mice.

"These AGRP neurons cause hunger - they are the quintessential hunger neuron," explained Bradford B. Lowell, MD, PhD, Professor of Medicine in the Division of Endocrinology, Diabetes and Metabolism at BIDMC. "It's a major advance to learn that we can artificially turn them on and cause full mice to work to get food and to eat as if they hadn't eaten in a long time. These neurons seem capable of causing a diverse set of behaviors associated with hunger and eating."

Dr. Lowell and his team at BIDMC are taking advantage of their ability with advanced imaging technology to see into the mouse brain's insular cortex. They're switching individual cells on and off to gain insight into how hunger cues in people may influence eating by unlocking the precise brain circuitry that influences how people weigh the pros and cons of eating particular foods.

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Closing Thoughts

Now we can begin to understand why cravings for junk food or wanting to eat even when you are already full are not just related to willpower, but to a biochemical response that scientists are trying to figure out and correct. Agouti-related protein (AGRP) in the hypothalamus of our brain causes appetite stimulation and has been found to be elevated in obese human males.

The work from Beth Israel Deaconess Medical Center scientists is a huge advancement, since accessing and imaging the insular cortex is very difficult, and learning to understand how hunger cues in humans may influence eating by switching individual cells on and off is a real challenge. Understanding the mechanisms of what causes obesity or eating disorders and the ability to correct or manage them is critical, since obesity is becoming a worldwide epidemic particularly in developed countries. Obesity also leads to other health issues, such as Type 2 Diabetes, hypertension, osteoarthritis, sleep apnea and the list goes on.

Next month or Part 2 of this series will be looking at research from other scientists for weight loss. Ever wonder why some people can lose weight quickly and other can't, no matter what they do? This may have to do with the type of fat you have. So stay tune for the September newsletter on fat and obesity.

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Should you have any questions or need of assistance with your business due diligence, determining your product's value proposition and economic value of your product, feel free to contact me at 781-935-1462 or regina@biomarketinginsight.com.