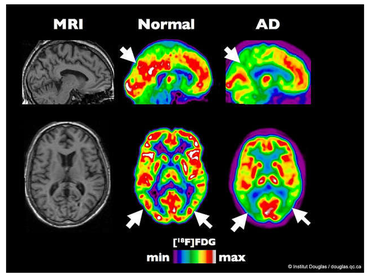
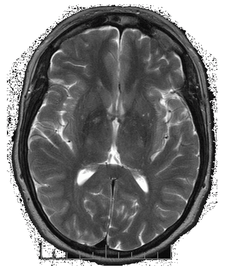
Visualizing Reward Circuitry and CNS Weight Management Pathways via the Oculus Rift™ Virtual Reality Headset

Bradley Tanner, MD, Mary Metcalf, PhD, Brian Tanner, Clinical Tools, Inc., Chapel Hill, NC

Public Health Relevance: The consequences of obesity are broad and severe: Two-thirds (66%) of U.S. adults are considered at least overweight (BMI ≥ 25 kg/m2), while one-third of adults are categorized as obese (BMI ≥ 30 kg/m2)





Short Description: With NIH/NIDDK funding (SBIR Grant #1 R44 DK108608-01, Serious Game-based Development of Obesity Intervention Skills) we are creating educational tools to enhance student understanding of obesity and the CNS structures and communication involved in weight control.

Problem: The various hormones and neuropeptides associated with weight regulation establish obesity as a complex medical problem with strong scientific evidence. Understanding the biological mechanisms can and should guide current and future therapies.

Unfortunately students often have a very cursory understanding of the carefully coordinated CNS processes involved in weight management. Unlike other bodily systems such as kidney filtration and the heart's pumping action, the brain doesn't lend itself to exploration; understanding the complicated CNS systems involved in weight management is difficult. Students need a tool to internalize a robust 3D model of the brain and its circuitry as it relates to obesity and weight management.

Suggested Citation & Communication

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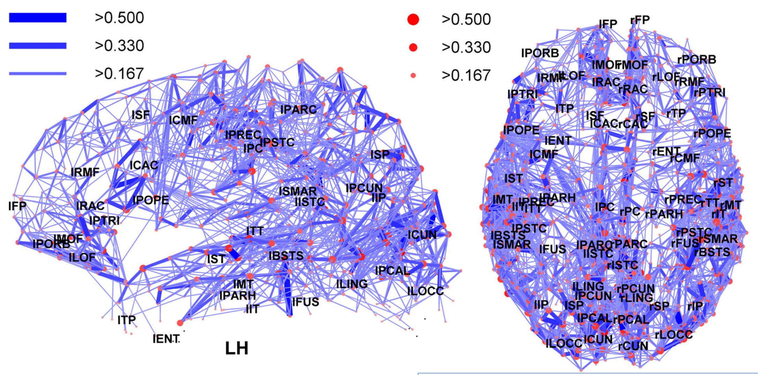
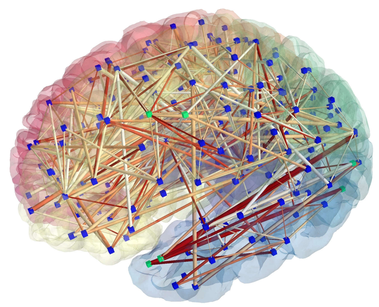
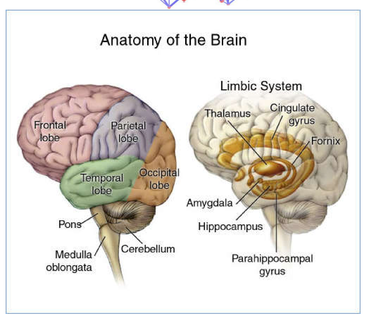
Contact Author: **bradtanner@gmail.com**

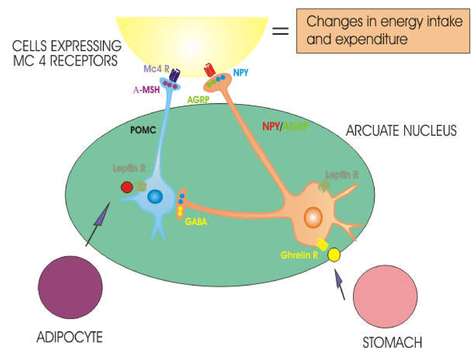
Approach: We are building a 3D model of the brain that learners will experience in an immersive 3D virtual environment using Unity 3D and the Oculus Rift™ VR platform. Oculus enables a near perfect representation of reality in terms of low lag and a full field of view. It evokes strong engagement; users perceive themselves inside a real-world 3D environment.

The complex biological basis of obesity medicine is taught via a Unity 3D-based "breakout" learning experience to provide a basic science foundation for the clinical knowledge









Progress: In the first phase of the project we are developing a 3D model of the brain using Unity 3D to demonstrate the complex biological basis of obesity medicine. This model can be viewed in two ways: 1) a standard 2D video of the same model (delivered on a computer monitor or tablet) or 2) an immersive exploration of the relevant structures with students wearing an Oculus headset and visually "exploring" the model. This immersive experience will be delivered via Facebook's Oculus Rift 3D virtual reality platform with hand and head position controls to enable users to control their experience.

In the preliminary study we are comparing the effectiveness the more immersive experience delivered via Facebook's Oculus virtual reality platform vs. the 3D model of the CNS delivered via standard passive video in terms of knowledge of neuroanatomy and neurochemistry, attitude regarding the biological basis of obesity, and user satisfaction.

Results: Early data shows high satisfaction with 3D VR vs. video presentation. Data collection is ongoing.

Future Directions: A planned study compares an immersive Oculus 3D experience with a 2D version of the same content to assess impact on: neuroanatomical knowledge, confidence in the ability to acquire more knowledge, and interest in learning more about the biological cause of obesity. We will also measure attitudes related to: the scientific basis of obesity. Process outcomes include measures of realism, simulation sickness side effects, and satisfaction

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Acknowledgments & Disclosure

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Clinical Tools, Inc is 100% owned by Bradley Tanner, MD and he serves as President of Clinical Tools, Inc.