

## Westosha Central High School SMART Team

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### Regulating Jeans with Genes – A Protein Driven Pathway to Appetite Suppression

**PDB:** 1BND

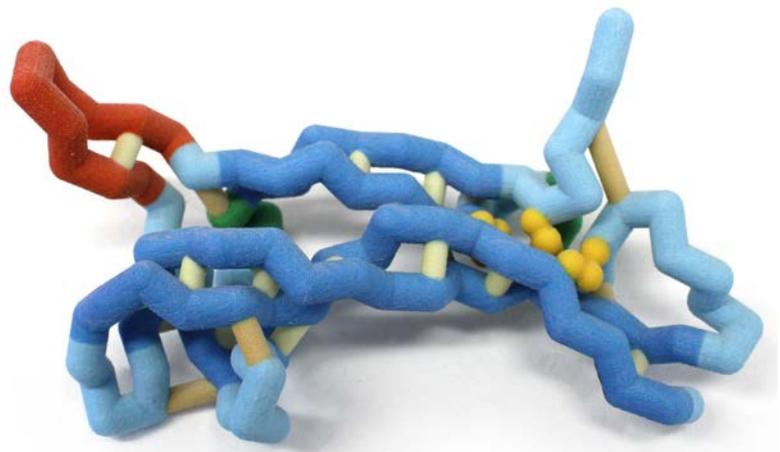
**Primary Citation:** Rios, M. (2013). BDNF and the central control of feeding: Accidental bystander or essential player? *Trends Neurosci*, (2), 83-90.

**Format:** Alpha carbon backbone

**RP:** Zcorp with plaster

#### **Description:**

According to the World Health Organization, over 1.9 billion people in the world are overweight. Many of these people are overweight as a direct result of overeating. Obesity could potentially be treated by inducing an anorexigenic response, or loss of appetite. Several neurotransmitters are involved in signaling for appetite suppressing or stimulating responses. BDNF, the brain-derived neurotrophin factor, works as one of many appetite regulators in the ventromedial nucleus (VMN) in the hypothalamus. Injection of BDNF into rat VMN has been shown to drastically reduce appetite, increase metabolism, and ultimately lead to weight loss. Conversely, knockout of BDNF has been shown to lead to overeating and obesity. BDNF has a high affinity for the receptor Trk-B due to neurotrophins having variable binding domains. The Westosha Central SMART (Students Modeling A Research Topic) Team modeled BDNF as it binds to Trk-B. Once bound, transduction sends a cascading signal that can stop feeding behavior. Various signals have been shown to affect BDNF concentration leading to anorexigenic and orexigenic responses. BDNF concentration correlates with increased leptin, a hormone made by adipose tissue, physical activity, and glutamate. Concentrations of BDNF decrease as the neurotransmitter GABA increases. Understanding BDNF production and signaling provides researchers with a better opportunity to control expression and elicit a specific response in an attempt to treat obesity or eating disorders.



### Specific Model Information:

- The backbone of the model is colored lightskyblue
- The alpha helices are colored seagreen
- The beta sheets are colored dodgerblue
- Six cysteine sidechains are highlighted in gold. These six cysteines form a “cysteine knot” that holds the protein chain together.
- Amino Acids 41-50 are defined as “Loop 2” and bind with the TrkB receptor. These amino acids are highlighted in firebrick.
- Hbonds are colored in lemonchiffon
- Struts are colored in burlywood

<http://cbm.msoe.edu/smartTeams/index.php>

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