

Obesity: A Disease of the Brain

The understanding of obesity has changed over time.

We are now learning why many people gain weight and how the brain plays an important role in our **appetite system** and overall weight management.¹

Three parts of the brain regulate when and how much we eat:^{2,3}

SOMEWHAT IN OUR CONTROL

DECISION-MAKING CENTRE

<Executive Function>

- Translates thoughts into actions
- Determines when, how much and what to eat
- Constantly makes decisions about everything, very busy



NOT IN OUR CONTROL

THERMOSTAT CENTRE

<Homeostatic System>

- Regulates your overall energy balance
- Sends and receives messages from your body
- Controls how hungry and full you are

REWARD CENTRE

<Hedonic System>

- Controls how much you like, want, crave for food, and the pleasure you get from eating

We cannot control whether we feel hungry or full because our appetite system is often **outside of our control**.^{2,3}



The body responds to weight loss by making you more hungry and less full, therefore more challenging to lose weight.⁴⁻⁶

Humans evolved to survive when food was scarce – our brain defends against weight loss & encourages weight regain!



We all inherit a unique appetite system, and the degree of how much we want certain foods **varies from person to person.**



Studies have found that people living with obesity have a heightened reward system when shown images of food.⁷

- There is a much stronger drive or wanting for food
- Participants were more sensitive to being hungry

These biological barriers help us understand why obesity is a disease of the brain.



We cannot control our appetite system, but treatment is available and effective.

Obesity treatment options available today support different parts of the appetite system

THERMOSTAT CENTRE	Medications and bariatric surgery can access these two areas of the brain: <ul style="list-style-type: none"> • Make the thermostat centre less sensitive, and less hungry • Dampen the drive to eat in the reward centre
REWARD CENTRE	
DECISION-MAKING CENTRE	Behavioural therapy can help you build skills to support this area.

Scan the QR code to learn more about the appetite system.



References: 1. Wharton S, Law DW, Vallis M, *et al.* Obesity in adults: a clinical practice guideline. *CMAJ.* 2020;192:E875-91. 2. Lau DCW, Wharton S. Canadian Adult Obesity Clinical Practice Guidelines: The Science of Obesity. Available from: <https://obesitycanada.ca/guidelines/science>. Accessed December 23, 2021. 3. Hansen TK, Dall R, Hosoda H, *et al.* Weight loss increases circulating levels of ghrelin in human obesity. *Clinical Endocrinology.* 2002;56:203-206. 4. Ahima RS. Revisiting leptin's role in obesity and weight loss. *J Clin Invest.* 2008;118(7): 2380-2383. 5. Fothergill E, Guo J, Howard L, *et al.* Persistent Metabolic Adaptation 6 Years After "The Biggest Loser" Competition. *Obesity.* 24(8):1612-1619. 6. Vallis M and Macklin D. When behaviour meets biology: if obesity is a chronic medical disease what is obesity management? *Clin Obes.* 2021;11(3):e12443. 7. Devoto F, *et al.* Hungry brains: A meta-analytical review of brain activation imaging studies on food perception and appetite in obese individuals. *Neurosci Biobehav Rev.* 2018;94:271-285. 8. Pedersen SD, Manjoo P, Wharton S. Canadian Adult Obesity Clinical Practice Guidelines: Pharmacotherapy in Obesity Management. Available from: <https://obesitycanada.ca/guidelines/pharmacotherapy>. Accessed August 5, 2022. 9. Biertho L, Hong D, Gagner M. Canadian Adult Obesity Clinical Practice Guidelines: Bariatric Surgery: Surgical Options and Outcomes. Available from: <https://obesitycanada.ca/guidelines/surgeryoptions>. Accessed May 18, 2022.



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