



# Sweet tooth? Here's the sweet truth:

## The effects of non-nutritive sweeteners on appetite and satiety

Samantha Adeli, Alexandra Pépin & Pascal Imbeault

uOttawa

Behavioral and Metabolic Research Unit, School of Human Kinetics, Faculty of Health Sciences, University of Ottawa



### Introduction

- Non-nutritive sweeteners (NNS) provide a sweet, sugar-like taste without providing significant energy (calories). Increasing evidence suggests that chronic consumption of NNS contributes to weight gain, despite being currently viewed as a method of effectively reducing energy intake. It is hypothesized that NNS may exert effects on satiety and appetite regulation, which could thus affect weight regulation.
- Aim:** Clarify whether NNS have an effect on satiety and appetite regulation and to what extent this affects weight gain in humans.

### Methodology

#### Study Selection

- Key words such as appetite, appetite regulation, satiety, artificial sweeteners, and non-nutritive sweeteners were used
- Criteria for article inclusion:
  - Experimental studies were included. (Reviews examined separately)
  - Intervention of the study must examine the effects of consumption of artificial sweeteners on hunger, satiety, energy intake, or mechanisms for appetite regulation.
  - Research must be conducted on humans or rodents.
  - Study must be published between 1985-2017.

#### Resources/database used:

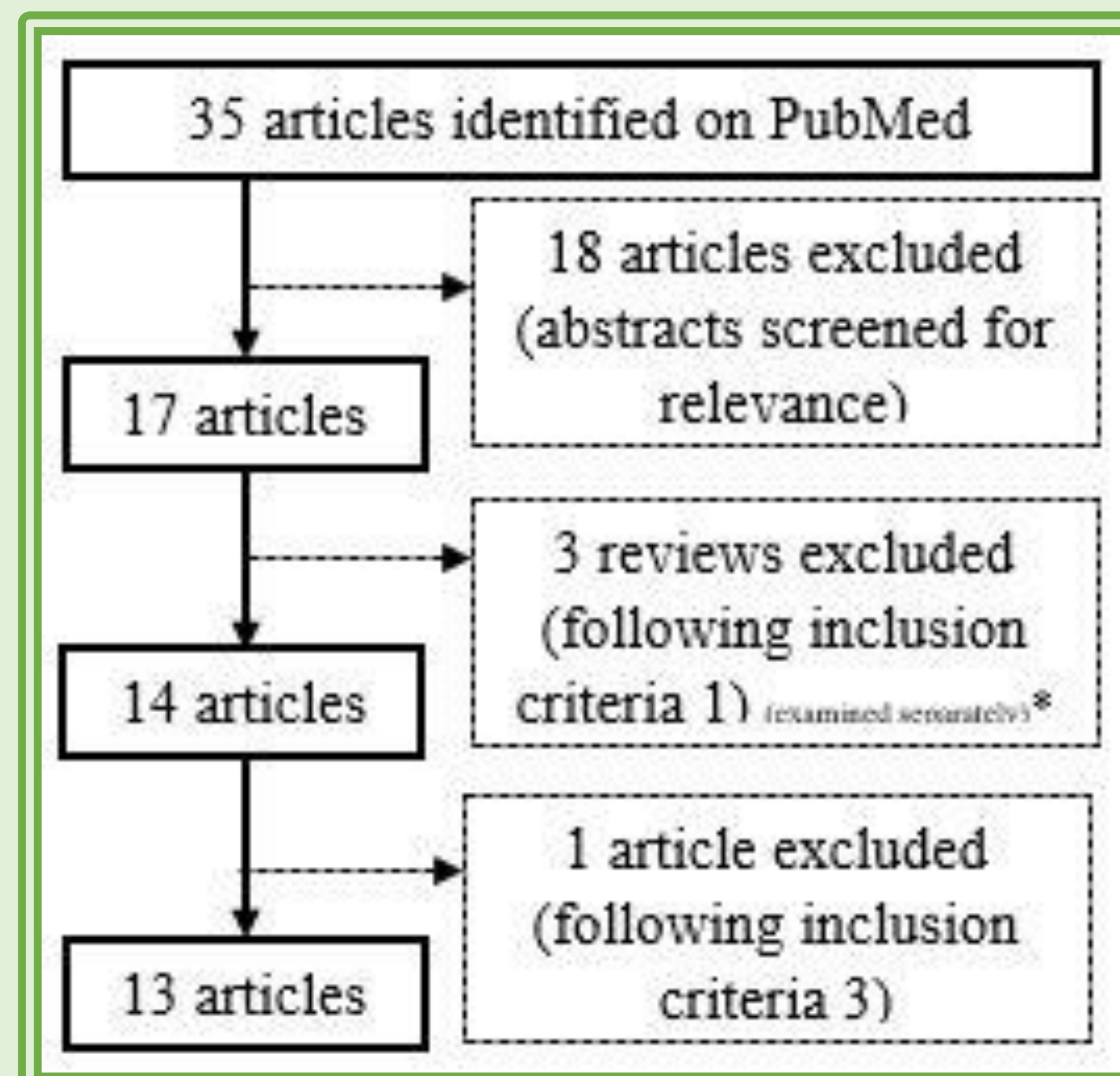
- PubMed

#### Data extraction:

- Titles and abstract were screened from search to identify possibly relevant articles
- The studies' methods section was then assessed to ensure they meet the criteria for article inclusion and to determine whether the study assessed short-term or long-term (chronic) effects.
- Articles were examined in their entirety, with special attention to the results section to extract key findings.

### Results

Figure 1: Study Selection



#### Findings from systematic reviews:

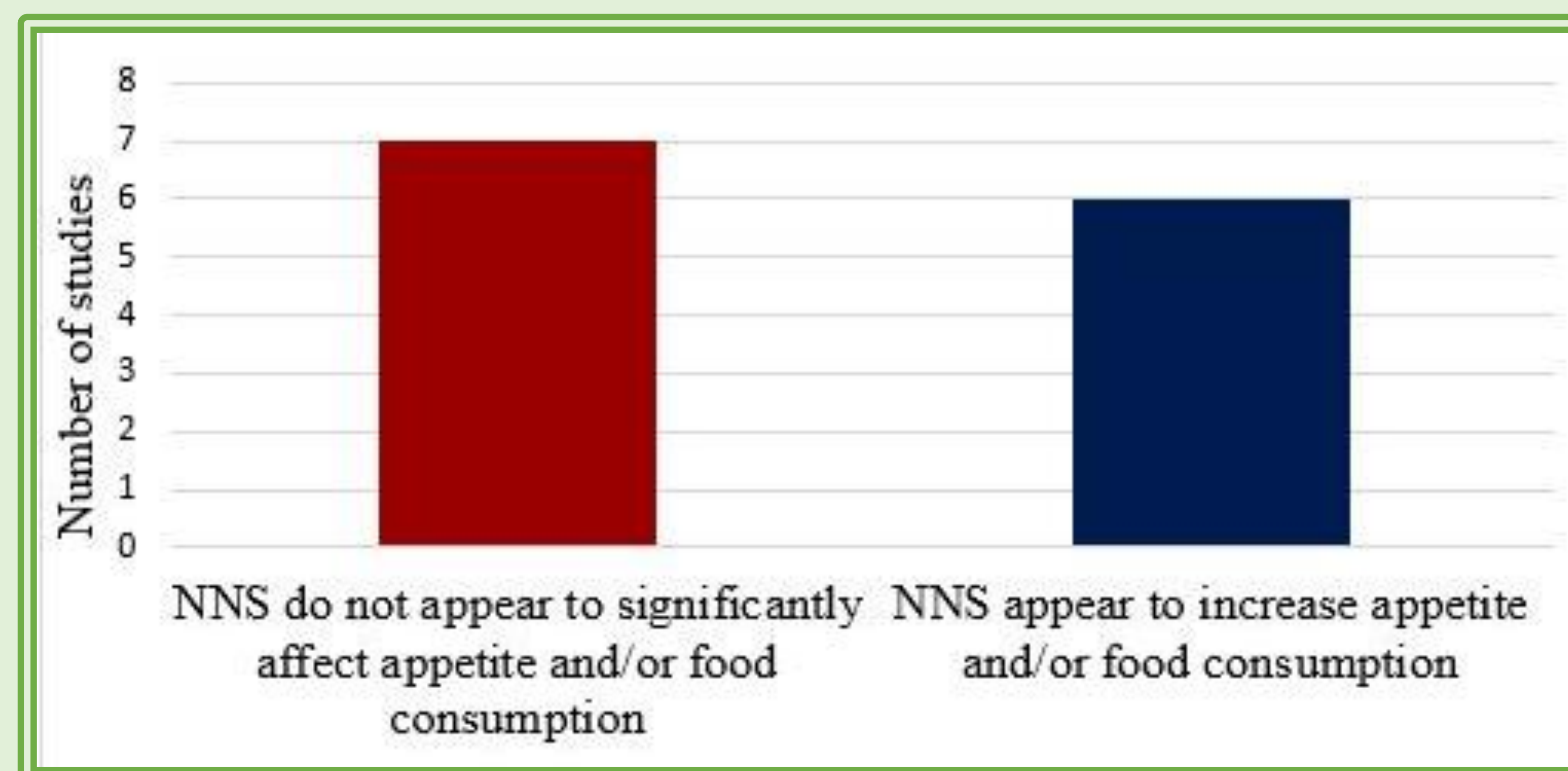
- NNS have not shown an increase in appetite or the promotion of food consumption in short term studies, long term studies are needed.<sup>1</sup>
- NNS may affect metabolic processes by interfering with sweet taste receptors, but more research is needed to reach a conclusion.<sup>2</sup>
- The consumption of intense sweeteners does not cause an increase in calorie intake: increased perceived hunger ratings do not result in an increase in food ingestion.<sup>3</sup>

Table 2: Findings from experimental studies

|                            | Studies in which NNS do not appear to significantly affect appetite and/or food consumption <sup>4-10</sup> | Studies in which NNS appear to increase appetite and/or food consumption <sup>11-16</sup> | Total experimental studies reviewed |
|----------------------------|---|---|-------------------------------------|
| Total                      | 7   | 6   | 13                                  |
| Duration <24 hours         | 7   | 6   | 13                                  |
| Human population           | 7   | 5*  | 12                                  |
| Rodent population          | 0   | 1 <sup>16</sup>   | 1                                   |
| NNS consumed in beverage   | 4   | 4   | 8                                   |
| NNS consumed in solid food | 3   | 2   | 5                                   |

\*One of these studies was conducted on women with dietary restrictions<sup>13</sup>, while another study induced an exercise challenge in addition to the nutritional intervention<sup>12</sup>.

Figure 2: Proportion of studies in which NNS do not or do appear to affect appetite and/or food regulation



### Conclusion

To date, literature examining the effects of NNS on appetite regulation remains inconclusive. Further studies should aim to clarify the long-term or chronic effects of NNS on satiety, energy consumption, and appetite regulation in order to contribute to the elaboration of nutritional recommendations by public agencies regarding the use and the consumption of these sugar substitutes.

### References

- Drewnowski A. *Nutr Rev.* 1995;53(1):1-7.
- Pepino MY. *Physiol Behav.* 2015;152(Pt B):450-455.
- Renwick AG. *Physiol Behav.* 1994;55(1):139-143.
- Anderson GH. *Appetite.* 1989;13(2):93-103.
- Anton SD, et al. *Appetite.* 2010;55(1):37-43.
- Canty DJ. *Am J Clin Nutr.* 1991;53(5):1159-1164.
- Drewnowski A. *Am J Clin Nutr.* 1994;59(2):338-345.
- Rolls BJ. *Appetite.* 1988;11 Suppl 1:62-67.
- Rolls BJ. *Appetite.* 1989;13(2):115-127.
- Rolls BJ. *Physiol Behav.* 1990;48(1):19-26.
- Blundell JE. *Lancet (London, England).* 1986;1(8489):1092-1093.
- King NA. *Physiol Behav.* 1999;66(2):375-379.
- Lavin JH. *Int J Obes Relat Metab Disord.* 1997;21(1):37-42.
- Rogers PJ. *Physiol Behav.* 1989;45(6):1093-1099.
- Tordoff MG. *Physiol Behav.* 1990;47(3):555-559.
- Tordoff MG. *Appetite.* 1989;12(1):1-10.

### Acknowledgements

Project funded by the University of Ottawa's Undergraduate Research Opportunity Program (UROP).

Contact: [sadel029@uottawa.ca](mailto:sadel029@uottawa.ca)