

ISN Symposium on Neural control of appetite - From genes to circuits and behavior

The Symposium was part of the 2nd FALAN Congress which took place in Buenos Aires, Argentina, in October 17-20. FALAN is the Federation of Latin American and Caribbean Neuroscience Societies. Although the majority of the ~1200 people who attended the Congress work within Latin America and Caribe, there were also lot of researchers coming from the USA and Europe. The symposium was held on October 18th, simultaneously with 3 other symposia. Nonetheless, the room, with capacity for 300 people, was full from the beginning to the end, which suggests that people found the topic of the symposium to be relevant and they enjoyed the four presentations. The symposium lasted 2 hours distributed in a 5 minute presentation (by chairs), four 20 minute talks followed each by 5-7 minutes of questions, and concluding remarks by chairs.

Funds generously awarded by ISN were used to provide travel and accommodation expenses for one foreign chair and 3 foreign speakers, and also the registration for all chairs and speakers (five people in total). A group picture is attached.

Symposium Report

Chairs: Ivan E. de Araujo (USA) and Viviana F. Bumaschny (Argentina)

- Presentation 1: **Circuit logic of food reward** - Speaker: Luis A. Tellez (USA)
- Presentation 2: **Proopiomelanocortin control of food intake** - Speaker: Viviana F. Bumaschny (Argentina)
- Presentation 3: **Hypothalamic dysfunction in obesity** - Speaker: Licio A. Velloso (Brazil)
- Presentation 4: **Control of eating and exploration by hypothalamic circuit** - Speaker: Denis Burdakov (UK)

The first speaker, Dr Tellez from Yale University, showed evidence that demonstrates that while the sweetness of sugars may primarily serve as a sensory cue attracting animals towards potential energy sources, sugars' nutritional reward value determines the ultimate decision of consuming or not a certain substance. Thus, although the neural mechanisms mediating sugar's dual control over behavior remain elusive, current evidence indicate that sweetness and nutritional value are encoded by separate neural circuits. The talk reviewed emerging evidence supporting the hypothesis that separate dopaminergic pathways encode gustatory and nutritional values of sugars.

The second speaker, Dr Bumaschny from the Universidad de Buenos Aires and CONICET, described the complexity of the proopiomelanocortin (POMC) pro-peptide and the roles of its derived bioactive peptides. Then she discussed emerging evidence, collected from a reversible Proopiomelanocortin (POMC) knockout mice, revealing that the plasticity of energy balance neural circuits is lost in overweighted animals, preventing them to achieve a normal body weight after a genetic rescue. In the second part of the talk she focused on the subpopulation of hypothalamic GABAergic Proopiomelanocortin (POMC) neurons, presenting unpublished results supporting that this subpopulation plays a critical role in the control of food intake and glucose homeostasis.

The third speaker, Dr Velloso from the Universidade Estadual de Campinas, presented evidence from patients and animals showing that saturated fats present in large amounts in

western diets can activate an inflammatory response in the hypothalamus, affecting the capacity of its circuits to respond appropriately to satiety and adipostatic signals. In the first part of the talk he focused in the mechanisms behind saturated fatty acid-induced hypothalamic dysfunction. Then, he presented studies that have identified mechanisms that mediate some of the anti-inflammatory actions of unsaturated fatty acids in the hypothalamus. He highlighted their preventive and therapeutic potential in obesity. Finally, he discussed neuroimaging methods used to study the hypothalamus of obese humans.

The fourth speaker, Dr Burdakov from The Francis Crick Institute, presented new data on how orexin hypothalamic neurons control processes vital for life, such as eating and exploration. He showed that orexin cell activity is inhibited by eating and that complete orexin cell inactivation induced an overeating phenotype that caused overweight. He presented *in vivo* chemogenetic and behavioral evidence in conjunction with *in vitro* optogenetic circuit mapping, to illustrate how wider hypothalamic circuits may coordinate diverse neural signals to ensure effective adaptive behavior.

Altogether, the four talks covered different aspects of the regulation of energy balance and the integration of nutrient signals with central nervous system responses. The symposium reviewed novel insights into different neural circuits underlying appetite that are influenced by food reward, body energy stores and external cues, and how this circuits regulate feeding behavior. Emphasis was placed on how cutting-edge neurobiological tools may assist in understanding the physiopathology of obesity.

Acknowledgments

We would like to thank the members of the ISN Conference Committee for selecting the symposium for financial support. The ISN support was essential for carrying out this fruitful scientific event.

Viviana F Bumashny, MD, Ph.D.

Symposium Chair



From left to right: Dr Velloso, Dr Bumaschny, Dr de Araujo, Dr Burdakov and Dr Téllez.