

# Sugar, Stress, and Sex

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Christa McIntyre

“So, apparently, putting ‘sex’ in the title really brings people out,” Ewan McNay, University at Albany, the State University of New York, joked as he opened the symposium “Sugar, Stress, and Sex: How Hormones Affect Cognition.” He was right — the room was packed, and everyone was there to hear the latest research on the effects of sugar (as in glucose), stress (as in glucocorticoids), and sex (as in estrogens) on the hippocampus and other regions of the brain.

McNay, who co-chaired the symposium, discussed his own work on sugar — or rather, on the sugar-governing hormone insulin. “In addition to the body being diabetic, the brain is also diabetic,” he explained, discussing animals with Type 2 diabetes and referring to insulin’s effect on the central nervous system (CNS). He found during research involving memory tasks in rats that insulin is a key modulator of hippocampal memory processes. Further, McNay showed that CNS insulin resistance — caused by Type 2 diabetes — is linked to Alzheimer’s-like symptoms, including accumulation of amyloid within the hippocampus.

McNay’s co-chair Karyn Frick, Yale University, admitted being responsible for the “sex part” of the symposium — that is, how the sex steroid hormone estradiol affects memory. Her data show that specific signaling molecules in the hippocampus must be activated in order for estradiol to enhance object recognition memory. This research, she said, offers a novel approach to developing new hormone therapies and fighting age-related memory decline.

## A packed room at the “Sugar, Stress, and Sex” Symposium

The three presenters’ research emphasized the role of stress hormones in memory and brain plasticity. Benno Roozendaal, University Medical Center Groningen in The Netherlands, for example, showed that certain hormones, namely epinephrine and glucocorticoids, enhance memory consolidation of new information (such as during a traumatic event) but do so at the expense of recall of older memories. In his talk “Stress Hormones, Traumatic Memory, and PTSD,” Roozendaal also offered a promising study of Post-Traumatic Stress Disorder (PTSD) symptoms. Roozendaal’s research showed that patients in the Intensive Care Unit (ICU) who received stress-like doses of the steroid hydrocortisone during treatment experienced a reduction in chronic stress symptoms six months later as compared to those who received a placebo. He proposed that the drug may have prevented the patients from reliving the traumatic experiences while in the ICU, preventing further problems.

Jeansok J. Kim, University of Washington, said that intense memories or traumatic, stressful events have subsequent effects on memory function. The research he explained during “Stress and Plasticity” pointed to decision-making, in particular, as one of the functions that suffers as a result of stressful events.

Continuing the focus on stress, Christa McIntyre, University of Texas at Dallas, asked an important question for her research: “Why is it that our most enduring, long-lasting, and strongest memories are memories of a fearful event or an exciting event?” She explained in “Molecular Markers of Emotional Modulation of Memory” that salient experiences produce the release of stress hormones, such as noradrenaline in the amygdala, which in turn influence memory by the translation of proteins and the strengthening of appropriate synapses. As McIntyre said, “We don’t remember every novel experience, we only remember the ones that are important” for our survival.