

Poster #30
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Title of Research: Dietary and Sex-Specific Factors Regulate Hypothalamic Neurogenesis in Young Adult Mice
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Introduction/Purpose:

Obesity and metabolic disorders are common public health problems. The development of new treatments for obesity and metabolic disorders is predicated upon the identification of neural substrates and mechanism that underlie its etiology and pathophysiology. Current evidence suggests that hypothalamic neurogenesis may play an important role in the regulation of weight and metabolism in juvenile and adult mammals, though the environmental and physiological regulation for this remain poorly understood.

Experimental Design:

In this report, we share new findings on the contributions of sex-specific and dietary factors to regulation of neurogenesis in the hypothalamus. To assess neurogenesis, we pulsed mice with Bromodeoxyuridine (BrdU, a proliferative marker) at P45-53. At P75, we euthanized the mice and ran immunohistochemistry for BrdU and Hu (neuronal marker) to track new neuron. We assessed proportion of new neurons in the median eminence (ME) and arcuate nucleus (ArcN) for male and female mice. In addition, we analyzed changes in hypothalamic neurogenesis from different diets introduced at P42. Finally, we focally irradiated the ME (stopping proliferation) at P45 to evaluate the role of neurogenesis on weight maintenance.

Results:

We show that high fat diet (HFD) inhibits ArcN neurogenesis in both sexes but stimulates ME neurogenesis in female mice. Like HFD, Low protein diet inhibits ArcN neurogenesis but stimulates ME neurogenesis in female mice. In female mice fed HFD-caloric restriction, proliferation decreased in the ME compared to mice fed HFD – ad libitum. In mice fed HFD, inhibiting ME neurogenesis by irradiation attenuated weight gain in females but not males.

Conclusions:

These findings suggest that the physiological effects of high fat diet may be mediated by the alteration of neurogenesis in certain hypothalamic regions according to gender. These findings suggest that the physiological effects of high fat diet may be mediated by the alteration of neurogenesis in certain hypothalamic region. Our results present a new avenue, modulating neurogenesis, to affect weight gain in a gender specific manner. It also implicates neurogenesis dysfunction in other obesity-induced diseases.