



Lifetime reproduction of giant transgenic mice: the energy stress paradigm

C. D. Rollo, J. Rintoul, and L. J. Kajiura

ABSTRACT

Lifetime reproduction of female transgenic rat growth hormone (TRrGH) mice and their normal siblings was evaluated on a high-protein (38%) diet, a standard diet (23% protein), and the standard diet supplemented with sucrose cubes. Compared with those on the standard diet, normal mice fed the high-protein diet showed significant increases in litter size, number of litters, and lifetime fecundity. Number of litters and lifetime fecundity were also enhanced in normal mice fed sucrose. TRrGH mice showed no significant improvements in reproduction on the high-protein diet, but they were significantly smaller. Sucrose dramatically improved reproduction of TRrGH mice, with no reduction in mature mass. The percentage of fertile TRrGH mice increased from 45% on standard chow to 71% with sucrose. The number and size of litters of TRrGH mice also significantly increased with sucrose, mean lifetime fecundity doubling from 9 pups on standard food to 18 pups on sucrose. However, TRrGH mice did not attain the reproductive success of normal mice on any diet. These results suggest that TRrGH mice are energetically stressed by enforced channelling of energy into growth. An immense literature addresses infertility due to energy limitation and stress generally. We synthesize these aspects with growth hormone transgenesis to derive an integrated view of neuroendocrine energy regulation relevant to restoring fertility of transgenic GH animals.

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