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The growth hormone axis, feeding, and central allocative regulation: lessons from giant transgenic growth hormone mice

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ABSTRACT

Lifetime consumption rates of male transgenic growth hormone (GH) mice and normal controls were measured on either a 38% protein diet (HP), the standard rodent diet (STD) (23.5% protein), or the standard diet supplemented with a free choice of sucrose (CARB). On STD, daily intake of normal mice increased little at sizes greater than 20 g, but larger transgenic mice ate progressively more. Both kinds of mice showed declining daily mass-specific consumption with increasing age. Transgenic mice consistently ate 13.3% less food than normal mice on a mass-specific basis across all ages. On the self-selective CARB diet, normal mice exhibited increasing age-specific daily consumption, whereas transgenic mice exhibited a trend towards age-related decline in mass-specific feeding that proved significant on the basis of body mass. Transgenic mice ingested more sucrose than standard chow and this did not vary with age. In contrast, normal mice ate less sucrose than chow and chose a declining proportion of sucrose with age. Transgenic and normal mice showed a unitary relationship of daily intake of HP in relation to body mass, resulting in constant mass-specific feeding across all ages. Transgenic GH animals, including livestock, show numerous defects that we have attributed to relative energetic stress associated with excessive allocation to lean growth. This is exacerbated by failure to offset increased demands of growth by increasing mass-specific feeding. Results presented here document altered feeding regulation in transgenic GH mice and suggest underlying mechanisms.

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