Urea Synthesis, Nitrogen Balance, and Glucose Turnover in Growth-Hormone-Deficient Children Before and After Growth Hormone Administration

Dahms et al studied urea synthesis and glucose turnover using a primed constant infusion of $^{15}N_2$-labeled urea and a constant infusion of [6,6-$^2H_2$]glucose in 10 prepubertal, growth hormone (GH)-deficient children prior to and after 6 days of human GH (hGH) therapy. The patients were admitted following diagnosis of GH deficiency, which was established by failure to respond to at least three stimulation tests. The first 6 days of hospitalization constituted a control period, during which a liquid diet that provided 9% of energy as high biologic-value protein was given. On day 6, tracer infusion studies were performed following an overnight fast. hGH (NPA) was then administered (0.1 U/kg/day, intramuscularly) between 10:00 P.M.and 11:00 P.M.and the studies were repeated on day 12.

The patients' weight and energy intake did not vary during the protocol. However, plasma urea nitrogen decreased significantly by the second day of hGH therapy. Urea synthesis also decreased significantly after 6 days of hGH therapy. Nitrogen excretion, determined by total stool and urinary nitrogen, was decreased, and this was accounted for by decreased urea excretion. The decrease in urea excretion was the result of decreased urea synthesis. Plasma glucose increased in eight of the 10 patients during hGH therapy, but there was no significant change in the rate of glucose turnover. There was no correlation between subsequent growth velocity while the patients were on hGH and the quantitative decrease of urea nitrogen during the acute administration of hGH.

Dahms WT, Owens RP, Kalhan SC, et al. *Metabolism* 1989; 38(3):197-203.

Editor's comment—*The authors state that previous studies have looked at the effect of GH on nitrogen balance using classic nitrogen balance studies. The present studies, however, demonstrate that the mechanism of the decrease in nitrogen secretion induced by GH is a decrease in urea synthesis. The authors further suggest that the most likely explanation for the decreased urea synthesis is the decreased production of ureagenic substrates by peripheral tissue, and state that the observed decreases in the plasma concentrations of the amino acids after hGH administration support this hypothesis. These carefully performed studies help to explain the changes that occur during GH administration. Unfortunately there was no correlation between the 6-month growth rate and the change in urea synthesis or blood urea nitrogen during the 7-day treatment.*

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