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CARTAS AL EDITOR

Corticosterone and Muscle Protein Breakdown *in vivo* in Rats: Effect of Subcutaneous and Intraperitoneal Injection

The net catabolic effects of glucocorticoids hormones on skeletal muscle are widely recognized and well documented (7). It has been reported decreases in muscle protein synthesis after glucocorticoids administration (3, 7), but effects on muscle protein breakdown have not been clearly established. Several glucocorticoids and ways of administration to investigate muscle protein metabolism have been used. MILLWARD *et al.* (5), administered triamcinolone acetonide intraperitoneally, studying its effects on muscle and liver protein metabolism. TOMAS *et al.* (6), used corticosterone subcutaneously in determening the *in vivo* rate of muscle protein breakdown in rats.

The goal of this paper is to show the difference of administering corticosterone intraperitoneally (IP) and subcutaneously (SC) to rats in measuring muscle protein breakdown by monitoring the urinary excretion of 3-methylhistidine (3-Mehis) (8).

Adrenalectomized and intact male Sprague Dawley rats about 120 g body weight were distributed into four groups of five rats each: Intact control receiving vehicle (Control); vehicle consisted of NaCl (0.8 %), polisorbate 80, sodium CM-cellulose (0.5 %) and benzyl alcohol (0.9 %); adrenalectomized, receiving same vehicle (AdX); adrenalectomized receiving 10 mg of corticosterone per 100 g body weight per day IP (AdX-10 IP) and adrenalectomized receiving 10 mg of corticosterone per 100 g body weight per day SC (AdX-10 SC). The 10 mg of corticosterone dose is chosen because it has been shown to be catabolic (6). Injections were given to rats between 11-12 a.m., since the third day of the experiment during seven days. Then, injections were stopped, and the experiment is continued three days further. All rats were fed on an adequate control diet (18 % lactalbumin) and were pair-fed to the food intake of AdX group. Urine excretion is collected every day under 0.1 ml of toluene and prepared for urea nitrogen (1) and 3-Mehis (4), determination. Body weight was recorded daily. A sample of blood was taken from the tail vein just before the 7th injection of the hormone, for plasma corticosterone levels determination (2).

Body weight changes indicated that rats on control and AdX groups gained over 40 g. AdX-10 IP gained about 30 g and AdX-10 SC group lost about 30 g during the hormone administration period, and, upon suppressing the corticosterone injection, they begun to gain some body weight, but they never reached the values of the other groups. Plasma corticosterone level in the AdX-10 SC group was about 30 % higher than that of the group receiving the hormone by IP via. Results shown in figure 1 indicate that urea nitrogen excretion was significantly ($p < 0.01$) elevated in the groups receiving corticosterone replacement, but it was much higher in the one receiving the hormone by SC via, as compared to the values from the control group. 3-Mehis excretion was elevated in the group receiving the corticosterone by

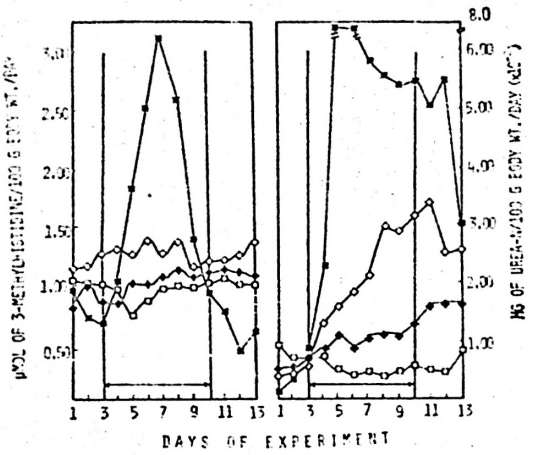

Fig. 1. *Daily 3-methylhistidine and urea-N output/100 g body weight before, during and after corticosterone treatment.*
Values are mean for five rats in each of the following treatment groups: intact + vehicle (control) (◆), adrenalectomized + vehicle (□), adrenalectomized + 10 mg of corticosterone intraperitoneally/day (◇), and adrenalectomized + 10 mg of corticosterone subcutaneously/day. (■). Injections were given for seven days (period indicated by the horizontal arrow). All rats were pair-fed to the average food intake of adrenalectomized + vehicle group.

SC via ($p < 0.01$, during the seven days of injection, as compared to values of the control group). However, the same dose administered IP did not produce any catabolic effect on muscle protein turnover and no significant differences were found among the other groups.

Results suggest that elevated corticosterone doses do have a catabolic effect on muscle protein turnover when the hormone is administered subcutaneosly, and does not when it is injected intraperitoneally. It is suggested that IP way induces a faster hormone metabolization rate than SC way.

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S. SANTIDRIÁN and V. R. YOUNG

Massachusetts Institute of Technology
Department of Nutrition and Food Science
Cambridge, Massachusetts 02139 (USA)

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