

Seasonality of the pituitary gland in red deer (*Cervus elaphus*) stags

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Red deer (*Cervus elaphus*) stags alternate between liveweight gain in spring and loss in autumn. Evidence supports a role for growth hormone (GH) in determining this growth pattern. Rapid spring growth is associated with high GH pulses and mean GH levels (Suttie *et al.*, 1989). GH release by the pituitary in response to exogenous growth-releasing factor (GRF) correlates positively with endogenous GH secretion in humans (Voderholzer *et al.*, 1993). This study aimed to determine if there was a seasonal change in GH response to GRF in young stags and if such a change would relate to the seasonal growth pattern.

Twelve stags were kept indoors from 6 to 15 months of age and live weight recorded weekly. Each stag was treated i.v. with 0.1 µg/kg bGRF 1-29 at four-week intervals. Blood was collected at -30, -20, -10, 0, 10, 20, 30, 45, 60, 90, 120, 130 and 150 minutes with respect to GRF at time 0.

Pre-GRF GH levels and GH response to GRF altered with season and growth state. Pre-GRF GH levels were higher in spring than winter. GH response increased in spring, prior to the onset of rapid growth. During rapid growth, the response to GRF changed; declining in late-spring then increasing again in mid-summer. As growth rate

fell in late-summer, the GH response dropped dramatically. There was a final increase in GH response as growth rate declined further.

We suggest that seasonal changes in GH response to GRF reflect endogenous GH output and are related to the growth state. Increased GH responses in spring and summer preceded growth increases. It is tempting to speculate that the drop in GH response in late-summer was related to the fall in growth rate. Further, the increased GH response in autumn was due to stimulation of GH as live weight is lost thus reflecting the lypolytic role of GH.

REFERENCES

- Suttie, J.M., Fennessy, P.F., Corson, I.D., Laas, F.J., Crosbie, S.F., Butler, J.H. & Gluckman, P.D. 1989. Pulsatile growth hormone, insulin-like growth factors and antler development in red deer (*Cervus elaphus scoticus*) stags. *Journal of Endocrinology* 121:351-360.
- Voderholzer, U., Laakman, G., Hinz, A., Daffner, C., Haag, C., Hofmann, H.P. & Börschel, B. 1993. Dependency of growth hormone (GH) stimulation following releasing hormones on the spontaneous 24-hour GH secretion in healthy male and female subjects. *Psychoneuroendocrinology* 18:365-381.