

HIGH CONCENTRATIONS OF IGF-I AND IGF-II RECEPTORS WITH ABSENT GH RECEPTORS IN RED DEER ANTLER; IMPLICATIONS FOR CONTROL OF BONE GROWTH.

Ambler GR^{*}, Breier BH^{*}, Klempt ND^{*}, Suttie JM^{*}, Gluckman PD^{*}.

^{*}Department of Paediatrics, University of Auckland, New Zealand

^{*}Invermay Agricultural Research Centre, Private Bag, Mosgiel, New Zealand

Antler development in the red deer (*Cervus elaphus scoticus*) has been associated with a high winter/early spring GH pulse frequency and amplitude resulting in increased serum IGF-1 concentration, with a strong correlation between antler growth rate and serum IGF-1 (1). Further, removal of the growing antler is associated with a greater rise in IGF-1 suggesting that antler growth may be dependent on circulating IGF-1 (2). To further investigate the control of antler growth we have performed radioreceptor assays (RRA) for GH, IGF-I and IGF-II receptors on microsomal membrane preparations (MMP) from velvet antlers.

Velvet antler buds obtained in early spring were homogenised and microsomal membranes prepared in the presence of aprotinin. 4M MgCl₂ was used to remove endogenous ligand. In the respective RRAs, radioligands used were rec bovine GH, rec hIGF-I and oIGF-II.

Maximal specific binding of 17.6% was found in the IGF-1 RRA and 69.8% in the IGF-2 RRA for 100mg initial tissue equivalents (100 μ l MMP). In both systems, binding was reversible by the addition of excess cold ligand. Cross-reactivity studies demonstrated classical properties of the IGF-I and IGF-II receptors. For the IGF-I receptor IGF-I bound with 18 times the affinity of IGF-II (K_d 22.4 litres/nmol for IGF-I vs 1.20 litres/nmol for IGF-II) with capacities of 39.8 and 209 pmol/100mg tissue equivalents respectively. The IGF-II receptor was specific for IGF-II with K_d 7.77 litres/nmol and capacity 803 pmol/100mg tissue equivalent.

Radioreceptor assay for GH revealed specific binding of less than 1% at all membrane concentrations, and preliminary in-situ hybridisation results confirm the absence of GH receptors in the velvet antler.

Since antler is composed of cartilage which undergoes endochondral ossification to bone these studies provide some insight into the role of these hormones in bone growth. High concentrations of IGF-II receptors support its role as a local bone growth factor, while the presence of IGF-1 receptors in the absence of GH receptors suggests that for this tissue IGF-1 has a classical endocrine role.

1. Suttie JM et al. Journal of Endocrinology (1989) 121, 351-60.

2. Suttie JM et al. Endocrinology (1988) 122, 3005-7.