

THE EFFECT OF TESTOSTERONE ON RECEPTORS FOR INSULIN-LIKE GROWTH FACTORS IN DEER ANTLERS.

J. L. Elliott*^{1,2}, G. W. Asher*², P. C. Molan*¹, and J. J. Bass*² (SPON: R. L. W. Averill), ¹Department of Biological Sciences, University of Waikato, Private Bag 3105, Hamilton 2001, New Zealand; ²AgResearch, Ruakura Agricultural Centre, Private Bag 3123, Hamilton 2001, New Zealand.

In deer, antlers are secondary sexual characteristics which show dramatic changes in association with seasonal levels of plasma testosterone. This study was undertaken to examine the insulin-like growth factor-I (IGF-I) and IGF-II receptor populations in antlers during normal growth, and the effect of stimulation by testosterone on these receptor populations in the antler. Fallow deer antlers from seven animals were collected on days 20 to 100 after casting of old antlers. Nine additional bucks were treated with 4 ml Durateston, a synthetic testosterone preparation, administered as a single subcutaneous injection at day 50 after casting. Antlers were collected on days 1 - 10 after treatment. Cryosections of tissues from the antler tips were used for ¹²⁵I-IGF-I and ¹²⁵I-IGF-II binding studies by autoradiography. Macroautoradiographs were analysed using computer densitometry and microautoradiographs were analysed by radiographic grain counting. Specific binding of IGF-I increased in the antler throughout the growth period under study, with a marked increase during ossification (day 100). Receptor binding was highest in the cartilaginous zone until day 100 when binding increased in the developing periosteum from 14.9% (at day 20) to 38.4%. Specific binding of IGF-II was highest (46.0%) in the reserve mesenchyme and perichondrium zones and was constant in intensity and distribution throughout the growth period. Testosterone treatment enhanced mineralisation and ossification in the antler cartilage, as seen by histological changes. In the treated antlers, IGF-I binding to receptors at day 60 had advanced developmentally to a stage equivalent to days 80 - 100 of control growth. This was most obvious in the emerging periosteum where binding had increased to 32.2%. There was no difference in IGF-II binding between control and testosterone-treated groups. These results indicate that IGF-I and IGF-II each bind to distinct receptor populations in the antler throughout growth. The effect of testosterone in this study was to inhibit antler growth in association with enhanced cartilage maturational changes and increased receptor binding of IGF-I, but not IGF-II.