

LOCAL EFFECTS OF OESTRADIOL IMPLANTS ON MINERALISATION
OF ANTLER BONE

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INTRODUCTION

Antlers are bones of the skull of mature deer stags which undergo a marked increase in mineralisation during the terminal phase of growth. This mineralisation process can be accelerated by supplying exogenous steroids such as oestradiol or blocked by removal of the source of such steroids. We attempted to determine if the effects of oestradiol on mineralisation could be achieved by a direct action on the bones.

METHOD

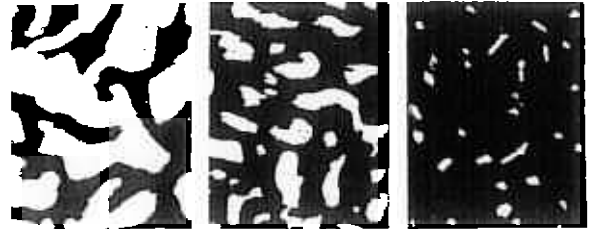
Antlers of red deer stags were implanted subcutaneously with silastic capsules containing 0, 0.1, 1, 10 or 100mg oestradiol (n=2). At 4 weeks of treatment antlers were removed from the stags and cortical bone samples from the implant and contralateral sites were analysed for ash content and examined histologically for percentage of intrasosseous space.

RESULTS

Ash of bone at the implant site, expressed as the mass ratio of ash to organic matter (dry), increased (p<0.1) with increasing dose of oestradiol, whereas percentage of intrasosseous space decreased (p<0.05). In the cases of implants containing 10 or 100mg oestradiol there was evidence for an effect on non-implanted sites of the same or contralateral antlers, suggesting a systemic spread of effect of the hormone. However, the lower dose implants (0.1, 1mg oestradiol) produced effects on antler bone which were confined to the locality of the implantation site.

CONCLUSIONS

These results show that oestradiol can stimulate local ossification of bone by direct actions on this or nearby tissues and that the procedure we have developed provides a potentially suitable model system for performing *in vivo* studies of the mechanism which regulates mineralisation of bone in adults.



Transverse histological sections of cortical bone from 10 week old antlers adjacent to implant containing 0mg (left), 10mg (centre) or 100mg oestradiol (right) which had been in place for 4 weeks.

AREA OF INTRASOSEOUS SPACE (% OF FRAME)			
DOSE OF E ₂ IMPLANT (MG)	LI	L	R
0	64.2, 56.5	60.0, 54.4	62.3, 53.6
0.1	59.0, 63.9	60.8, 78.3	69.1, 66.7
1	62.3, 35.6	61.3, 49.4	66.5, 48.2
10	36.3, 24.1	39.6, 46.9	41.3, 59.2
100	14.0, 8.9	38.7, 19.5	42.5, 20.3

ASH:OM			
DOSE OF E ₂ IMPLANT (MG)	LI	L	R
0	0.92, 0.93	0.95, 0.95	0.98, 1.03
0.1	0.99, 0.72	0.93, 0.75	0.90, 0.75
1	0.85, 1.27	0.81, 1.10	0.99, 1.11
10	1.43, 1.32	1.20, 1.05	1.08, 0.91
100	1.30, 1.40	1.09, 1.39	1.05, 1.30

Intrasosseous space (%) and ash content (as ratio to organic matter) of cortical bone sections in 10 week old antlers of red deer stags. LI indicates bone tissue (left antler) adjacent to site of estradiol implant, L is from opposite implant site and R is from a corresponding site (to LI) on the contralateral (right) antler.