

# Change of growth pattern and thickness of epiphyseal plate in female rats according to injected estrogen dosage

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## OBJECTIVES

The purpose was to get the basic data of optimum serum concentration of estrogen in maximizing pubertal growth spurt, and decreasing the acceleration of epiphyseal closure of long bones.

## METHODS

### Subject

Fifteen female SD rats (13-week aged ; post pubertal growth spurt) were randomly divided into 3 groups

Three groups were randomly divided according to serum concentration of estrogen

#### 1. Group 1 as a control (N=5)

sesame oil

#### 2. Group 2 as a low dose (N=5)

10 $\mu$ g/kg/week of estradiol depo

#### 3. Group 3 as a high dose (N=5)

100 $\mu$ g/kg/week of estradiol depo

For 8 weeks (week 13 - 20)

Subcutaneous injection on posterior neck area

### Experiment

#### 1. Anthropometric check

Crown-rump length, body weight check weekly

#### 2. Laboratory check

Growth hormone, Estradiol using ELISA

#### 3. Dissection of proximal tibia

HE staining

Thickness of epiphyseal plate including proliferative zone and hypertrophic zone were checked (20 equally divided site)

week

0 1 2 3 4 5 6 7 8

length ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑  
weight ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑

GH ↑  
Estradiol ↑

Dissection of tibia and femur epiphysis & HE staining ↑

## RESULTS

Fig.1A Comparison of changes of body length and body weight before and after treatment

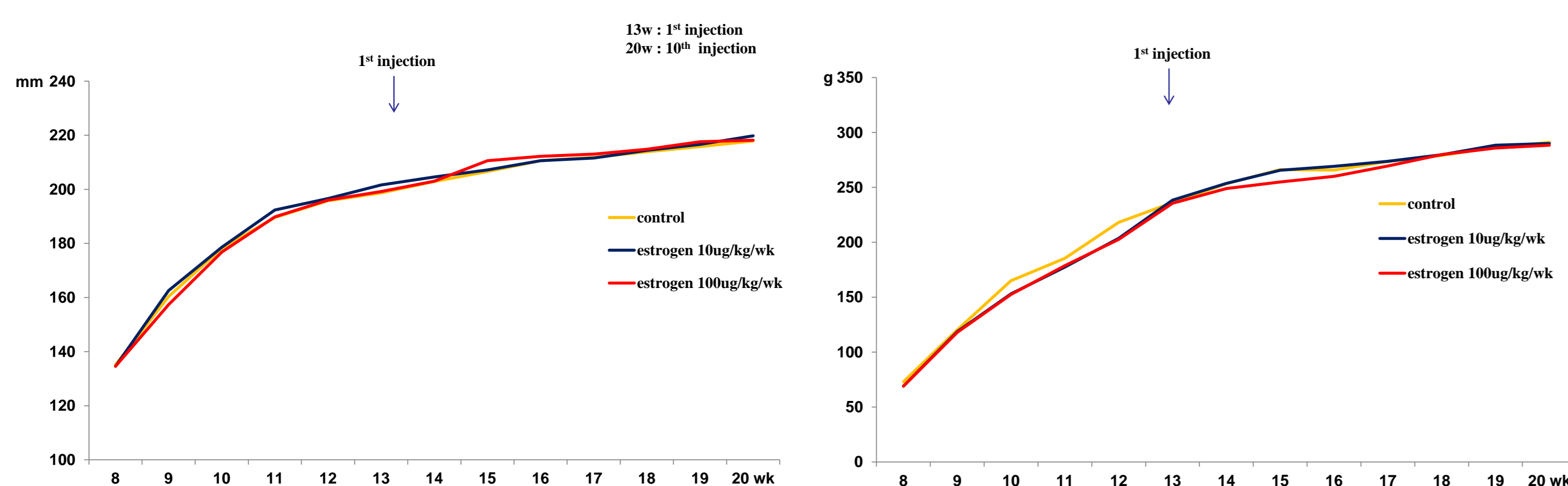


Fig.1B Comparison of growth velocity in the dosage of estrogen



Fig.2 Comparison of serum GH levels before and after treatment

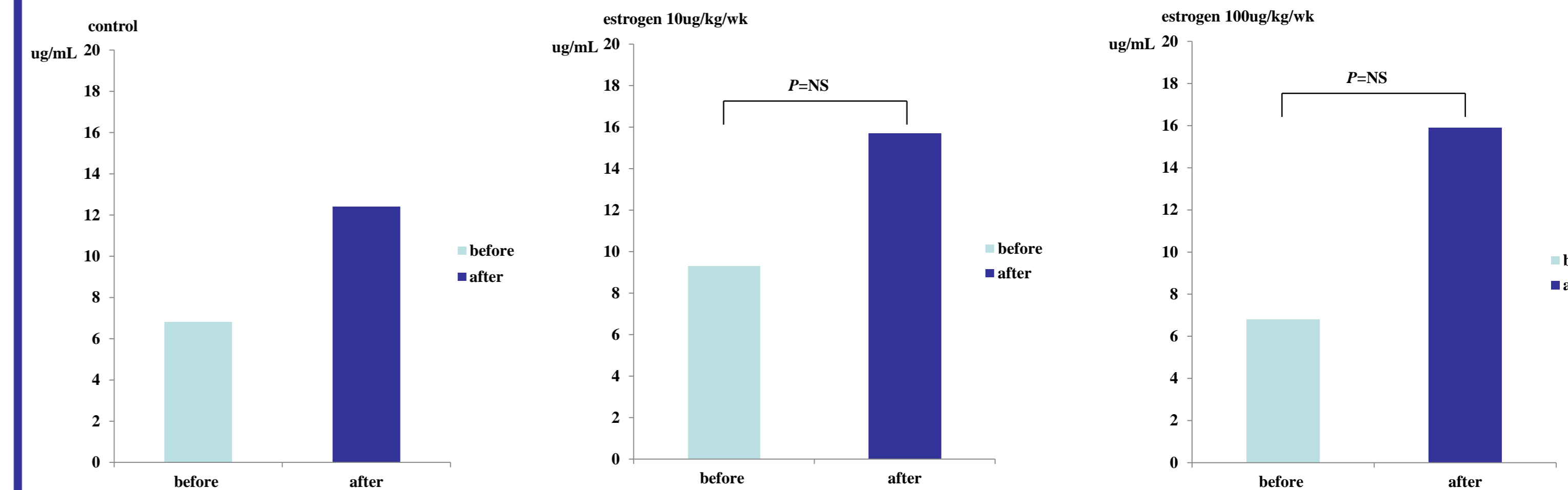


Fig.3A Comparison of the thickness of proliferative zone after treatment

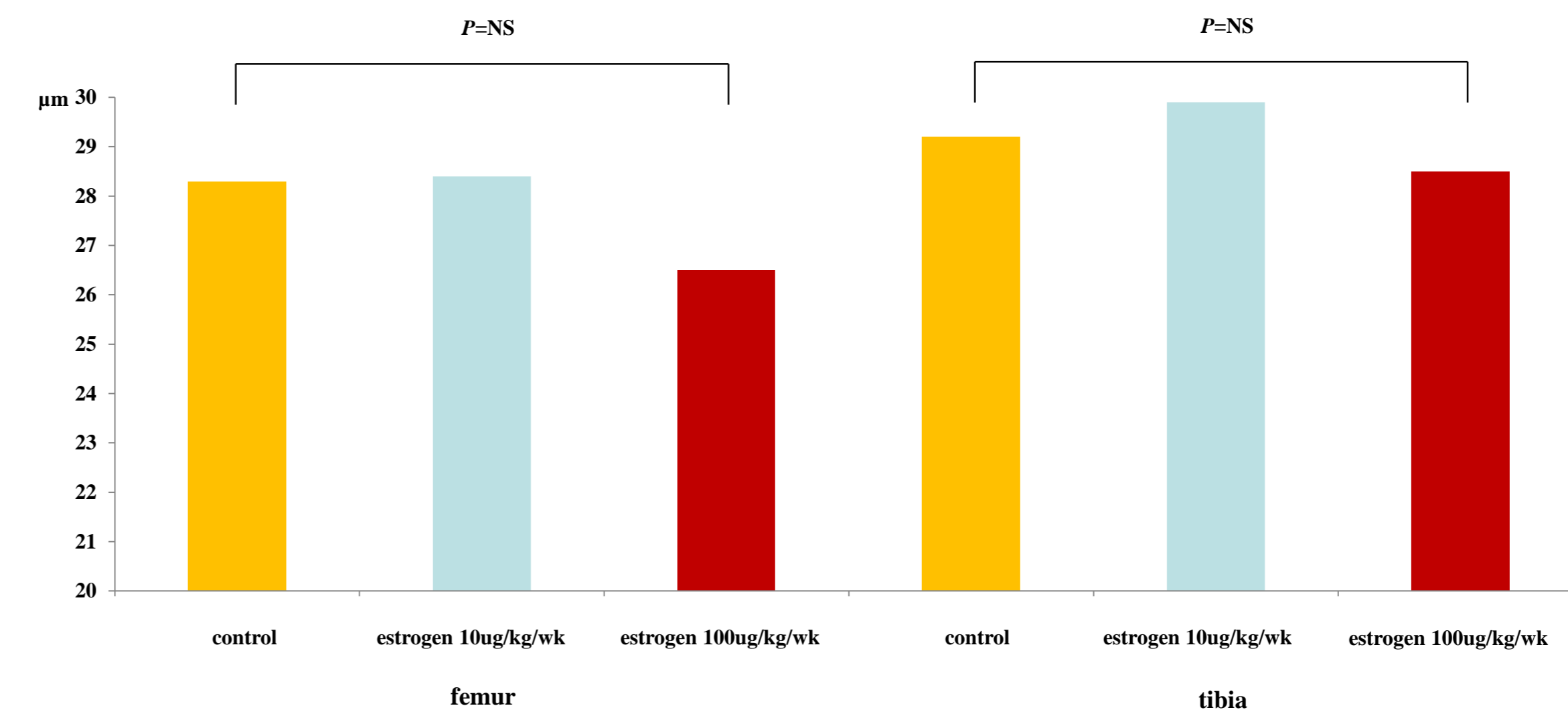


Fig.3B Comparison of the thickness of hypertrophic zone after treatment

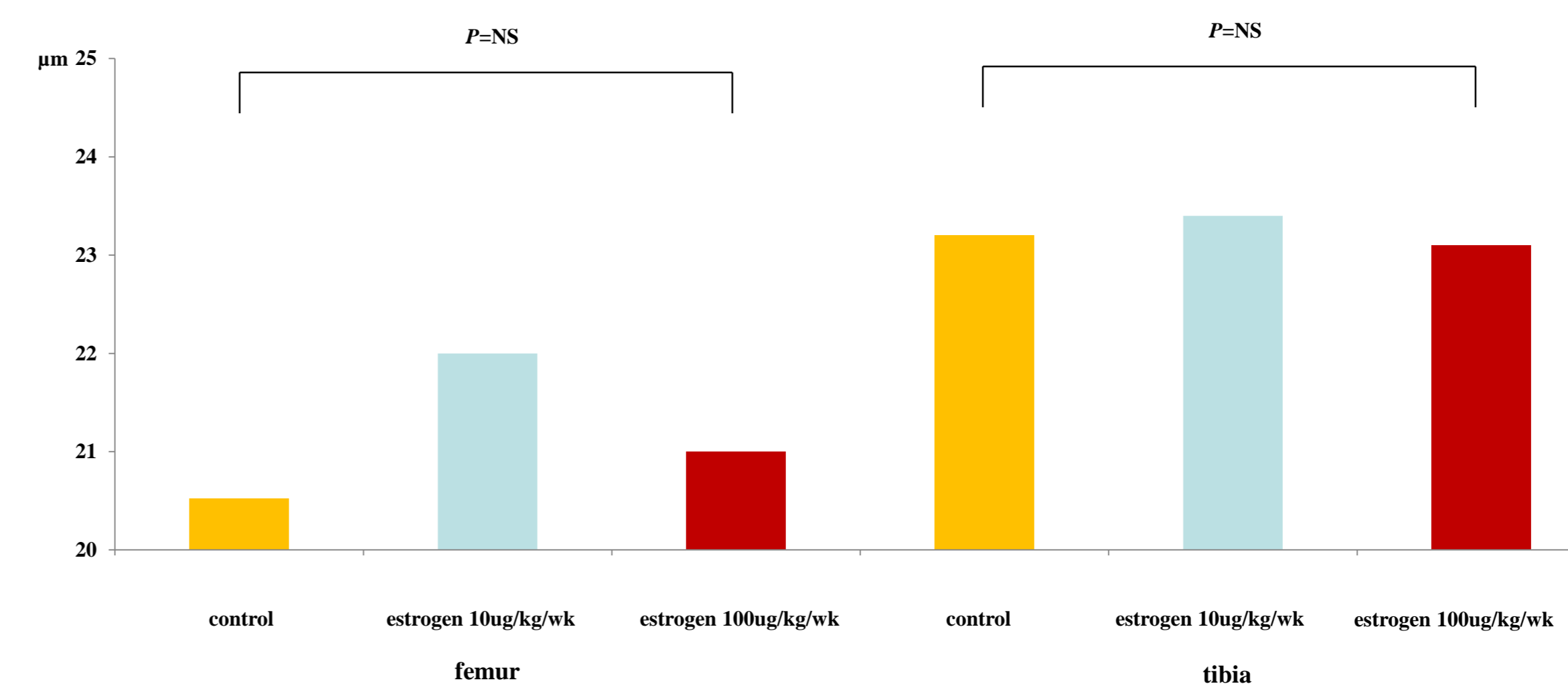
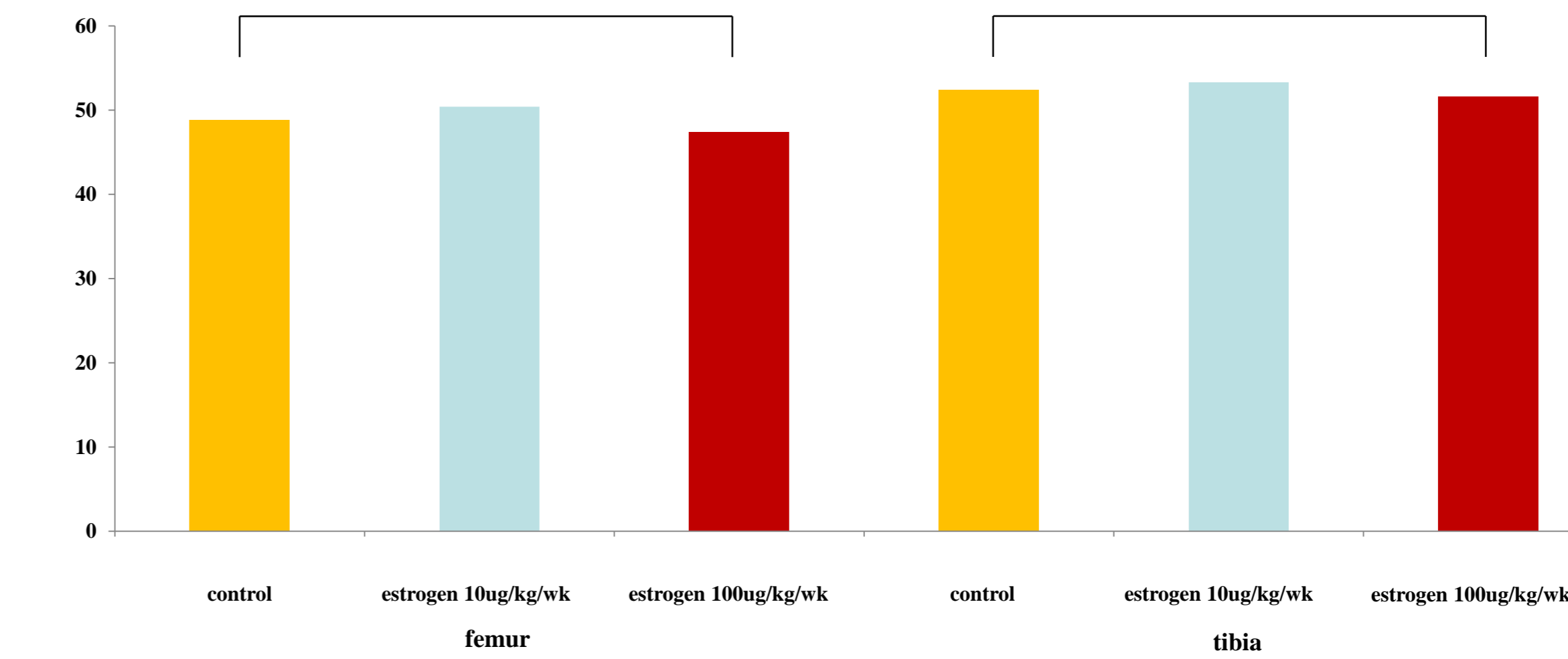


Fig.3C Comparison of the total thickness of epiphyseal plate after treatment



## CONCLUSIONS

Both low and high dose estrogen could increase the secretion of growth hormone.

There is a tendency that epiphyseal plate thickness is negative relation with estrogen dosage, but larger sample studies are needed.

The effects of estrogen on epiphyseal plate in rodents may be different with human, therefore this kind of studies in animal models other than rodents are necessary.

