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PRELIMINARY NOTE

TESTOSTERONE UPTAKE IN MIDTRIMESTER HUMAN FETUSES

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INTRODUCTION

It has been generally accepted that differentiation and growth of the genital ducts, external genitalia and diencephalic centres are influenced by testosterone and some of its metabolites. The peripheral effect of testosterone is dependent upon the specific binding to a protein (proteins) in the target cells. The existence of this binding was demonstrated in the urogenital tract of the rabbit embryos by Wilson[1]. The testosterone binding protein from the genital tract of the rat fetuses was characterized by Gupta and Bloch[2]. Except of a short report published by Šulcová and Jirásek[3] we did not find any data on the testosterone binding in the human fetal tissues.

EXPERIMENTAL

[^{3}H]-Testosterone uptake was studied in the external genitalia, planta pedis, hypothalamus, cerebral cortex and gonads from two normal surgically obtained human midtrimester fetuses. The fetus A: male, menstrual age 19 weeks and 3 days, total body weight 240 g, crown-heel length 220 mm, crown-rump length 150 mm. The fetus B: female, menstrual age 17 weeks and 4 days, the total body weight 140 g, crown-heel length 185 mm, crown-rump length 120 mm.

The tissue samples were dissected immediately after surgery. The testosterone uptake was determined according to Wilson[1]. Tissue fragments (12–110 mg; 2–5 parallel samples) were incubated in 1 ml Krebs–Ringer phosphate buffer, pH 7.4, containing glucose (2×10^{-2} M), [1,2,6,7(*n*)-^{3}H]-testosterone (S.A. 87 Ci/mmol) in concentration 1.9×10^{-8} M and propylene glycol (20 μl). The nonspecific binding was determined from parallel samples to which a 1000 fold excess of nonradioactive testosterone was added (1.9×10^{-5} M). The incubation was continued in O_2 atmosphere at 0°C for 2 h. After incubation and centrifugation, the tissues were carefully washed in ice-cold buffer and then extracted with methanol. The radioactivity was measured in aliquots of the incubation media and tissue extracts. Testosterone was separated by paper chromatography in the system cyclohexane–toluene–methanol–water (9:1:8:2, by vol.). The protein contents in tissues were determined by the method of Lowry *et al.*[4].

RESULTS AND DISCUSSION

Intracellular concentration of the specifically bound radioactive testosterone expressed as fmol/mg protein are presented in the Table 1.

It is evident that a maximal testosterone uptake occurred in both fetuses, a male and a female, in the external genitalia. Regarding sex differences, the concentration of the exogenous testosterone was higher in the male tissues, with the exception of planta pedis which represented a control tissue with a low uptake. A lower uptake of testosterone in the fetal ovary than in the fetal testis is comparable with the findings in rabbit embryos [1]. The biggest difference in testosterone uptake between male and female was observed in the cerebral cortex. The results are considered as comparable, although the age difference between the fetuses is approx. two weeks.

In contrast to the well documented role of androgens in the differentiation of the external genitalia and male genital ducts [5, 6], the significance of testosterone for the development of the fetal testis remains unknown. The physiological role of testosterone in the development of female fetuses remains doubtful.

Our observation completes the data dealing with the specific binding of steroids in different tissues of mammalian fetus [1–3, 7–11].

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REFERENCES

1. Wilson J. D.: Testosterone uptake by the urogenital tract of the rabbit embryo. *Endocrinology* **92** (1973) 1192–1199.

Table 1. Specific testosterone uptake by some human fetal tissues

Tissue	No. of replicate incubations	Fetus A male, 19–20 weeks (mean (range) of values)	Fetus B female, 17–18 weeks (mean (range) of values)
External genitalia	2	268 (243–293)	150 (132–167)
Planta pedis	4	23 (19–28)	43 (28–52)
Hypothalamus	2	106 (97–115)	70 (63–76)
Cerebral cortex	5	164 (148–180)	22 (15–29)
Gonads	3	165 (147–178)	57 (50–67)

Values represent fmol/mg protein.

2. Gupta Ch. and Bloch E.: Testosterone-binding protein in reproductive tract of fetal rats. *Endocrinology* **99** (1976) 389–399.
3. Šulcová J. and Jirásek J. E.: Záchyt testosteronu v periferních tkáních lidského plodu. *Čs.gynekologie* **42** (1977) 58–60.
4. Lowry O. H., Rosebrough N. J., Farr A. L. and Randall R. J.: Protein measurement with the Folin phenol reagent. *J. biol. Chem.* **193** (1951) 265–275.
5. Jost A.: Hormonal effects on fetal development: a survey. *Clin. Pharm. Therapeut.* **14** (1973) 714–720.
6. Wilson J. D. and Siiteri P. K.: The role of steroid hormones in sexual differentiation. In *Endocrinology* (Edited by R. O. Scow). Excerpta Medica, Amsterdam (1973) pp. 1051–1056.
7. Pasqualini J. R., Sumida C. and Gelly C.: Steroid hormone receptors in fetal guinea-pig kidney. *J. steroid Biochem.* **5** (1974) 977–985.
8. Giannopoulos G., Hassan Z. and Solomon S.: Glucocorticoid receptors in fetal and adult rabbit tissues. *J. biol. Chem.* **249** (1974) 2424–2427.
9. Davies J., Naftolin F., Ryan K. J. and Siu J.: A specific, high-affinity, limited-capacity estrogen binding component in the cytosol of human fetal pituitary and brain tissues. *J. clin. Endocr. Metab.* **40** (1975) 909–912.
10. Pasqualini J. R., Sumida C. and Gelly C.: Cytosol and nuclear [^{3}H]-oestradiol binding in the foetal tissues of guinea-pig. *Acta endocr. Copenh.* **83** (1976) 811–828.
11. Pasqualini J. R., Sumida C., Nguyen B. L. and Gelly C.: Récepteur de l'oestradiol dans le compartiment foetal. *Ann. Endocr.* **37** (1976) 89–90.