Levels of free and conjugated androgens and progestins in coelomic fluid and serum of stellate sturgeon (*Acipenser stellatus* Pallas) females

by

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ABSTRACT. - Stellate sturgeon (*Acipenser stellatus* Pallas) females from the Volga River were analysed for sex steroids after hormonal stimulation. The results show a significant increase of sulfated sex steroid levels in serum and coelomic fluid (CF) at final maturation (FM). It is hypothesized that the steroid metabolites could be part of a chemical communication system related to reproduction.

Key words. - Sturgeon - Androgens - Progestins - Sulfates - Glucuronides.

Introduction

Free steroid concentrations in the serum and coelomic fluid (CF) in Russian and stellate sturgeon females have been a subject to an earlier report (Barannikova *et al*., 2002; Bayunova *et al*., 2003). But the profiles of conjugated forms of sex steroids (sulfates and glucuronides) have received far less attention and the role of these forms of circulating steroids in sturgeons is still not clear. In the present study we also extend those observations to the serum and CF in females.

Methods

Stellate sturgeon females (n = 4) were captured from Volga River, delivered to the sturgeon hatchery and held in the ponds during 2-3 weeks before experiment. Fish were treated by LH-RH-A to induce ovulation. Blood samples were taken from the caudal vein at the time of the treatment (0 h) and in the following 7, 10, 13, 16 h and at ovulation (21-28 h). CF was collected during ovulation. Concentrations (ng/ml) of free, sulfated and glucuronided testosterone (T), 11-ketotestosterone (KT), 17, 20-β-dihydroxy-4-pregnen-3-one (DHP), 17,20-β-21-trihydroxy-4-pregnen-3-one (20βS) and 11-desoxycortisol (S) were measured by radioimmunoassay. Levels of progesterone (P4) were measured by ELISA.

Results and discussion

The serum levels of free T and its sulfate peaked 10 h and 13 h after LH-RH-A treatment and decreased during ovulation. Free 20βS and S serum levels significantly elevated 7-10 h after the treatment, as well as their sulfates. Free serum DHP levels increased 16 h after the treatment and tended to decrease at ovulation (Tab. I). The free and conjugated forms of all sex steroids were detected in CF (Tab. II).

Conclusions

We showed the serum dynamics of free and conjugated

Table I. - The dynamics of free and conjugated sex steroid levels (ng/ml) in the serum of stellate sturgeon females during FM. The differences are significant: *: $p < 0.05$; **: $p < 0.01$ - in comparison with point "0"; ^{x}: $p < 0.05$ - in comparison with point "10".

Form	Steroid	Time after the treatment, h					
		0	7	10	13	16	21-28
Free	T	43.3 ± 18.86	49.0 ± 33.52	175.3 ± 46.27**	117.4 ± 33.44**	122.3 ± 45.90	5.6 ± 0.58^{x}
	KT	10.3 ± 3.40	11.7 ± 2.05	10.0 ± 2.49	11.8 ± 4.35	13.7 ± 3.19	13.3 ± 2.77
	P4	0.2 ± 0.05	0.3 ± 0.08	0.2 ± 0.04	0.2 ± 0.02	0.2 ± 0.09	-
	20βS	0.3 ± 0.02	0.8 ± 0.06**	0.8 ± 0.04**	1.0 ± 0.19	1.03 ± 0.13	0.9 ± 0.08
	DHP	0.2 ± 0.03	0.2 ± 0.02	0.3 ± 0.03	0.3 ± 0.05	0.7 ± 0.37*	0.2 ± 0.01
	S	0.5 ± 0.08	1.0 ± 0.13*	1.1 ± 0.29	0.9 ± 0.18	1.1 ± 0.33	-
Sulfate	T	1.6 ± 0.02	1.7 ± 0.09	1.9 ± 0.08	3.8 ± 2.00*	1.9 ± 0.09	1.3 ± 0.20^{x}
	KT	0.2 ± 0.05	0.4 ± 0.03	0.5 ± 0.20	0.3 ± 0.05	0.3 ± 0.02	0.3 ± 0.09
	20βS	0.2 ± 0.06	0.2 ± 0.05	0.5 ± 0.07*	0.2 ± 0.01	0.2 ± 0.06^{x}	0.13
	DHP	0.3 ± 0.08	0.6 ± 0.15	0.3 ± 0.07	0.4 ± 0.16	0.5 ± 0.11	0.5 ± 0.11
	S	0.3 ± 0.02	0.4 ± 0.02*	0.5 ± 0.07*	0.4 ± 0.07	0.4 ± 0.04	-
Glucuronide	T	-	0.2	0.2	1.6	0.23	0.3
	KT	-	-	0.3 ± 0.05	0.4	0.2 ± 0.07	0.1 ± 0.04
	20βS	0.2 ± 0.02	0.2	0.2 ± 0.02	0.1 ± 0.07	0.2	0.2 ± 0.10
	DHP	0.4 ± 0.10	0.6 ± 0.14	0.4 ± 0.14	0.6 ± 0.07	0.5 ± 0.17	0.5 ± 0.06
	S	0.3 ± 0.08	0.6 ± 0.12	0.4 ± 0.06	0.4 ± 0.06	0.4 ± 0.05	-

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Table II. - The levels (ng/ml) of free and conjugated sex steroids in CF of stellate sturgeon females.

Steroid	Free	Sulfate	Glucuronide
T	2.3 ± 0.61	1.5 ± 0.18	0.24 ± 0.01
KT	10.7 ± 6.64	1.2 ± 0.75	0.2 ± 0.06
20βS	0.73 ± 0.09	0.13 ± 0.05	0.3 ± 0.07
DHP	0.15 ± 0.04	0.76 ± 0.19	0.53 ± 0.08
S	0.17 ± 0.03	0.18 ± 0.01	0.17 ± 0.04

sex steroid levels in stellate sturgeon females at FM. Data demonstrated significant increase of sulfated T, 20βS and S serum levels after LH-RH-A treatment. Our data suggest that these forms of sex steroids could be part of a chemical communication system related to reproduction.

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