

EXPERIMENTAL BIOLOGY

ACTION OF STIMULATING DOSES OF ANTITESTICULAR AND ANTIOVARIAN CYTOTOXIC SERA ON GONAD EXPLANTS OF ANIMALS OF DIFFERENT AGES

L. I. Barchenko

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The action of stimulating doses of antitesticular cytotoxic serum on tissue explants of rat testes and of antiovarian cytotoxic serum on tissue explants of rat ovaries varies with the age of the animals: the sera have a more marked stimulant action on tissues of old animals.

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Stimulation of the function of organs and tissues by small doses of cytotoxic sera is most beneficial in cases when loss of function is due either to past disease or, as more commonly happens, to age. The use of substances stimulating tissue function of the old organism can succeed only if the tissues still preserve their power to increase functional activity.

In the present investigation the stimulant action of small doses of cytotoxic sera on tissues of animals of different ages was compared.

EXPERIMENTAL METHOD

Tissue explants of the testes and ovaries of albino rats aged from 3 days to 3 years were used. The tissues were cultivated in Carrel flasks. The nutrient medium contained Tyrode solution, goose plasma, horse serum, and bovine embryonic extract.

Cytotoxic sera for rats were obtained by immunizing rabbits with rat testicular tissues (to obtain antitesticular cytotoxic serum) and rat ovarian tissues (to obtain antiovarian cytotoxic serum). The antibodies were titrated by the complement fixation reaction. Cytotoxic sera were added to the liquid nutrient medium covering the explants, and the dosage of the sera was accordingly determined in percentages of the volume of liquid nutrient medium in the flask. The cytotoxic sera were used in doses of 0.05 and 0.01%, because in our previous investigations to test the effect of various doses of the same sera on tissue explants from young, sexually mature animals these doses gave the most constant and marked stimulant action [1]. The corresponding volume of normal rabbit serum was added to the nutrient medium of the control explants.

The criterion used to judge the action of the cytotoxic serum on the tissues was growth of the experimental explants compared with the controls. Growth was measured by drawing the explants with a drawing apparatus under low power of the microscope, followed by planimetric measurement of the outlined areas. The growth index was calculated from the results obtained. The figures given below are mean values obtained by measuring the growth of between 30 and 35 explants. The numerical data were analyzed by statistical methods.

EXPERIMENTAL RESULTS

Under the action of small doses of antitesticular cytotoxic serum on testicular explants and of antiovarian cytotoxic serum on ovarian explants, well-marked stimulation of growth of the rat testicular and ovarian tissues for animals of all ages investigated was obtained in all experiments (Table 1). However, the intensity of stimulation varied in explants from animals of different ages. In most experiments stimulation of growth of tissue explants from old rats was greater than stimulation of tissues from animals of

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TABLE 1. Action of Small Doses of Antitesticular Cytotoxic Serum (ATCS) on Testicular Tissues and of Antiovarian Cytotoxic Serum (AOCS) on Ovarian Tissues of Animals of Different Ages

Expt. No.	Serum, titer and dose	Age of rat	Growth index of explants		P	Growth of expl. ex- plants (in % of growth of controls)
			exptl.	control		
1	ATCS 1:320; 0,05%	5 days	12,5±0,40	10,58±0,43	<0,001	105
		2½ months	16,23±0,65	1,63±0,33	<0,001	171
		9 months	4,57±0,28	3,25±0,20	<0,001	140
		2 years	4,39±0,20	2,29±0,20	<0,001	187
2	ATCS 1:400; 0,05%	3 days	9,69±0,90	7,89±0,40	>0,05	123
		4 months	4,55±0,20	3,48±0,20	<0,001	130
		1 year	3,33±0,29	2,07±0,20	<0,001	160
		2 years 11 months	5,50±0,20	2,55±0,10	<0,001	215
3	ATCS 1:320; 0,01%	3 days	8,15±0,30	4,55±0,20	<0,001	181
		3 months	3,80±0,20	1,98±0,40	<0,001	192
		1 year	3,20±0,30	1,68±0,10	<0,001	191
		2 years 3 months	2,68±0,10	0,91±0,10	<0,001	294
4	ATCS 1:400; 0,01%	10 days	16,95±0,94	4,63±0,27	<0,001	365
		6 months	4,19±0,36	3,11±0,20	<0,01	123
		2 years 8 months	2,55±0,21	1,54±0,15	<0,001	172
5	ATCS 1:640; 0,01%	3 days	9,53±0,50	4,55±0,20	<0,001	209
		3 months	3,32±0,28	1,98±0,40	<0,001	166
		1 year	2,38±0,10	1,68±0,10	<0,001	141
		2 years 3 months	2,84±0,10	0,91±0,10	<0,001	312
6	AOCS 1:160; 0,05%	5 days	17,25±1,0	13,58±0,60	<0,01	127
		3 months	8,60±0,90	6,05±0,55	<0,02	142
		1 year 4 mos	10,49±0,70	5,47±0,50	<0,001	191
7	AOCS 1:320; 0,05%	10 days	16,96±0,90	11,95±1,08	<0,001	142
		4 months	15,12±0,72	5,97±0,41	<0,001	253
		1½ years	10,15±0,60	5,81±0,40	<0,001	172
8	AOCS 1:400; 0,05%	10 days	17,90±0,90	13,00±0,60	<0,001	137
		4 months	14,76±0,90	7,35±0,50	<0,001	200
		2 years	16,28±1,20	8,50±0,04	<0,001	191

all other age groups. Only in individual experiments was this rule broken. In one experiment (No. 4), for instance, unusually marked stimulation of growth of testicular tissues from 10-day old rats were obtained, namely, 365% compared with the growth of the control explants, while in another experiment (No. 7), stimulation of ovarian tissues of 4-month old rats exceeded stimulation of growth of tissues from rats aged 1.5 years.

Stimulation of the tissues of old animals by means of small doses of cytotoxic sera is thus not only possible but, in most cases, it is actually more marked than stimulation of the tissues of young animals.

The fact that small doses of cytotoxic sera have a stronger (relative to the initial level) stimulant action on the tissues of old animals than of young may be explained by the fact that all processes of functional activity in the young organism are at a relatively high level, so that they can be increased only slightly by means of stimulating agents. It is interesting to note that similar data were obtained during transfusion of small doses of blood with the object of stimulating reactivity of the organism [2]. Such a procedure has been shown to increase reactivity in middle-aged and elderly animals to a greater degree than in young. During aging of the organism the processes of functional activity in the tissues are depressed, yet they retain the potential for an increase in their level, and administration of small doses of cytotoxic sera leads to stimulating of the tissues.

LITERATURE CITED

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