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CHANGES IN NUCLEIC ACID LEVELS DURING AESTIVATION IN *PILA GLOBOSA* (SWAINSON)

CHANGES in enzyme activity levels were noted during aestivation in *P. globosa*[1,2]. Enzymes concerned with glycolysis were known to increase[3] whereas those concerned with TCA cycle decreased during aestivation[4]. The regulation of enzyme activity levels at the enzyme protein level was reported for some enzymes *vis-a-vis* phosphorylase by the interconversion of the two phosphorylases[5,6], glutamine synthetase by cooperative feedback inhibition[7]. But the control of enzyme activity level of many enzymes is regulated at the transcriptional level involving gene expression[8]. There were no studies so far concerning synthetic potential of aestivated snails to get a better understanding of aestivation and a study was undertaken to estimate the nucleic acids and RNA/DNA ratios in the three tissues, *viz.*, digestive gland, mantle and foot of active and 6 months aestivated *P. globosa*.

Collection, maintenance and mode of aestivation were described elsewhere. The tissues were isolated in cold. DNA was estimated by the method of Giles and Myers[9] using diphenylamine. RNA was estimated by the method of Munro and Fleck as described by Glick[10]. The values were expressed as μ gm nucleic acid/gm wet wt. of the tissue.

The results showed a decrease in the nucleic acid content in all the tissues of aestivated snail. The decrease in the DNA content was relatively less except in mantle where 32·7% decrease was observed. The DNA content decreased only to the extent of 11% and 25·5% in the case of digestive gland and foot respectively. The decrease of DNA in the digestive gland was statistically insignificant probably due to the pivotal role it plays in the metabolism of aestivated snail. The significant decrease of DNA content in the mantle and the foot might be due to a decrease in the cell count in these tissues due to the activity of intracellular lysosomal enzymes. The resulting proteins, fats and carbohydrates might be a source of nourishment to the tissue cells. Probably it is this capacity of the snail (in addition to maintain-

TABLE I

Levels of DNA and RNA fractions in the tissues of active and aestivated Pila globosa

(Values expressed in μ gm of nucleic acid/gm wet wt.) Each value is the average of 15 different estimations

Sl. No.	Nucleic acid fraction	Digestive gland		Mantle		Foot	
		Active	Aest.	Active	Aest.	Active	Aest.
1.	DNA	4517±260	4017±190	2789±125	1875±120	1623±350	1102±165
	% Change		−11·07		−32·77		−25·47
2.	RNA	7725±760	4300±376	3413±276	1944±194	1389±139	745±85
	% Change		−44·33		−43·04		−46·35
3.	RNA/DNA	1·71	1·07	1·22	1·04	0·86	0·68
	% Change		+37·44		+15·29		−20·9

Note: 1. ± indicates standard deviation.
2. The changes noted are significant at 0·001 level.

ing its metabolism at a low ebb) that sustains its life for years during aestivation. The RNA content decreased more or less uniformly in all the three tissues, the per cent decreases noted were 44, 44, 46 respectively for digestive gland, mantle and foot. But when RNA/DNA ratio was taken (which gives an index of the synthetic activity of each tissue), there was an increase by 37% and 15% in the digestive gland and mantle whereas in the foot there was a decrease of 20·9%. Though the metabolism in general was decreased during aestivation, some of the enzymes concerned with specific pathways were reported to have been increased for example, glycolytic enzymes warranting for increased synthesis of ribonucleotides in connection with the synthesis of these enzyme proteins.

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AGE-DEPENDENT RESPONSE OF LACTATE DEHYDROGENASE OF GASTROCNEMIUS MUSCLE OF THE RAT TO TESTOSTERONE AND ESTRADIOL

Introduction

ALTERATIONS in the qualitative and quantitative nature of enzymes may be one of the factors to contribute to the process of senescence. These changes in the levels of enzymes can be modulated by hormones. It is well known that sex steroid hormones regulate the activity of glycolytic enzymes in the target tissues like ventral prostate and seminal vesicle[1] as well as in non-target tissues like cerebral hemisphere[2]. But in muscle, so far, studies indicate the presence of receptors for androgens as well as estradiol[3-7]. We report here the age-dependent response of the enzyme, lactate dehydrogenase (LDH ; EC. 1.1.1.27) in the skeletal muscle (gastrocnemius) of male albino rats to testosterone and estradiol.

Experimental

Young (7-), adult (38-) and late reproductive (78-week old) wistar strain male albino rats were maintained under standard laboratory conditions. Trail experiment was carried out starting from 10 μg each hormone treatment for 4, 8 and 16 h treatment. Significant results were observed with 100 μg of each hormone treatment for 4 h duration. The rats of each age were divided into six sets. The first set served as normal. The remaining five sets were castrated bilaterally under ether anaesthesia. They were kept for 21 days as mentioned earlier. On the 22nd day, the rats of second set were given vehicle solution which served as control for hormone treated rats. The rats of third, fourth, fifth and sixth sets were given 50 and 100 μg testosterone or estradiol/100 g body wt. respectively. Both the hormones were dissolved in 10% ethanol-normal saline and administered intraperitoneally at 4·00 p.m. They were sacrificed at 8·00 p.m. on the same day and gastrocnemius muscle was taken out immediately. A 5% homogenate of the tissue was prepared with 0·1 M phosphate buffer, pH 7·4 and the homogenate was centrifuged at 14,000 × g for 30 min at 0° C. The supernatant was used for the spectrophotometric assay of LDH[8]. The enzyme activity was expressed as units/mg protein (specific activity) after determining the protein content[9]. Each set of data was collected from 5–6 animals and statistically analysed. Polyacrylamide gel electrophoresis was carried out to study the isoenzymic pattern under the above experimental conditions[10-12].

Results and Discussion

Table I shows that the activity of LDH in the gastrocnemius muscle of normal rats increases till 38 weeks and decreases significantly in 78-week old rats. As this enzyme is suitable for anaerobic glycolysis, especially in this tissue, its decrease in old age may decrease the anaerobic metabolism of the tissue. Similarly, an age-dependent decrease in the rate of glycolytic to aerobic-oxidative enzymes in the extensor digitorium longus and diaphragm has also been observed[13]. The other possibilities to our finding may