대한생리학회지 : 제21권 제 2 호

—Brief Communication—

Effect of Denervation on Glucose and Glycogen of Skeletal Muscle of *Uromastix hardwickii*

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= Abstract =

The concentrations of glucose and glycogen in the normal gastrocnemius muscles of *Uromastix hardwickii* were 88.82±4.52 mg/100 gm and 158.98±23.19 mg/100gm of wet weight of the muscle, respectively. 14-days denervation period has no any effect on glucose contents while the glycogen concentration was decreased to 1/3 of the normal control innervated muscles.

Key Words: Gastrocnemius muscle, Denervation, Glucose, Glycogen.

Denervation produces severe atrophy of the muscle and leads to degenerative changes. Bass (1962) has shown an increased O_2 and glucose consumption in denervated muscles. The effect of denervation on glycogen level of muscle was found to depend on the types of the skeletal muscles (Joanna & Gorski, 1981). During the first 12~14 hours of denervation, glycogen was accumulated in fast (Extensor Digitorum Longus, EDL) and slow (Soleus) muscles of rat while the ensuing 12~24 hours, the glycogen concentration was decreased only in EDL but not in soleus (Joanna & Gorski, 1981; Villa & Bergamini, 1983).

In the present study, the effect of denervation was made on glucose and glycogen contents of the gastrocnemius muscle of *Uromastix*. The denervation of the left gastrocnemius muscle was performed as described (Javed & Shaikh, 1987). For glucose estimation, the preweighed muscle was homogenized in 2 ml distilled water in porcellin mortar and pastle. The resultant sample was sonificated at 12000 Hz/sec in water bath for 15 min. The proteins were precipitated by adding 1 ml 10% Na-tungstate and 1 ml 2/3N H_2SO_4. The sample was centrifuged for 15 min at 5000 rpm and the supernatant was analyzed for glucose concentration. Glycogen was extracted as described by Good et al. (1933).

Estimations of glucose and glycogen were made by the method of Follin-Wu as described by Oser (1965), while the glycogen was first hydrolyzed to glucose by concentrated HCl and then neutralyzed by NaOH.

The results were analyzed by calculating the mean±standard errors (SE) and using student's t-test for estimating the significance between the control and denervated muscles. The average values of glucose for normal muscles were 88.82±4.52 mg/100 gm of the wet weight of the muscles (Table 1). Denervation for 7 and 14 days has not produced any significant change in the contents of glucose in muscle (Table 1).

The glycogen was estimated only from 14 days denervated animals. The average normal value from

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Table 1. Effect of denervation on glucose and glycogen contents of the gastrocnemius muscles of *Uromastix hardwickii*. The values are shown in mg/100gm of wet weight of the muslces and presented as the mean ± SE. The figures in parenthesis represent the number of muscles used

Estimations	Normal		7-days denervated		14-days denervated	
	R	L	N	D	N	D
Glucose	87.62 ± 7.04 (18)	89.96 ± 4.83 (18)	88.44 ± 6.73 (14)	89.05 ± 4.92 (14)	84.44 ± 7.05 (9)	96.73 ± 11.79 (9)
Glycogen	—	—	—	—	158.98 ± 23.19 (14)	55.79 ± 3.91 (14)

R = Right normal ; L = Left normal ; N = Right normal side of the denervated animals ; D = Left denervated side of the denervated animals.

right normal muscles was 158.98±23.19 mg/100 gm of muscle. The left denervated side showed the mean value of 55.79±3.91 mg/100 gm of muscle which was about 1/3 of the normal value (Table 1) and statistically this decrease was highly significant ($P<0.0005$).

The best source of energy in the muscle is the glucose and glycogen (Bass, 1962; Villa & Bergamini, 1983; Hemminga et al., 1985). Very little information is available regarding the glucose contents of the skeletal muscles. Genrally almost no free glucose could be recovered from muscle cells probably due to high rate of glucose utilization by muscles (Clark et al., 1985). The glycogen contents of the mammalian skeletal muscles were different in different species (Barnes & Worrell, 1985; Shoubridge et al., 1985). Our results for denervation effect on glycogen are according to the previous findings of Bass (1962) who observed a temporary increase in the glycogen contents immediately after nerve sectioning which was then followed by a progressive decrease with increased denervation periods. In the rat, durig the first 12~14 hours of denervation, glycogen was shown to increase but in next 12~24 hour of denervation period the glycogen concentration decreased only in EDL but not in soleus muscles (Villa & Bergamini, 1983). We have not measured glycogen immediately after denervation, we therefore do not know if any change has occured in glycogen contents soon after denervation.

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