Summary. Field studies have shown that there is a seasonal variation in mitosis of lens and corneal epithelium (high in May and June, low during the rest of the year). This phenomenon can be reproduced in the laboratory by temperature manipulation. The response in the lens depends on the presence of the pituitary gland while the corneal one seems to be independent of it.

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Relationship Between Ca-ATPase Activity and Subunits of Myosin in the Myocardium of Rats Conditioned by Swimming

Native myosin of fast (F-myosin), slow (S-myosin) and cardiac (C-myosin) muscle prossesses ATPase activity. The ATPase activity of extracted and purified myosin in vitro can be activated in several ways, e.g. by Ca^{++}. This activity can be changed under normal circumstances or following chronic alterations of physiological state (development of organism[1], work overload[2,3], muscle dystrophy[4], heart failure[3,5]). It seems that the enzymatic activity of contractile proteins generally correlates with the functional and contractile capability of the respective muscle[1,6]. The mechanism by which the enzymatic activity of myosin is changed, as well as the reciprocal changes in the myosin molecule which enable this dynamic of the ATPase activity and force velocity relation, is of considerable theoretical interest and today is still unclear.

The aim of the present study was to determine whether changes in the specific Ca-ATPase activity in contractile proteins following work overload are linked causally with the changes in molecular weight of the light chains (LC) of myosin or the change in their proportions to each other.

The Ca-ATPase activities were studied in the cardiac actomyosin- and myosin solutions from control rats (CH) and of rats conditioned by swimming (SH). The duration of swimming (water temperature 35 °C) was 100–120 h in 8–10 weeks.

Actomyosin was extrated from fresh ventricular tissue using 3 vol. of Weber-Edsall-solution for 24 h at 4 °C and purified by repeated precipitation. The myosin was prepared by dissocisation of the above actomyosin by the ultracentrifugal separation of myosin and actin according to Weber[7]. After swimming training, Ca^{++}-ATPase activity in actomyosin- and myosinsolutions was significantly increased compared to the control rats. This held good for a large range of different Ca^{++}- and K^{+}-concentrations[2].

By SDS-gel electrophoresis[8] using 10% polyacrylamide, we found that cardiac myosins from both trained (SH) and untrained (CH) rats posses 2 light chains with a mol wt from 26,000 (LC_1) and 18,500 (LC_2). Differences in mol wt between 2 light chains of CH and of SH could be excluded.

However, the stoichometry of these chains indicated that the changes in the enzymatic activity of C-myosin of trained rats were accompanied by an altered quantitative relationship of both light chains of myosin. The relative amount of the electrophoretically slower component (LC_1) with a mol wt of 26,000 was significantly higher in myosin from SH than in the myosin from CH. Whereas the ratio

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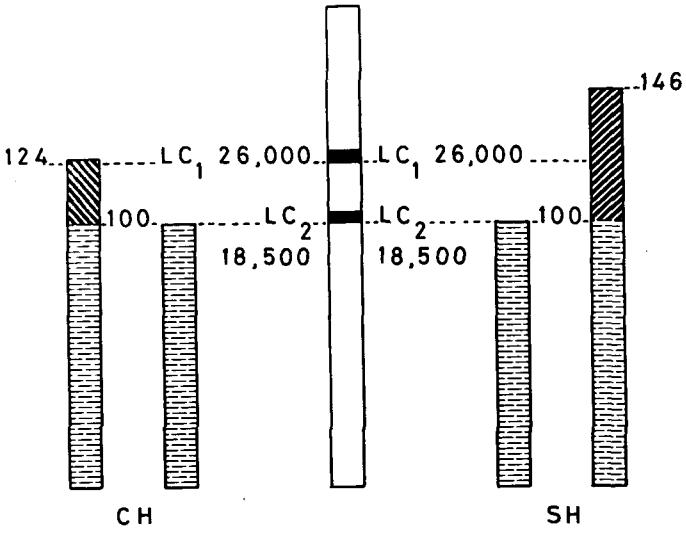

Fig. 1. Average shift in the relation LC_1/LC_2 in SH (146:100) in comparison with CH (124:100). SH, cardiac myosin of rats conditioned by swimming; CH, cardiac myosin of control rats.

of LC_1:LC_2 in C-myosin from control rats amounts to 124:100, a relation of 146:100 results in the case of the C-myosin of rats conditioned by swimming (Figure).

These results are consistent with those of OGANESSYAN et al.[3]. Their results indicated that the alterations in enzymatic activity of the cardiac contractile proteins in dogs following work overload (experimentally-induced aortic stenosis) were associated with concomitant local changes in HMM-region of myosin. In this molecule-region (HMM), light chains are associated with the myosin core[9].

The changes in the specific ATPase activity and pattern of light chains of myosin associated with the alterations of physiological state or with the contractile capability of respective muscle, can be explained on the basis of isoenzymes. It is evident that there are differences between individual myosin species which originate in the different muscle types. Moreover, stoichometry of essential light chains in myosin preparations indicates that in all myosin preparations of fast, slow and cardiac muscle, there may be several different molecule types present, at least with respect to light chains combination of myosin molecules[10].

Moreover, according to studies of SARKAR[11], the relative contribution of essential light chains to ATPase activities of myosin is unequal. In F-myosin, LC_1 contributes significantly more to this activity (60–70%) than LC_3 (30–40%).

Hence it is possible that the changes in light chains pattern and specific ATPase activity of a given myosin preparation, as found by us in foregoing experiments, may be based on variations in the combination of particular isoenzymes in the given myosin preparation.

The variation in the relation of the particular subunits of myosin to each other may originate in the kind of biosynthesis and degradation of myosin molecule. With respect to the formation as well as the degradation, the myosin molecule is a dynamic protein. It is neither synthetized nor degraded as a functional unit. As shown in several studies, its single subunits are produced[12] and degraded[13] independently and at heterogeneous rates[14]. There is consequently no one-to-one coordination of the synthesis and degradation of its individual subunits. The synthesis of myosin is significantly accelerated in response to work overload[15]. As a consequence of severe physical exercise, hemodynamic load of the heart is increased and therefore the production of myosin-protein is significantly accelerated. This accelerated production of myosin along with a different speed of synthesis and degradation of the individual components leads to the changes in the relations of light chains to each other and accordingly to changes in the specific ATPase activity. Hence, the control-mechanism to synthese the individual subunits and consequently the particular isoenzymes could together to be regulative mechanism to produce a myosin of the specific ATPase activity appropriate to the activity pattern of respective muscle.

Zusammenfassung. Im Myokard schwimmtrainierter Ratten fand sich eine signifikante Steigerung der spezifischen ATPase-Aktivität von Aktomyosin und Myosin, die von einer Änderung in der Relation der leichten Ketten des Myosinmoleküls begleitet war.

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Neurochemical Correlates of Alloxan Diabetes: I. Ribonucleic Acid and Protein Levels of Amphibian Brain

Various lines of evidence have implicated insulin in the modification of CNS activity and function[1,2]. Studies in the rat involving administration of alloxan have demonstrated that total phospholipid contents of the brain increase markedly in diabetic condition[3]. FIELD and MASSACHUSETTS[4] reported a depression of the activity of the acetic thiokinase enzyme in diabetic nerves. However, recent studies[5] indicate that the spontaneous electrical activity of the brain, the cerebral glucose consumption and the rate of efflux of K^+ from the brain of rats are not affected by insulin. In view of such a discrepancy in the information available on the CNS of diabetic vertebrates, the present study was proposed. The present investigation presents information about the changes occurring in the levels of RNA and proteins in the different regions of the brain of normal and alloxan-diabetic frogs.

Frogs, *Rana cyanophlictis*, of medium size (22–28 g) were used for the study. They were purchased from local dealers and stocked in the laboratory aquaria at 25 ± 2 °C. These animals were force-fed once in 3 days on the leg muscle of frog.

Diabetes was induced by i.m. injections of freshly prepared aqueous solution of alloxan monohydrate (40 mg/kg body weight)[6]. Animals were analyzed 48 and 96 h after alloxanization. They were killed by decapitation and the brains were quickly removed and washed in ice-cold saline (to remove the adhering blood). The fore, mid and hind brain regions were separated with sterilized fine bent forceps and scalpel, weighed in an electrical balance in amphibian Ringer[7] and immediately extracted with distilled water. Proteins from the aqueous extract were

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