Tabelle II sind eigene Messungen (mit *b* bezeichnet) zusammengestellt; sie werden mit Daten aus der Literatur⁸ (mit *a* bezeichnet) verglichen, die auf entsprechende Reaktionsbedingungen umgerechnet wurden. Man sieht, dass die Aktivitäten in Fischmuskeln an der oberen Grenze der für verschiedene Säuger-Muskelgewebe erhaltenen Daten liegen. Berechnet auf molarer Basis vermögen Fischmuskelextrakte 77mal mehr Glycylglycin zu spalten, als durch Kathepsin aus Hämoglobin Tyrosin freigesetzt wird. Sollten andere Peptidasen des Fischmuskels ähnlich hohe Aktivitäten besitzen (was noch untersucht werden soll), so ist anzunehmen, dass katheptische Spaltprodukte von Peptidnatur im Fischmuskul alsbald zu Aminosäuren aufgespalten werden.

Die bisher erhaltenen Daten werden ausführlich an anderer Stelle publiziert.

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Summary

Fresh tissues from sea fishes show much higher activities of cathepsins than the corresponding mammalian tissues. The significance of these findings is discussed. There is no indication for the presence in fresh extracts of fish muscle of either proteinases with a pH optimum near neutrality or of decarboxylases for glutamic and aspartic acids. The activities of glycylglycine dipeptidase in fish muscle are found to be at the upper limit of the values obtained by other workers with mammalian tissues.

Role of Catalase in Heinz Body Formation

The most probable theory explains the Heinz body formation as a degradation process of certain cell components caused by hydrogen peroxide, which accumulates if catalase is inhibited by several materials¹. Exogenous hydrogen peroxide does actually produce Heinz bodies in potassium cyanide poisoned red cells². On the other hand, catalase acts in certain circumstances peroxidatically³, and such an effect of the catalase is also present in connection with catalase poisons. Catalase poisons, such as aniline and 2,4-dichlorophenol, inhibit not only the catalase, but the inhibitor also changes in the presence of catalase and peroxide⁴.

It is possible that inhibited catalase may also have an active role in the Heinz body formation, and therefore the possibility of Heinz body formation in red cells without catalase or with a low catalase content must be investigated.

Catalase inhibition by potassium chlorate is irreversible⁵, and therefore the potassium chlorate treatment of red cells seemed to be a suitable method to

obtain red cells with a low catalase content⁶. In this experiment, 0.5 ml of washed human red cells were incubated at 37.0°C with 0.2 ml of 1.9% potassium chlorate and 0.8 ml of *M*/15 phosphate buffer of pH 7.0. At different times, the red cells were washed with physiological saline 3 times. In this manner red cells were gained with about 50% (60 min), 40% (90 min) and 30% (120 min) catalase content.

To 0.5 ml of treated and washed red cells, a like amount of citrate plasma and 1.0 ml of 1.0% potassium cyanide and, after 5 min, 1.0 ml of 1.0% hydrogen peroxide were added. Hydrogen peroxide was dissolved in *M*/15 phosphate buffer of pH 7.0. The experiment was carried out at 37.0°C. Samples taken after 30 min were stained by Wolfer's staining technique with methyl violet⁷.

This experiment has shown that if red cells are incubated with potassium chlorate 60 min before the cyanide-peroxide test, Heinz bodies still appear, as a rule, in the majority of the red cells. If the treatment is finished in the 90th min, Heinz bodies appear only in few cells.

In a previous paper, an experiment was described which has suggested that the role of catalase inhibitor cannot be limited to the catalase inhibition, but it plays a direct role in the Heinz body formation². The present study has given evidence that the necessary condition for Heinz body formation, besides the inhibitor and peroxide, is the sufficient quantity of catalase. For these reasons, it appears plausible that the Heinz bodies are produced as a result of the interaction of catalase, inhibitor and hydrogen peroxide. In this process, not only peroxide is used as a substrate but also the inhibitor. The former is used by the catalase function of the catalase, the latter by the peroxidase function of the catalase. In this way, both mechanisms act together and both are responsible for Heinz body formation, and when the catalase oxidizes its inhibitor peroxidatically, it does the same with certain cell components.

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State Institute of Occupational Medicine, Departement of Industrial Hygiene, Budapest, October 1, 1957.

Zusammenfassung

Bei der Behandlung von Erythrozyten mit Kaliumchlorat sinkt mit der Behandlungsdauer die Fähigkeit zur Bildung von Heinzkörperchen. Dies weist darauf hin, dass die Katalase ebenso sehr Vorbedingung der Heinzkörperchenbildung ist wie Katalase-Inhibitor und Peroxid.

⁶ L. MAGOS, in this issue.

⁷ Planches d'Hématologie, Sandoz (Basel 1950).

Catalase Inhibition by Potassium Chlorate in Red Cells

Catalase inhibition by potassium chlorate is irreversible¹. On this basis it is evident that the catalase activity of red cells after washing with physiological saline, remains as low as at the end of the potassium chlorate treatment.

¹ H. BLASCHKO, Biochem. J. 29, 2303 (1935).

¹ S. BRENNER and A. C. ALLISON, Exper. 9, 381 (1953).

² L. MAGOS, Exper. 12, 264 (1956).

³ D. KEILIN and E. F. HARTREE, Proc. roy. Soc. [B] 119, 141 (1936).

⁴ L. MAGOS, A. M. A. Arch. Industr. Health. 15, 148 (1957).

⁵ H. BLASCHKO, Biochem. J. 29, 2303 (1935).