## Enhancement of Enzymatic Catalysis of Cross-Linked Dextran in the Presence of Non-Ionic Polymer

The specific interactions between some macromolecular substances may be enhanced in media containing non-ionic water-soluble polymers. It has been shown previously that an enhancement of certain antigen-anti-body interactions occurs in the presence of dextrans[1-8] and polyethylene glycols[9]. A similar enhancement in reactivity was recently observed in an enzyme system[10]. The enzyme employed was α-amylase, the activity of which was increased in the presence of dextran during the hydrolysis of a synthetic highmolecular weight cross-linked blue starch polymer[11]. Furthermore, in this system it was shown that in addition to enhancement of enzymatic activity, the inhibition by specific antibody could also be demonstrated[10].

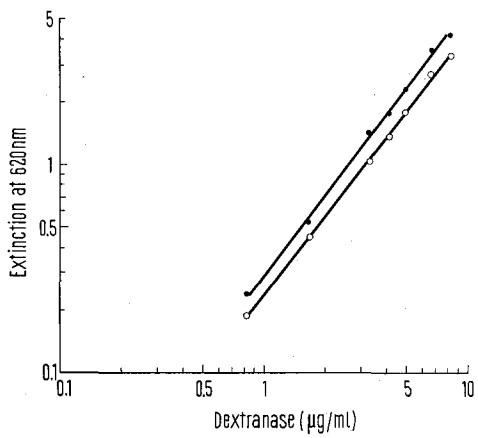


Fig. 1. Hydrolysis of blue dextran polymer (25 mg/ml) with indicated amounts of dextranase for 30 min at 45 °C. ●—●, in the presence of polyethylene glycol; ○—○, in the absence of polyethylene glycol.

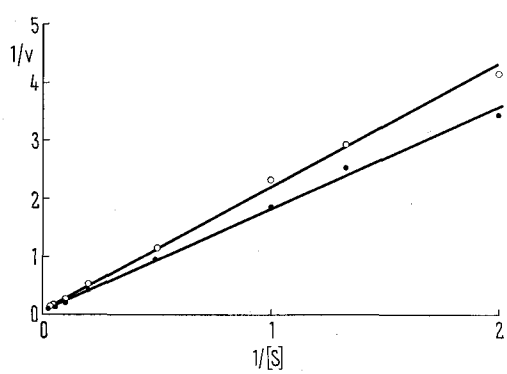


Fig. 2. Lineweaver-Burk plot. Dextranase activity (of dextranase preparation, 4.17 µg/ml) throughout 60-fold increase of substrate concentration (from 0.5–30 mg/ml of reaction mixture). The reaction was run at 45 °C for 30 min. ●—●, in the presence of 4% of polyethylene glycol; ○—○, in the absence of polyethylene glycol.

The present study describes another enzymatic system, namely dextran-dextranase, which can be influenced by the presence of non-ionic polymer of polyethylene type. The substrate used was a cross-linked and coloured dextran, the synthesis of which is described elsewhere[12].

Dextranase (Worthington, 150 U/mg protein) at a given concentration was pre-incubated in water bath at 45 °C. Aliquots of suspended blue dextran polymer in 0.1 *M* potassium phosphate buffer, pH 6.0 (containing 0.02% sodium azide) were used. To some tubes polyethylene glycol compound 20 *M* (Union Carbide) was added to give a final concentration of 4%. After a given time of incubation at 45 °C, the reaction was terminated by the addition of 0.5 ml of 0.5 *M* sodium hydroxide. The coloured supernatant was separated from the unhydrolyzed polymer by centrifugation. The extinction of supernatant was measured in a Zeiss PMQ II spectrophotometer at 620 nm.

Figure 1 shows the hydrolysis of blue dextran polymer by dextranase in the presence and in the absence of polyethylene glycol. In the presence of polyethylene glycol, there is a definite increase in the enzymatic activity at all levels of dextranase used. The hydrolysis of various amounts of blue dextran polymer by a constant amount of enzyme, in the presence and in the absence of the non-ionic polymer, is shown in a Lineweaver-Burk plot (Figure 2). Both curves (with different slopes) intercept the 1/v-axis at the same point. The increase in the Michaelis constant suggests that, in the presence of polyethylene glycol, there is an increase in the affinity between the enzyme and substrate. The changes in apparent $K_m$ values of dextranase in the presence and in the absence of various non-ionic polymers using dextrans cross-linked to different degrees, will be reported on at a later date.

*Zusammenfassung.* Die enzymatische Spaltung von vernetztem und gefärbtem Dextran mit Dextranase wird in Gegenwart von neutralem (nicht ionogenem) Polymer-Polyethyleneglykol erhöht.

M. CESKA

*Department of Biochemistry,*
*Pharmacia AB, Box 604,*
*S-75125 Uppsala (Sweden), 3. September 1971.*

1 K. HELLSING, Acta chem. scand. *20*, 2251 (1966).
2 M. CESKA, Nature, Lond. *217*, 356 (1968).
3 M. CESKA and F. GROSSMÜLLER, Experientia *24*, 391 (1968).
4 M. CESKA, Immunology *15*, 837 (1968).
5 M. CESKA, Biochem. J. *111*, 607 (1969).
6 K. HELLSING, Biochem. J. *114*, 151 (1969).
7 M. CESKA, J. Immunol. *103*, 100 (1969).
8 M. CESKA and A.-M. LINDFIN, Immunology *20*, 123 (1971).
9 M. CESKA, Biochim. biophys. Acta *117*, 625 (1968).
10 M. CESKA, Experientia *27*, 767 (1971).
11 M. CESKA, E. HULTMAN and B. G.-A. INGELMAN, Experientia *25*, 555 (1969).
12 M. CESKA, Experientia *27*, 1263 (1971).

## Effect of Alkoxyglycerols on the Serum Ornithine Carbamoyl Transferase in Connection with Radiation Treatment

Alkoxyglycerols occur in small quantities in many natural products. In the haemopoietic organs of mammals, particularly the bone marrow, they are relatively abundant. They also occur in relatively high concentrations in human mother's milk[1-4]. They occur most abundantly in nature in the liver oil of certain species of shark[3,4]. The general formula for alkoxyglycerols is $CH_2OH \cdot CHOH \cdot CH_2O \cdot R$, where $R$ is a longchain aliphatic radical. The