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INTERACTION OF CADMIUM AND BOVINE SERUM ALBUMIN AND THE MOBILIZATION OF CADMIUM FROM BOVINE SERUM ALBUMIN WITH CHELATING AGENTS

The binding of cadmium to Bovine Serum Albumin (BSA) was studied by means of the potential recovery method with a Cd selective electrode as the monitor. The average number of moles of Cd bound to each mole of BSA (\bar{N}) was determined as the function of Cd concentration at different pH values. $\log \bar{N}$ vs $\log [Cd]$ profiles are linear provided the pH is kept constant. If both $[Cd]$ and $[H^+]$ are introduced as variables, a general equation $\bar{N} = K[Cd]^m$ may be obtained to fit the experimental data. Both K and m are functions of pH. The \bar{N} values under different conditions may be calculated by means of this equation. From Scatchard plots of the experimental data, it is suggested that there are two strong and ten weak binding sites (from pH 5.28 to 7.92) and the binding constants for these sites were determined. The results of competitive gel chromatographic studies show that cadmium ions can hardly displace the BSA-bound zinc ions, but zinc ions can displace BSA-bound cadmium ions readily. It is supposed that the strong binding sites for cadmium may be the same ones as for zinc, the zinc binding being stronger than the cadmium binding, while the

weak binding sites bind cadmium only. Fluorescence studies support this supposition. Surfactants (SDS and Tween 80) change the fluorescence spectra of BSA and Cd-BSA solutions and influence significantly the binding capacity of BSA for Cd. The mobilizing ability of chelating agents to BSA-bound cadmium was determined by gel chromatography and the results are expressed as a parameter F , which is the ratio of BSA-bound cadmium in the presence and absence of chelating agent. The relative mobilizing abilities are: $DTPA > EDTA > EGTA > NTA > TRIEN > PEN > CYS > HIS > SA$.

The $\log F$ values vary linearly with $\log K'_{CdL}$. Dimercapto chelating agents are anomalous in this respect. DMPS and DMS increase the binding capacity of BSA. These results are in accord with the *in vivo* experiments reported in ref. [1].

REFERENCES

- [1] A.B. MARK, *J. Inorg. Nucl. Chem.*, **43**, 3039 (1981).