duction of neutral proteinases had been previously stimulated by the ionophore A23187 failed to become «hyperstimulated» in the presence of Co^{2+} (data not shown).

As the concentrations of Co^{2+} needed to produce these effects are found in patients with prosthetic joints [3,4], the cellular reactions we describe here deserve further scrutiny.

REFERENCES

[1] S.R. GOLDRING, A.L. SCHILLER, M. ROELKE, D.A. O'NEILL, W.H. HARRIS, *J. Bone Joint Surg.*, **65A**, 575-584 (1983).

[2] C.H. EVANS, J.D. RIDELLA, *Anal. Biochem.*, **142**, 411-420 (1984).

[3] R.F. COLEMAN, J. HERRINGTON, J.T. SCALES, *Br. Med. J.*, **1**, 527-529 (1973).

[4] H.S. HOBBS, M.J. MINSKI, *Biomaterials*, **1**, 193-198 (1980).

PS6.20 — MO

S.H. LAURIE
D.E. PRATT
School of Chemistry
Leicester Polytechnic
P.O. Box 143, Leicester
England

THE STRUCTURE AND REACTIVITY OF Ni(II)-ALBUMIN PROTEIN COMPLEX

There is much concern regarding the toxic effects of ingested nickel, particularly among workers in nickel refineries [1,2]. For this reason the biochemical studies undertaken by SARKAR and his co-workers [3,4] in relation to ingested Ni are of particular importance. They have shown that the main Ni(II)-binding constituents in human blood are the amino acid histidine (His) and the protein albumin. This distribution resembles that for Cu(II) except the albumin has a much stronger affinity [4] for Cu(II) than Ni(II). Nevertheless, these studies have established that the two metal ions bind to the same site in the albumin, and this, from Cu(II) studies, is known to involve the *N*-terminal amino acid residues. The proposed near square-planar geometry formed from the amino *N*, deprotonated peptide *N* atoms, and a histidine *N* is depicted in Fig. 1.

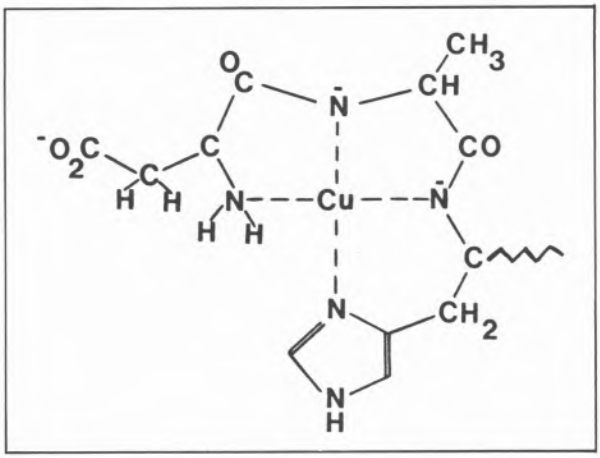


Fig. 1
The proposed Cu(II) coordination site

The ability of Ni(II) to cause peptide *N* deprotonation is known to be less than that of Cu(II), and a structure such as that in Fig. 1 would require a high pH for its formation. In keeping with this the UV/Vis absorption spectrum of 1:1 Ni(II):albumin shows an intense absorption band at 420 nm, characteristic of a square-planar environment, which reaches a maximum absorption at pH > 9 [4].

We have examined the bovine albumin binding of Ni(II) by means of UV/Vis absorption and CD spectroscopy. In agreement with GLENNON and SARKAR [4] the square-planar type spectra reach a maximum at pH > 9. The spectra, shown in Fig. 2, reveal that at the pH of blood (7.4) 70% of the Ni is bound as in Fig. 1. The remaining 30% must be octahedrally co-ordinated since, under the conditions used, this would be spectroscopically silent. The rapidity of interconversion between the two forms as the pH is altered suggests that the octahedral site must also be at the *N*-terminal end of the protein chain.

We have also found that the rate of ligand exchange for Ni(albumin), as in

$$\text{Ni(albumin)} + 2\text{HisO} \rightleftharpoons \text{Ni(HisO)}_2 + \text{albumin}$$

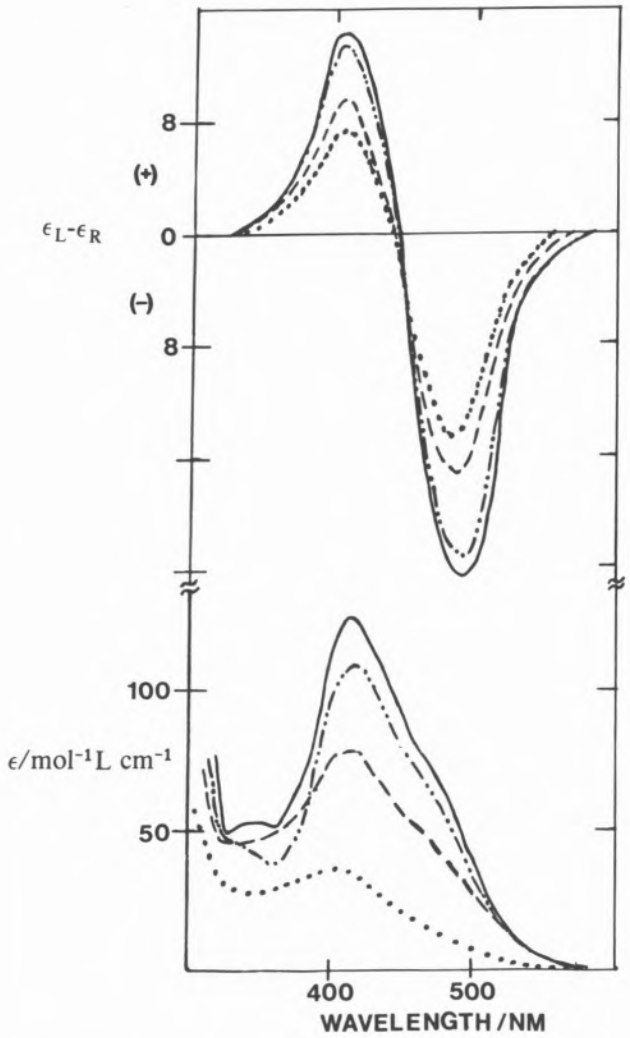


Fig. 2
The CD (upper) and UV/Vis absorption (lower) spectra of Ni(II)-albumin solutions at pH 6.9 (·····), pH 7.4 (-----), pH 8.1 (-·-·-), and pH 9.3 (———)

is very slow, requiring > 90 min to achieve equilibrium at 37°C and pH 7.4 (0.15 M NaCl solution), the octahedral species reacting more rapidly (via a dissociative mechanism) than the square-planar form which reacts associatively. The difference in *kinetic* behaviour between Ni(albumin) and Cu(albumin) could be an important factor in their different metabolic properties [4].

REFERENCES

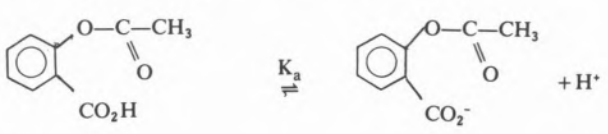
[1] M.D. McNeely, M.W. Neckay, F.W. Sunderman Jr., *Clin. Chem. Winston-Salem, N.C.*, **18**, 992 (1972).
[2] F.W. Sunderman Jr., *Ann. Clin. Lab. Sci.*, **7**, 377 (1977).
[3] M. Lucassen, B. Sarkar, *J. Toxicol. Environ. Health*, **5**, 897 (1979).
[4] J.D. Glennon, B. Sarkar, *Biochem. J.*, **203**, 15 (1982).

PS6.21 — TU

ALBERT D. KOWALAK
KAREN LeBOULLUEC
University of Lowell
Lowell, Massachusetts 01854
U.S.A.

THE STABILITY CONSTANTS FOR IRON(II)ASPIRINATE(ACETYLSALICYLATE)

The use of acetylsalicylic acid, aspirin, to relieve pain, reduce fever plus a wide variety of other ailments is well known. However, the theories to explain the effects of aspirin are vague. One theory postulates that the body under stress will have a two fold or greater increase of copper ions in the blood stream with a loss of essential copper from the organs. The role of the aspirin is the formation of a copper chelate which facilitates the return of copper to the deficient cells [1]. The chemistry of the coordination of aspirin with metal ions is therefore necessary to have a complete understanding of the therapeutic role of aspirin.
Copper(II)aspirinate has been prepared and structural studies of the solid [2] report a polymeric material of units of $[Cu(C_9H_7O_4)_2]_2$ with the carboxylic group acting as a bridging ligand between two Cu(II) ions as well as Cu-Cu bonding. The aspirin complex in the solid state does not exhibit chelation. There are no other studies that have been reported on the interaction of aspirin with copper; in fact, very little has been reported on the interaction of aspirin with metal ions.
We wish to report the results for the determination of the stability constants for the iron(II)-aspirin system.
The aspirin as ligand is monobasic:



HL $\quad$ L^- $\quad$ (1)