Poster Session: Metal Ions in Biological Systems

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Comparison of the Chemical States of Chromium in Yeast and Higher Plants

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Chromium in plants has been reported to be in two very different complexes. The glucose-tolerance factor (GTF) was reported to be a 400 dalton cation [1] whereas the complex purified from higher plants (HPC) was reported to be a 3000 dalton anion [2, 3]. The purification procedures for these complexes were different. It was desired to measure the charge and relative molecular size of the chromium complexes obtained using both purification procedures on yeast and on a representative higher plant.

Chromium-51 labeled Brewers yeast (*Saccaromyces carlesbergensis*) and alfalfa (*Medicago sativa L.*) were fractionated by two published procedures for the preparation of the glucose-tolerance factor and by a procedure for the preparation of the chromium-containing complex from higher plants. One GTF procedure used a 50% n-butanol extraction followed by dialysis and chromatography on DEAE-cellulose [4] and the other used a 50% ethanol extraction followed by activated charcoal purification [5]. The HPC preparation used water extraction followed by molecular sieve chromatography on Sephadex G-25 [2]. Aqueous solutions of all three preparations from both yeast and alfalfa were chromatographed on Sephadex G-25 and the ionic charge determined by ion exchange chromatography.

The results are summarized in Table I. The GTF procedures applied to yeast produced a positively charged complex with a peak R_f of 1.71 to 1.76 and a rather diffuse peak. The GTF procedures applied to alfalfa produced a negatively charged complex with an R_f of 1.68. The HPC procedure with yeast or alfalfa gave a negatively charged complex with an R_f of 1.5 to 1.6.

TABLE I. Properties of Chromium Complexes prepared from Yeast and Alfalfa.

Preparation method	R_f on Sephadex G-25		Ionic charge	
	Yeast	Alfalfa	Yeast	Alfalfa
GTF–ethanol [5]	1.71	1.69	+	–
GTF–n-butanol [4]	1.76	1.68	+	–
HPC [2]	1.45–1.55	1.61 ± 0.04	—	—

The GTF procedures produce a smaller complex than the HPC procedure. Yeast and alfalfa complexes purified by either GTF procedure have opposite charges, the yeast complex having the charge reported for the GTF. With the HPC procedure only anionic complexes were found from either starting material.

The chromium-containing complex found in higher plants is different from the GTF even though both are alcohol soluble. A complex similar to the HPC complex can be isolated from yeast.

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The Role of a Metal–Transferrin–Transferrin–Receptor Mechanism in the *in vitro* Uptake of Metals by Human Lymphoblasts (WIL-2)

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It is now clear that in addition to its role as the principal iron carrier protein in the plasma and extracellular fluid, transferrin also acts as the carrier protein for a number of toxic and non-toxic 'foreign' metals, such as gallium [1], hafnium [2], thorium [3], plutonium [4] and, probably, americium and curium [5].

Iron is known to be taken up into reticulocytes and at least some other cells through an iron–transferrin–transferrin–receptor mechanism [6], and it has been recently suggested that a similar mechanism may be concerned in the uptake of gallium by tumour cells [7]. The possibility that a metal–transferrin–transferrin–receptor mechanism may be