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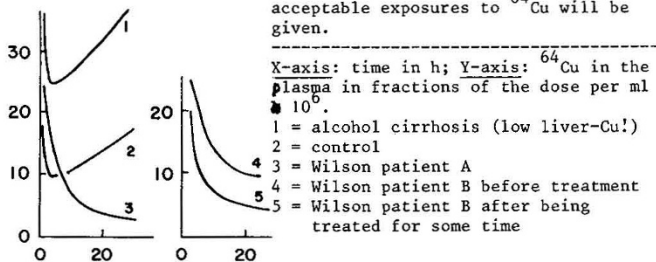
THE EFFECT OF CYST(E)INE ON HUMAN PLATELETS. Menichelli A., Del Principe D., Di Giulio S., De Matteis W. Dept. of Pediatrics, University of Rome, Rome, Italy.

Cyst(e)ine metabolism is a source of intracellular oxidant stress (Astler et al, J Clin Invest 76:567, 1985). We studied the cyst(e)ine effect on platelet (plt) suspensions. Catalase activity of plts incubated 60 min at 37°C with 100 µM cyst(e)ine, 1 mM 3-amino-1,2,4-triazole (AT), 0.2 mM DL-Buthionine-(S,R)-sulfoximine (inhibitor of glutathione cycle) and then washed 3 times, was measured polarographically. Plt aggregation was performed by standard method. Catalase activity (determined by O₂ generated/mg protein after H₂O₂ addition) was inhibited by about 50% after cysteine, and by about 30% after cystine addition (n=20, p<0.01). Cysteine inhibited by 40% plt aggregation, whereas cystine inhibited 2/3 of 20 samples. This effect was partially reversed by externally added catalase. The partial inhibition of catalase in the presence of AT indicates the production of H₂O₂ (AT inhibits catalase only in the presence of H₂O₂). Our data suggest that cyclic oxidation-reduction of thiols, of pharmacologic or physiologic interest, may affect glutathione-depleted plts, by producing H₂O₂.

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⁶⁴ COPPER-LOADING TEST AS INDICATOR OF ELEVATED LIVER-COPPER, E.G., IN WILSON'S DISEASE. Van den Hamer, C.J.A. and Hoogenraad, T.J.U. Interuniversity Reactor Institute, Delft and University Hospital, Utrecht The Netherlands

The shape of the curve of plasma-⁶⁴Cu as function of time after an i.v. dose of 0.5 mg of ⁶⁴Cu yields information about the Cu-status of the patient. The drop in ⁶⁴Cu during the first hours post dose is less steep when the exchangeable, mobile Cu in the body is high (curve 3 versus 2; curve 4 versus 5). The increase of plasma-⁶⁴Cu after t=5 h post dose is due to incorporation of ⁶⁴Cu in the plasma protein ceruloplasmin: lower liver-Cu results in a higher incorporation of ⁶⁴Cu (curve 1 versus 2). Application of the test to Wilson's disease (especially for early recognition) and some other - in part unexplained metabolic disorders affecting the Cu-metabolism - will be mentioned. A protocol which leads to acceptable exposures to ⁶⁴Cu will be given.



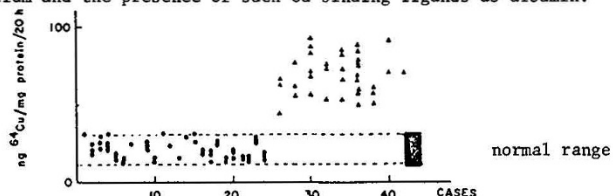
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⁶⁴-COPPER UPTAKE IN FIBROBLASTS IN MENKES' DISEASE Van den Berg, G.J. and Van den Hamer, C.J.A. Interuniversity Reactor Institute, Department of Radiochemistry, Nuclear Biomedical Studies Mekelweg 15, 2629 JB DELFT The Netherlands

Menkes' (Kinky Hair) Disease, an inborn error of Cu-metabolism, is detectable in in vitro cultured skin fibroblasts. Such cells accumulate significant more ⁶⁴-Cu from the medium than control cells: the results of 9 otherwise verified patients and of 24 controls illustrate this (see Figure).

Some unusual results of patients will be mentioned, among which one confirmed Menkes patient, which had unusual biochemical characteristics and a patient which had an unknown Cu-deficiency, different from Menkes' Disease.

Some complicating factors of the ⁶⁴-Cu uptake will be discussed: the influence of confluency of the cultures, Cu content of the medium and the presence of such Cu binding ligands as albumin.



Incorporated ⁶⁴-Cu by human skin fibroblast cultures (o = from controls, Δ = from patients, each symbol represents one culture,

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ZINC BALANCE STUDIES IN BREAST-FED AND FORMULA-FED INFANTS. Sievers, E., Oldigs, H.-D., Schaub, J. Univ. Children's Hospital, Kiel, FRG.

It is assumed that zinc absorption from human milk is better than from formulas. The question arises, if formulas should be enriched with additional zinc. We studied 10 breast-fed and 5 formula-fed infants in 72-hour-balances under home conditions. Collecting periods started 2, 5, 8, 12, and 16 weeks postnatally. The formula was supplemented with zinc sulphate and contained 3.98 mg/l Zn. Zn concentration in faeces, urine and milk samples was determined by atomic absorption spectrometry. The median of zinc values in human milk fell from 3.56 mg/l in the 3rd week to 1.2 mg/l in the 17th week of lactation.

The median value of zinc intake in breast-fed infants declined from 0.566 mg/kg*d in the third week to 0.151 mg/kg*d in the 17th week. The median value of Zn intake in bottle fed infants remained between 0.597 and 0.707 mg/kg*d in the 5 collecting periods. Median values of Zn retention in the breast-fed infants ranged between 0.059 and 0.14 mg/kg*d, in the formula-fed infants between 0.043 and 0.306 mg/kg*d.

Infants fed a supplemented formula with 3.98 mg/l Zn have a higher Zn intake, but approximately the same retention as breast-fed infants. This leads to the conclusion that a formula enriched with zinc (content 3.98 mg/l) is equivalent to breast milk concerning zinc retention. Nonenriched formulas contain approximately 1 mg/l zinc.

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COPPER BALANCES IN YOUNG INFANTS AND PRETERMS (BREAST-FED AND BOTTLE-FED). Höhn, A., Dörner, K., Schaub, J. Univ. Children's Hospital, Kiel, FRG.

Nutritional copper deficiencies have been described in breast-fed and formula-fed infants, yet balance data are scarce. We compared intake and retention of copper in three groups of infants: breast-fed (I), fed with adapted but not copper-supplemented formula (II) and fed with a supplemented formula. The mean copper concentration of these milks as determined by wet ashing and atomic absorption spectrometry was in breast-milk (I) 611 - 1128 (depending on stage of lactation!), in (II) 121 and in (III) 619 µg/l. Five balance periods with 72 hours each were performed in infants during the 3rd, 5th, 9th, 12th and 16th week resulting in a total of 84 balances. The following mean intakes and retentions (± s.d.) were found (number of balances = ba, number of infants = inf):

[µg/kg*d]	I (44 ba/11 inf)	II (15 ba/6 inf)	III (25 ba/9 inf)
intake	114.5(±22.3)	19.8(±4.2)	106.4(±18.9)
retention	88.0(±46.5)	4.6(-11.5 - 9.6) (range)	55.5(±20.3)

Similar data were obtained in 21 balances of preterms fed with both formulas. Conclusion: Bioavailability of copper from breast-milk is best. Nutrition with formula milk unsupplemented with copper does not render a sufficient copper supply.

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VITAMIN E IS EXPOSED TO OXIDATION IN RED CELL MEMBRANES BUT IS PROTECTED DURING TRANSPORT IN PLASMA.

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α-Tocopherol (Vitamin E=E) is the only antioxidant of red cell membranes. Its oxidation prevents damage of membrane phospholipids and proteins. E is transported in plasma and delivered to cell membranes by lipoproteins. We compared the oxidation of E in plasma (protein bound) and red cells (membrane-bound) with E in aqueous solution (solubilized with Deoxycholate =DOC). An enzymatic radical generating system was used to oxidize E under physiological conditions.

We found E protected completely from oxidation in plasma but sensitive when incorporated in cell membranes. A similar protection was found when E was bound either to serum albumin or to the different purified lipoproteins. It is oxidizable when solubilized in DOC and 4 different oxidation products were characterized by HPLC, one of which could be identified as tocopherylquinone. Similar oxidation products and oxidation rates were found for E in red cell membranes.

These results suggest that E is easily accessible to oxidation in cell membranes but is protected by protein binding during transport in plasma.