

The growth maintaining activity and intestinal absorption of ascorbic acid in guinea-pigs

A. ODUMOSU* and C. W. M. WILSON, *Department of Pharmacology, Trinity College, University of Dublin*

It has been shown that guinea-pigs develop scurvy on a scorbutic diet in 20–28 days (Evans & Hughes, 1963; Hodges & Hotston, 1970). However, the relationship between the development of scurvy, leucocyte ascorbic acid levels and intestinal absorption of vitamin C has not been accurately established. After maintenance on a normal diet supplemented with vitamin C (50 mg in 100 ml water), 24 guinea-pigs were given a scorbutic diet for two weeks while receiving 20 mg of L-ascorbic daily by stomach tube. They were weighed regularly, food intake was recorded daily, and blood samples were removed at 6 day intervals for estimation of ascorbic acid concentrations. They were then divided into three equal groups receiving 20 mg (control C), 100 mg (hypervitaminotic: HV) and zero (scurbutic: S) ascorbic acid daily. After 7 days the plasma ascorbic acid of the S group began to fall and the group lost weight after 10 days. Plasma ascorbic acid and weight increased after 7 days in the HV group. Leucocyte ascorbic acid levels fell after 10 days in the scorbutic group and increased slightly in the other two groups. On the 28th day two of the S group died. The mean (\pm S.E.M.) leucocyte ascorbic acid concentration of the group was $9.3 \pm 1.3/10^8$ cells and the plasma ascorbic acid was 0.103 ± 0.016 mg%. In the HV group the corresponding levels were $32.8 \pm 1.7 \mu\text{g}/10^8$ cells and 1.097 ± 0.145 mg%. Weight changes for the groups at the end of the period were: C group +23%, HV group +32%, and S group –27% of the initial weights.

On the 28th day the intestinal absorption of ascorbic acid was measured *in vivo* from a loop of the ileum during a 2 h period. The percentage disappearance of ascorbic acid from the loops, the intestinal uptake, and alteration in blood concentrations of ascorbic acid were measured in the different groups. Ascorbic acid uptake from the lumen was least in the scorbutic animals. About three times as much ascorbic acid remained in the lumen of the S group as in the C or HV groups. A larger percentage of ascorbic acid remained in the mucosal cells of the control and scorbutic animals than in the cells of the hypervitaminotic animals. The increase in leucocyte ascorbic acid after the period of intestinal absorption was greatest in the C group and least in the S group, with the values in the HV group coming between. It is concluded that intestinal absorption of vitamin C is diminished in the terminal stages of scurvy. Concurrently leucocyte ascorbic acid concentrations in scorbutic animals fail to increase as easily as those in control or hyperscorbutic animals.

REFERENCES

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Liver damage and excretion of bivalent sulphur after exposure to carbon disulphide in fed and fasted rats with and without phenobarbitone pretreatment

W. H. BUTLER and L. MAGOS*, *M.R.C. Laboratories, Toxicology Research Unit, Woodmansterne Road, Carshalton, Surrey*

The increased frequency of coronary heart disease in people with a history of exposure to carbon disulphide (CS₂) prompted a study of the toxic effects of CS₂.