

Series of determinations in cases of prostatitis, circulatory diseases, liver damage, fevers, tuberculosis, pneumonia, cancer and other pathological conditions, showed no direct correlation of reduced glutathione with the clinical diagnosis. In general, when the cell volume was low in anemic cases, the whole blood reduced glutathione was reduced below the normal mean, and the figure per 100 cc. of cells was high (80 to 90 mg.). The opposite was true for polycythemic cases.

No relation could be established for reduced glutathione with clinical condition, exercise, diet, age, sex or color. Reduced glutathione usually varied with the hemoglobin value, but not constantly.

Unexplained variations of reduced glutathione for the same individual, and for different individuals with similar pathological pictures, were found. These were not due to oxidized glutathione since the same variations were obtained using the Benedict-Gotschall² colorimetric method for total glutathione.

The results are mostly negative in character. They indicate that reduced glutathione is not a physiological constant, but tends to be such. Further work is necessary on the complex function of glutathione in the body, before the results can be interpreted.

7246 P

Magnitude of Urinary Iron Excretion in Healthy Men.

RAMON F. HANZAL AND FRANKLIN C. BING.

From the Institute of Pathology and the Department of Biochemistry, School of Medicine, Western Reserve University.

Henriques and Roland¹ have found that the daily excretion of iron in the urine of both normal and pathological cases is very small, amounting to only 0.08 to 0.32 mg. These values are much lower than those reported by earlier workers. Lintzel,² however, has claimed that not more than 0.02 mg. of iron per liter can be found in normal urine. Likewise, other investigators³ have found the urine of patients suffering from various diseases to be practically iron-free. Because of its bearing on problems relating to the

² Benedict, S. R., and Gotschall, G., *J. Biol. Chem.*, 1933, **99**, 729.

¹ Henriques, V., and Roland, H., *Biochem. Z.*, 1928, **201**, 479.

² Lintzel, W., *Z. f. Biol.*, 1929, **89**, 350.

³ Lanyar, F., Lieb, H., and Verdino, A., *Z. f. physiol. Chem.*, 1933, **217**, 160.

metabolism of iron we have investigated anew the question of the magnitude of the urinary iron excretion.

The urine was obtained in clean bottles from male subjects who were pursuing their usual routine in the laboratory. In brief, the analytical procedure consisted of the following steps: A measured volume, usually 500 cc., of the fresh 24-hour urine specimen was evaporated to dryness in a silica dish, and then incinerated in an electric furnace at about 500°C. for 8 hours. The ash was dissolved in dilute HCl, brought to a volume of 50 cc., and aliquot portions were removed for the determination of iron by the thioglycolic acid method.⁴

The analytical technic was subjected to repeated tests and found to be adequate. All reagents were shown to be free from iron. Small quantities of iron added to urine were quantitatively recovered, proving that iron was not lost in the manipulations. Finally, a solution of pure substances was prepared in imitation of the main constituents of urine and this solution was evaporated, ashed, and analyzed for iron. None could be detected, proving that the iron found in the analyses was not due to contamination.

In 32 samples of clear urine from 3 healthy subjects the minimum and maximum values were 0.13 mg. and 0.42 mg. of iron per day. The average urinary excretion for each subject was 0.20, 0.24, and 0.30 mg. The individual variations from day to day were all within $\pm 50\%$ of the mean values. These fluctuations may be due to diet or other factors.

The nature of the urinary iron remains to be determined. Some of the iron of normal urine can be removed by filtration through a thick asbestos mat in a Gooch crucible. This indicates that part of the urinary iron is combined with, or present in, the formed elements of normal urine. Regardless of the nature of the urinary iron, it is evident that its determination should not be neglected in precise balance studies of the intakes and excretions of this element.

⁴ Hanzal, R. F., *PROC. SOC. EXP. BIOL. AND MED.*, 1933, **30**, 846.