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Cystine in Normal and Cystinuric Human Blood.

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It is usually stated that cystine is not present in detectable quantities in normal human blood.[1] The failure of the satisfactory recovery of small amounts of cystine added to blood has been attributed, by Harding and Cary,[2] to difficulties in the preliminary deproteinization necessary prior to cystine determination. They have reported the presence of little, if any, free cystine in cow blood plasma. The amino nitrogen of normal blood (4-7 mg. %) should include small amounts of cystine nitrogen. If loss of cystine in deproteinization could be avoided and if a sufficiently delicate method for the determination of cystine were available, it should be possible to detect cystine in normal blood.

By the use of ultrafiltrates of oxalate-fluoride plasma, mechanical loss of cystine by deproteinization has been avoided and the application of the method of Sullivan to the determination of cystine in such ultrafiltrates has been made possible by the use of the Pulfrich photometer. The details of the preparation of the ultrafiltrates and the determination of cystine will be presented elsewhere in connection with studies of the intermediary sulfur metabolism of experimental animals. Recovery of small amounts of cystine added to blood has been satisfactory.

Application of the above procedure to normal human blood has indicated the presence of approximately 1.0 mg. % of cystine in plasma ultrafiltrates. Samples of blood of one of us (B.H.B.), taken after fasting periods of 12 to 18 hours, have given values of 0.71, 0.80, 0.92 and 0.93 mg. % of cystine in the plasma ultrafiltrate and values of 0.80, 0.91 and 1.05 mg. after meals. The ultrafiltrate of the blood of the same individual, withdrawn 3 hours after the oral administration of 6 gm. of cystine in gelatine capsules, contained 1.72 and 1.40 mg. % of cystine, respectively in 2 experiments. In a third study, in which 7 gm. of cystine were fed, 1.30 and 0.88 mg. % of cystine were present in the plasma ultrafiltrates of blood samples taken 3 and 5 hours later, respectively. In 4 other normal subjects, cystine values ranging from 0.82 to 1.13 mg. were obtained.

[1] Hess, W. C., *J. Wash. Acad. Sci.*, 1929, **19**, 491.

[2] Harding, T. S., and Cary, C. A., PROC. SOC. EXP. BIOL. AND MED., 1926, **23**, 319; *J. Biol. Chem.*, 1928, **78**, xlix.

The plasma ultrafiltrate of the blood of a cystinuric patient (S.P.)[3] contained 1.13 mg. % of cystine, a value slightly higher than our average normal value, but, we believe, within the upper limit of the range of values for normal human blood. To this subject, 5.6 gm. of methionine were administered in 2 equal portions at the morning and midday meals. The plasma ultrafiltrate of a sample of blood withdrawn at 3:45 P. M. contained 0.92 mg. % of cystine. It may be noted that, while the isolation of cystine from cystinuric blood has been claimed,[4, 5] no quantitative data have been reported.

It should be noted that no attempt was made to determine the possible presence of cysteine in these ultrafiltrates. The values reported represent "total" cystine, *i. e.*, values obtained by the application of the Sullivan procedure to the ultrafiltrates after reduction with cyanide.

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Effect of Various Sterols on Thymus in the Adrenalectomized Rat.

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It has been pointed out that when an organism is seriously injured by an acute, non-specific, nocuous agent, a characteristic syndrome occurs, which consists of a rapid involution of the thymus and lymphatic system, oedema formation, with fluid in the pleural and abdominal cavities, loss of muscle tone, fall in body temperature, lung hemorrhages, and ulcers in the digestive tract. This syndrome has been given the name "Alarm Reaction".[1]

It has been shown further,[2] that, while adrenalectomy facilitates

[3] Lewis, H. B., Brown, B. H., and White, F. R., *J. Biol. Chem.*, 1936, **114**, 171.

[4] Demoulière, A., *La Cystinurie*, 1911, *Thèse pour le Doctorat en Médecine. Faculté de Médecine de Paris.*

[5] Müller, A., *Wien. med. Woch.*, 1911, **61**, 2364, 2488.

[1] Selye, H., *Endocrinology*, 1937, **21**, 169.

[2] Selye, H., *Br. J. Exp. Path.*, 1936, **17**, 234.