one could expect to detect the presence of dying cells by any of the known methods of counting even if they were to die in "showers" at hourly intervals. Assuming that there are 7000 polymorphs per mm.^{3} of blood, and that the average life of these cells is about 15 days (Cooke and Ponder[5]), there would be 20 cells per mm.^{3} of blood dying each hour, or only 0.002% of the white cells in a given volume of blood.

7566 P

Simultaneous Excretion of Creatinine and Certain Organic Compounds of Iodine.*†

K. A. ELSOM, P. A. BOTT AND E. M. LANDIS. (Introduced by A. N. Richards.)

From the Laboratory of Pharmacology, University of Pennsylvania Medical School and the Renal Clinic,‡ Hospital of the University of Pennsylvania.

In these experiments the urinary excretion of creatinine has been compared with that of (1) mono-iodo-methane sulphonate of sodium (Skiodan), (2) 3:5 diiodo-4-pyridon-N-acetic acid diethanolamine (Neoskiodan, Diodrast) and (3) sodium ortho-iodohippurate (Hippuran). These 3 organic compounds of iodine owe their practical usefulness in excretion urography to their exceptionally rapid elimination in the urine. Of the normal constituents of urine creatinine is excreted in highest concentration relative to the plasma level. The mechanism of creatinine excretion is not entirely clear (Rehberg,[1] Jolliffe, Shannon and Smith[2]); it is therefore interesting to record that the plasma clearances of these organic compounds of iodine may equal or, under certain conditions, considerably exceed the simultaneously determined creatinine clearances. Their excretion is similar on one hand to that of creatinine, on the other to that of phenol red (Marshall[3]).

In human subjects and unanesthetized dogs various grades of

* The expenses of this investigation were defrayed in large part by a grant from the Commonwealth Fund.

† The organic compounds of iodine were supplied by the Winthrop Chemical Company and by the Mallinckrodt Chemical Works.

‡ Determinations of creatinine were made by Miss E. H. Shiels.

[1] Rehberg, P. B., *Biochem. J.*, 1926, **20**, 447, 461.

[2] Jolliffe, M., Shannon, J. A., and Smith, H. W., *Am. J. Physiol.*, 1932, **100**, 301.

[3] Marshall, E. K., Jr., *Am. J. Physiol.*, 1931, **99**, 77.

water diuresis were induced. Creatinine was administered intraperitoneally (1.0 to 1.5 gm.) in dogs and orally (3.0 to 5.0 gm.) in man. Skiodan and Neoskiodan were injected intravenously. Hippuran was administered intravenously in dogs, orally in man. Large amounts of organic iodine were given to dogs but in man the amounts were limited to the ordinary dose used for excretion urography. Urine and samples of blood were collected at half-hourly or hourly intervals.

Urine and separated plasma were analyzed for iodine by Leipert's[4] method, and for creatinine by the method of Folin as used by Holten and Rehberg.[5] The clearances (C) of both iodine and creatinine were calculated in terms of cc. of plasma cleared per minute by the usual equation; urinary concentration (U) divided by blood concentration (B) times the volume (in cc.) of urine formed per minute (V), $C = \frac{U \times V}{B}$.

The excretion of creatinine and organic iodine was independent of the rate of urine formation. Fig. 1 shows the relation between

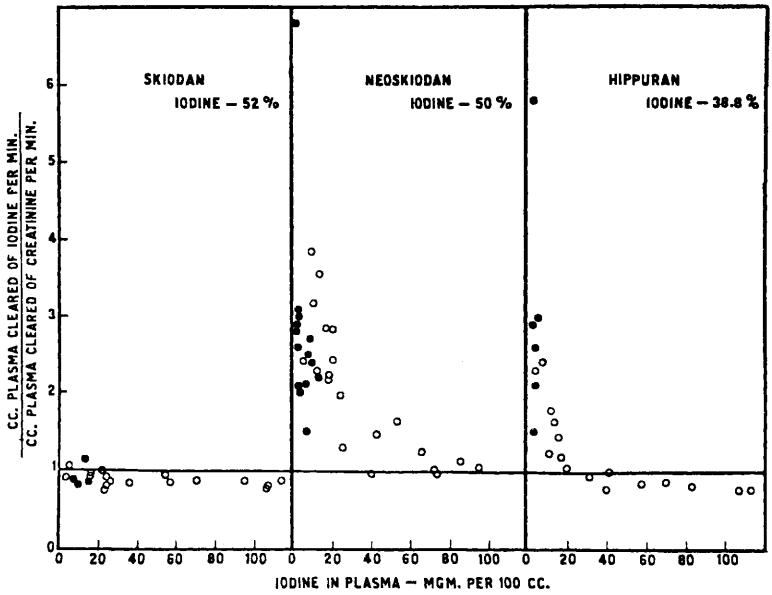

FIG. 1.

Chart showing ratios between plasma clearances of creatinine and of skiodan, neoskiodan and hippuran, in relation to the concentration of each organic compound of iodine in plasma (expressed in terms of iodine). Dots refer to man, circles to the dog.

[4] Leipert, T., *Biochem. Z.*, 1933, **261**, 436.

[5] Holten, C., and Rehberg, P. B., *Acta Med. Skand.*, 1931, **74**, 479.

simultaneous creatinine and organic iodine clearances; the latter for convenience are expressed in terms of iodine alone. Points on the horizontal line, intercepting the ordinate at 1.0, indicate that the clearances of organic iodine and creatinine were equal. The distance by which a given point is above or below that line shows the amount by which the iodine clearance exceeded or fell short of the simultaneous creatinine clearance, *i. e.*, the magnitude of the ratio, $\frac{\text{cc. plasma cleared of iodine per minute}}{\text{cc. plasma cleared of creatinine per minute}}$. This ratio is charted against the average concentration of iodine in plasma during the clearance period.

Skiodan clearances were approximately equal to creatinine clearances over a wide range of plasma Skiodan concentration. Neoskiodan and Hippuran clearances, however, were of the same order of magnitude as the creatinine clearances only when the concentration of Neoskiodan, or Hippuran, in plasma was high. They became several times greater than creatinine clearances when the concentration of Neoskiodan or Hippuran in plasma approached zero.

It appears, therefore, that the mammalian (dog and man) kidney excretes Skiodan and creatinine at approximately the same rate relative to plasma level. Under certain conditions Neoskiodan and Hippuran clearances have the same order of magnitude as the simultaneous creatinine clearances. The mammalian kidney can, however, concentrate Neoskiodan and Hippuran more highly than creatinine when their respective concentrations in plasma approach zero. This relationship provides a new tool for investigating renal function. The mechanism by which the kidney excretes these substances is being studied further.

7567 C

Effects of Deuterium Oxide on Respiration of Germinating Seeds.

GEORGETTE J. MELOT.* (Introduced by J. Ewing.)

From the Biophysical Laboratory, Memorial Hospital, New York City.

Lewis,[1] the first to report on the biological effects of heavy water, states that tobacco seeds do not germinate in nearly pure deuterium oxide, and that they do so very slowly in water containing 50%

* Fellow of the C. R. B. Educational Foundation.

[1] Lewis, G. N., *J. Am. Chem. Soc.*, 1933, **55**, 3503.