

imating that of the strain when freshly isolated, and also form an answer to the problem as to how such delicate organisms shall be sent or transported over long distances where subculturing is impossible.

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Phenol Red Clearances in the Dog.

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Marshall and his coworkers¹ were the first to adduce evidence that phenol red is excreted by the dog's kidney by tubular secretion as well as by glomerular filtration. This evidence was: (1) phenol red injected intravenously accumulated in the cells of the convoluted tubules of the anuric kidney obtained by spinal transection; (2) phenol red is in part bound to plasma colloids and thus rendered non-filtrable, and an insufficient concentration of filtrable phenol red is present in arterial blood to account for the quantity excreted in the urine; (3) in two experiments on anesthetized dogs the rate of excretion of phenol red was not proportional to the concentration in the plasma at all levels of the latter; (4) phenol red clearances in a normal dog were considerably greater than simultaneous creatinine clearances. The last mentioned experiments were done within a restricted range of plasma phenol red (0.21 to 0.54 mg. %) and leave undetermined the question of the relationship of the latter to the phenol red clearance, as well as the relationship of this clearance to the clearances of other urinary constituents.

Simultaneous phenol red and inulin clearances* have been determined in normal dogs, with special reference to the effect of the plasma concentration on the former. The results obtained upon one dog are illustrated in Fig. 1.

¹ Marshall, E. K., Jr., and Vickers, J. L., *Bull. Johns Hopkins Hosp.*, 1923, **36**, 1; Marshall, E. K., Jr., and Crane, M. M., *Am. J. Phys.*, 1924, **70**, 465; Marshall, E. K., Jr., *Am. J. Phys.*, 1931, **99**, 77.

* The use of inulin in renal studies has been discussed by Richards, Westfall, and Bott (*Proc. Soc. Exp. Biol. and Med.*, 1934, **32**, 73); in the dogfish by Shannon (*J. Cell. Comp. Physiol.*, 1934, **5**, 301), and a second by communication by Shannon dealing with the excretion of inulin in the dog is now in press in the *American Journal of Physiology*.

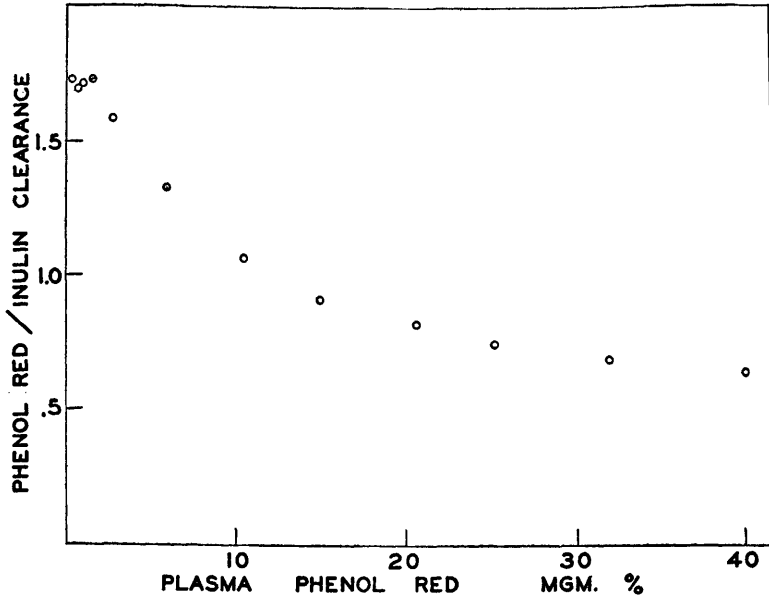


FIG. 1.

At plasma concentrations of phenol red from 3.0 to 2.0 mg. % down, the clearance of this substance (calculated upon the total dye in the plasma) has an approximately steady level, and the phenol red/inulin clearance ratio consequently is constant, having a value of about 1.7. As the plasma level of phenol red is increased, the phenol red clearance falls both absolutely and relative to the inulin clearance, until at a plasma level of 40 mg. % it is only 65% of the latter. Only 45% of the total phenol red in this experiment was filtrable through collodion at 38 mm. p CO₂ and 37°C., at this high level, and it is presumed that could the plasma level of dye be raised to a sufficient degree, the phenol red clearance, calculated on the basis of free phenol red, would approach the inulin clearance as a limiting value. The relationship between plasma level and clearance illustrated in the accompanying figure represents a reversible phenomenon, *i. e.*, the same clearance is observed at a particular plasma level whether the latter is reached on a rising or falling curve, or has been constant. Phlorizin has no appreciable effect upon the phenol red/inulin ratio.