TABLE II.

Pr. Case No. 438048. Hypertensive cardiovascular disease.

Min.	cc. of saline	Venous pressure mm. of water	Pulse	Arterial pressure
0	before infusion	70	72	
2		65	76	140/80
4		63	72	
6		70	72	
8		82	68	
10	550	83	68	145/80
12		92	72	
14		102	68	
16		108	68	150/82
18	1000	112	68	
20		117	72	
22		123	68	152/88
24		122	68	
26	1500	135	68	
—	—	—	—	
28		120	64	160/95
30		120	68	
32		115	64	
34		110	64	164/95
36		110	68	

From these observations the following suggestions are made: 1. Repeated venous pressure readings during an infusion give a measure of the ability of the vascular system to tolerate the increased volume of blood. 2. Cases of diabetic acidosis and postoperative shock may be given large amounts of fluid intravenously without elevation of the venous pressure. 3. Further work is necessary to show whether a useful test of cardiac function can be developed by measuring the reaction of the venous pressure during and after the intravenous injection of a large amount of fluid in a measured time interval.

7929 P

Viability and Virulence of Frozen and Dried Cultures of Meningococcus.

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One of the difficulties and time-consuming labors in work with the meningococcus has been the maintenance of cultures. Even with Hitchen's semi-solid ascitic fluid agar it is advisable to transfer

cultures every month and in no case can they be left much over 2 months. With other media the strains remain alive for much shorter periods. Bound up with this poor viability of meningococcus cultures in artificial media is the great difficulty of sending or transporting cultures on journeys requiring several days and exposure to varying temperatures. Cultures sent for example to Australia or India from this country almost never survive. At the same time it has been found that cultures lose certain of their characteristics on passage in artificial media. Thus the formation of the type-specific polysaccharide decreases[1] and, as the recent development of a mouse virulence test by Miller[2] has allowed one to show, the intraperitoneal virulence of a fresh culture may be rapidly lost during a few subcultures.

In order to obviate these difficulties, cultures of meningococci have been frozen and dried in our laboratory. Sixteen-hour cultures of the organisms on 10% rabbit's blood pneumococcus agar plates have been washed off with 10 cc. of hormone broth and distributed in 1 cc. amounts in soft glass tubes. These 1 cc. amounts have been rapidly frozen by immersion in a 95% alcohol-solid carbon dioxide snow mixture. The tubes are then placed in a high vacuum refrigerator and dried at —4°C. for 48 hours. At the end of this time the tubes are removed and placed in a desiccator at room temperature for 3 hours. They are then sealed off. It will be noted that as yet no attempt has been made to seal off *in vacuo*. This is shortly to be undertaken.

Tubes of frozen and dried material have now been prepared from 6 strains of meningococcus. Of these, 2 are old stock strains, and 4 are fresh strains. The 2 stock strains were still viable when last tested, that is at the end of 89 days. The 4 fresh strains were also viable when last tested, that is at the end of 151 days, 141 days, 89 days and 41 days respectively. One fresh strain, 520 M6, had an intraperitoneal virulence for mice at the time it was frozen and dried of $10^{-6}(+)$. Forty-one days after being frozen and dried this virulence was maintained.

It seems clear from this that both freshly isolated and stock strains of meningococci retain their viability when frozen and dried for many months. There is an indication also that the virulence of the cultures is maintained in the frozen and dried state at least over a period of 6 weeks. The technique of freezing and drying meningococcus cultures may be of use in storing cultures in a state approx-

1 Rake, G., *J. Exp. Med.*, 1933, **58**, 361.

2 Miller, C. P., *Science*, 1933, **78**, 340.

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.

7930 P

Phenol Red Clearances in the Dog.

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Marshall and his coworkers[1] 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.*