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Angiography by Use of Viscous Radiopaque Solutions.

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The delineation of the vascular system of the cerebrum and of the extremities has been accomplished with the use of thorium solution. This substance has the disadvantages of non-excretion and subsequent storage in the reticulo-endothelial system with dangerous sequelae of radio-activity. Sodium iodide in solutions of high concentration has likewise been used for these purposes, but has the disadvantage of the reaction of iodism.

Several authors[1-4] have outlined the vascular system of the lungs using the technique of intra-auricular catheterization and the subsequent injection of radiopaque solutions of concentrated sodium iodide and uroselectan directly into the interior of the right auricle. This procedure is formidable and hazardous, but necessary to these investigators because of the extremely rapid dispersal and dilution of their radiopaque solutions when injected into the peripheral venous circulation.

It occurred to the author that a high increase in viscosity of a radiopaque solution would enable one to avoid the necessity of intra-auricular catheterization because the rate and degree of dispersion and dilution of a viscous solution injected into an arm vein would be appreciably lessened and angiography could thus be made practicable.

Accordingly the innocuous, commonly used, 50% glucose solution was chosen as the viscous base and hippuran as the radiopaque substance. It was found that a 100% solution of the hippuran in 50% glucose solution could be effected. Injections of this viscous mixture were made into the arm vein of 4 rabbits and 2 dogs.

By fluoroscopy in 4 rabbits and 2 dogs the viscous radiopaque column of fluid could be visualized entering the heart, pulmonary arteries, outlining the thoracic aorta, and, in the rabbits, yielding excellently depicted angiographs (arterial) of the liver, spleen and kidneys. Two cc. of the 100% solution per kilo body weight was the amount injected. The animals survived without reaction.

1 Moniz and Carvalho, *Bull. Acad. Med.*, 1931, **105.**

2 Ravina, Sonnie, Benzaquen, *Presse Medicale*, 1932, **15**, 287.

3 Conte and Costa, *Radiology*, 1933, **21**, 461.

4 Carvalho and Moniz, *Acta Radiol.*, 1933, **14**, 433.

Further studies are now being made on toxicity and the dosage suitable for human injection with the hope that an innocuous mixture can be effected combining high viscosity and radiopacity which is suitable for safe and practical angiography.

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Relation of the Phospholipins to the Reactivity of Antipneumococcus Sera.

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Hardy and Gardiner's method[1] for the removal of lipoids from sera is based upon the fact that extraction of protein solutions by alcohol or alcohol-ether at low temperatures does not cause denaturation. Using this method, Hartley[2] has shown that the removal of lipoids from certain antisera apparently abolishes their *in vitro* reactivity. Felton[3] has extracted antipneumococcus horse serum in a similar manner, and has demonstrated that the removal of lipoids does not diminish protective action.

These findings have been confirmed for Type I antipneumococcus horse serum. Extracted sera fail to agglutinate homologous type pneumococci and to give a precipitate with the specific capsular polysaccharide. *In vivo,* however, they show the presence of protective antibody in unaltered concentration.

Lipoid extraction was carried out in the following manner: The antiserum was introduced, with stirring, into 10 volumes of absolute alcohol at —10°C. After 6 hours' extraction the precipitate was collected by centrifugation at a temperature below —2°C., and again extracted with an amount of chilled absolute alcohol equal to that first used. After 12 hours the precipitate was collected in the same manner, and was then extracted with anhydrous ether for 10 hours at —10°C. and for a second time with anhydrous ether for 10 hours at room temperature. The precipitate was then collected and freed of ether by vacuum distillation, and finally was dissolved in an amount of saline equal to the original serum volume. The resulting solution does not differ in appearance from untreated serum.

[1] Hardy, W. B., and Gardiner, S., *J. Physiol.*, 1910, **40**, lxviii.

[2] Hartley, P., *Brit. J. Exp. Path.*, 1925, **6**, 180.

[3] Felton, L. D., and Kauffmann, G., *J. Immunol.*, 1933, **24**, 543.