

purpose.¹ For the sake of convenience, the facts to be surveyed may be grouped under the following subjects: the toxic properties of the blood in uræmic states as measured by intravenous infusion; the relation of uræmia to the urea of the blood, to the extractive substances, and to the potassium salts; cerebral œdema and uræmia; the internal secretion of the kidney and uræmia; experimental uræmia from double nephrectomy and its relation to human obstructive uræmia, and other types of human uræmia.

A question of fundamental importance in the pathology of uræmia is whether the blood in this condition is more toxic when introduced into the circulation of animals than is human blood from normal persons. In the hope of answering this question, the blood serum from 28 uræmic patients, who were bled during life, was introduced intravenously into rabbits, proper precautions being taken as regards the freshness of the serum, its temperature, the rate of infusion, the exclusion of air from the vein, etc. The observations were not confined to rabbits, but included in some instances dogs and monkeys. Two different methods of intravenous infusion were employed. In one case the serum was infused into the femoral vein at a fixed rate until the commencement of fatal symptoms. In the other case, the serum was injected in much smaller amount, either into the femoral vein or into an ear vein with a view to ascertaining the minimum dose capable of causing death in the course of 24 or 36 hours. A difficulty which at once confronts the investigator in the use of these methods is the fact that normal human serum is in itself toxic to rabbits in a considerable degree, owing chiefly perhaps to its power of inducing coagulation. Thus I have found that it requires from 25—40 c.c. of normal human serum to the kilo to initiate fatal symptoms in rabbits when the method of continuous infusion is employed, while it seems generally agreed among investigators that the fatal dose of human serum, as employed by the second method, is from 9—12 c.c. per kilo. Inasmuch as it is found that there is considerable variation in the toxicity of the same serum for different rabbits of the same weight, notwithstanding every precaution in making the infusion, it is clear that it is necessary to observe much care in concluding that a given class of serums is more than normally toxic.²

Of the uræmic serums which were studied with respect to their

¹ The details of the experimental observations will be elsewhere published.

² Uhlenhuth claims that the serum should be subcutaneously injected into guinea pigs to avoid the error incidental to intravenous infusions. In several instances where I have employed this method, there seems to be no doubt that the blood was more than normally toxic, judging from the standard of normal toxicity given by Uhlenhuth.