VARIOUS solutions have been used to irrigate the brain and to replace lost cerebrospinal fluid. It has been amply demonstrated by Flexner and Amoss, Weed and Wegeforth, and Kasahara that the more nearly the replacing fluid resembles CSF, the less the reaction measures clinically or by cell and protein studies. The solution should have the proper inorganic salt content, pHi, and osmotic pressure. It must be free from pyrogens and not be altered by sterilization. Finally, it should be easy to handle and not be liable to contamination. Autologous CSF has two disadvantages. One is that sterility is difficult to maintain for long periods. Secondly, on exposure to air the pH changes in the alkaline direction. Sachs observed reactions with autologous fluid and believed that they were due to the contained protein, though it seems possible that developing alkalinity was responsible, since precautions to prevent loss of CO2 and consequent developing alkalinity were not mentioned. He used a bicarbonate buffered artificial CSF prepared by Hartmann and stated that the reaction was less marked.

One of us has devised a solution similar to Hartmann’s but which is much easier to prepare. We have found it especially useful clinically in the treatment of hydrocephalus and of subdural hematomas.

The solution in question was described by Elliott and Jasper (their Solution B), and its method of preparation is outlined in the appendix to this paper. It contains inorganic salts, including bicarbonate, and glucose, in concentrations similar to those in CSF and has the pH and osmotic pressure of normal body fluids.

In hydrocephalus, complete replacement of ventricular fluid with oxygen is often necessary for exact localization of the defect or obstruction in the absorbing pathway. Davidoff and Dyke pointed out the reaction of the central nervous system to pneumography, which was in proportion to the amount of injected air or oxygen. In 4 cases, we have replaced the ventricular oxygen on 5 occasions. A ventricular needle is placed in each ventricle, and the fluid at body temperature is introduced through the lower needle from the reservoir of an infant transfusion set (Fig. 1). A set of typical roentgenograms illustrating the completeness of the ventricular fluid replacement is shown in Fig. 2. Following these procedures, the “artificial spinal fluid” having been used as replacement fluid, reactions were minimal. The child is apt to vomit the first day. Temperature elevations from 100.4°
to 102.2° have occurred but have not lasted more than 1 day. Within the first few days the intracranial pressure may become elevated, so that a ventricular tap is required. In these cases, the protein has been not over 16 mg. per cent and cell counts have varied from 0 to 600. In 1 case 850 cc. of

Fig. 1. Ventricular fluid replacement by the 2-needle method. The procedure is carried out in the surgical dressing room with the aid of two nurses.

Fig. 2. Representative roentgenograms from a case of hydrocephalus demonstrating the completeness of ventricular fluid replacement (B) following ventriculography (A).