In our laboratory at the University of Virginia, we have prepared albumin, which is 96-98 % pure electrophoretically, by a relatively simple procedure. Plasma is heated in the presence of sodium caprylate at 70° for periods from 15 to 60 minutes. Under these conditions, the globulins are denatured and are readily precipitated by adjusting the heated solution to pH 4.2. The stabilized albumin remains in solution and is readily prepared in the dried form or as 5 % or 25 % solutions. The advantage of this procedure is its simplicity but the fibrinogen and gamma-globulins are lost. It has been found that hemolyzed samples of plasma, such as those obtained from out-dated blood may be processed to give a good preparation whereas such hemolyzed plasmas cannot be satisfactorily fractionated with ethanol.

It may be worth mentioning that Dr. Garrott Allen at the University of Chicago has advocated the storage of plasma at room temperature to destroy the hepatitis virus. The blood is drawn into sodium citrate and the plasma is withdrawn for storage. Under these particular conditions, plasma may be stored for years without any appreciable destruction of albumin. Dr. Allen feels that storage for 6 months at temperatures above 30° produces a pooled plasma essentially free from the risk of transmitting serum hepatitis. He feels that the virus inactivation is accelerated as storage temperature is increased.

Since there are a number of procedures available, the National Research Council is to conduct a conference on heat-treated plasma preparations at the end of this month, in order to determine the most effective methods for obtaining the greatest osmotic effectiveness by the simplest procedures and at the smallest cost. It is hoped that many of the problems will be resolved so that investigators throughout the world will be able to have a fair assessment of the present status of the best type of plasma protein preparations.

Frequent Plasmapheresis of the Same Donor as a Means
of Obtaining Large Amounts of Plasma Free of Bacteria
and Hepatitis Virus

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Plasmapheresis is the obtaining of whole blood from a donor with the retention of only the plasma ; the red blood cells being returned to the donor. An ADL-Cohn Blood Fractionator has been utilized in our study which permits continuous separation of the red blood cells and plasma at low temperatures with immediate return

of the red blood cells to the donor. Plasmapheresis has been carried out successfully 26 times on each of 23 donors in a period of 1 year. The volume of blood removed each time was 500 ml with about 200 ml of plasma retained; that is, each of 23 donors donated 200 ml of plasma 26 times in 1 year making a total of 5200 ml of plasma or almost twice the original plasma volume in 1 year.

The first slide* gives some of the data obtained on a representative donor over a period of 1 year. The space on the slide does not permit the inclusion of all the data so that only the figures at intervals of six weeks may be observed but these are representative of all the results.

The data on slide I show that the procedure is safe and feasible. Included on this slide are red blood cell counts, white blood cell counts, platelet counts, hemoglobin, hematocrit, percent nitrogen and the time required for plasmapheresis.

Many other tests were also carried out such as reticulocyte counts, white cell differentials, bone marrows, prothrombin clotting times, paper electrophoresis determinations on each plasma, etc. All were within normal limits.

598 plasmaphereses were carried out in the first year of this study (23 X 26).

Biweekly plasmapheresis was chosen because of the number of tests involved. Since the plasma proteins are regenerated in 16-18 hours, weekly plasmapheresis on the same scale should be feasible. This means that the amount of plasma taken from an individual may be increased 10 fold by the use of this technic. A sterile plasma must result since with the exception of the venipuncture, a completely closed system is maintained. The second slide demonstrates this. This slide shows a picture of the complete cartridge immediately following the phlebotomy. The red cells are in one plastic bag and the plasma is contained in a second bag. It may be seen that a seal has been made in each of the outlet tubes. Scissors are used to cut through the seal in order to detach the plasma. The bag containing the plasma is completely closed and may be kept at room or any other temperature for any period of time. Since individual plasmas are used the possibility of hepatitis transmission is immediately reduced to that encountered with whole blood. Aging at room temperature should reduce appreciably the incidence of infection. A selected group of donors may be used repeatedly which should also reduce the danger of infection. Samples for sterility and iso-agglutinin titration may be precured without endangering the sterility of the plasma as shown on slide III. This slide shows a complete unit of plasma. If a sample is required for testing some of the plasma is squeezed into the tube, as shown, a seal is made and the plastic tube containing the plasma sample is cut off. The sterility of the bulk of the plasma is never endangered.

The plasma is ready for immediate infusion by merely removing the sheath from the needle. Rapid administration may be made by squeezing the bag with the hand or with the aid of a mechanical device. Incorporated in this unit is a drip chamber and filter. If it is found desirable to store the plasma at room temperature it is necessary to enclose the unit shown in another container in order to prevent

* The slides referred to in this paper were not received and therefore could not be included in these Proceedings.

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water vapor transmission. This unit is shown in slide IV. The volume of plasma is about 200 ml. By using plastic equipment of slightly different design 400 ml units of plasma may be collected in exactly the same manner; that is, plasma from 2 donors may be combined. The plastic bags are nonbreakable and easily stored taking up much less space than the usual glass container. Heretofore it has been necessary to ship dried plasma in a container large enough to hold the diluent. A container of sterile pyrogen-free diluent must accompany the dried plasma. Two additional sets must be included; one for the transfer of the diluent to the dried plasma and the second for the administration of the fluid plasma to the donor. This current method has the disadvantages of breakage, the dried plasma must be dissolved, there is a good possibility of contamination, the administration of the plasma to the donor is slow and a relatively large amount of space is required. In comparison, the unit shown is subject to none of these criticisms and from the logistic point of view the advantages are too obvious to require enumeration.

Incidence of Post-Blood Transfusion Hepatitis in Santiago, Chile

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Abstract

This study concerns the frequency of incidence of hepatitis in :

1. A healthy population made up of 1291 blood donors and 1208 employees and laborers;
2. A population of patients divided in 1026 non transfused and 1005 previously transfused. The incidence of hepatitis did not show any significant difference between these groups.

104 transfusion recipients were studied who received 282 transfusions, with clinical controls and monthly liver tests during the five months following the last transfusion. The relation of the frequency of hepatitis to the number of transfusions was 1.4%. The risk per patient month was 0.8%. Of the 104 patients transfused, 4 had hepatitis (3.8%).