moved from the femoral head, and the acetabulum was curetted and deepened for the denuded head to fit into firmly.

Before operation there were 30 degrees of permanent flexion and 20 degrees of permanent adduction with practically no hip motion and no tenderness in the hip. Three years and eleven months after operation there was solid ankylosis with permanent flexion of 15 degrees and permanent adduction of 15 degrees. The foot pointed straight front. Actual shortening of one-half inch. Apparent shortening $1\frac{3}{4}$ inches. No pain. Walked without crutches. Health improved.

The origin of this arthritis was obscure, having come on gradually three years before operation, and increasing until she became incapacitated one year before surgical interference. She thought her operation a great benefit.

CASE 8. D. H. Small woman of thirty-seven years.

At operation a small almond-shaped mass, the size of a bean, could be felt inside the capsule just before it was opened over the femoral head near the cotyloid ligament. When the capsule was cut this was removed, and a sharp ridge on the edge of the femoral head was smoothed away.

Before operation there were irregular snappings and catches in the inguinal region on rising from sitting or kneeling postures, but there was no difficulty in ordinary walking or standing. The hip joint seemed to lock for a moment, and by slowly twisting it the patient was able to restore normal motion again. Flexion was possible to 90 degrees if done slowly. Complete extension was permitted. There was marked limitation in inward rotation and abduction while external rotation was more free. Two years and twenty-three days after operation she walked easily and painlessly with a slight limp. Flexion over 90 degrees was possible with fairly good inward and outward rotation and abduction. General health good.

The hip bothered her for nine years more or less before operation. For a year she tried hydrotherapy and a flannel spica, and finally came for surgical treatment after having become tired of the slow progress, the incapacity, and after x-rays had demonstrated marked lipping of the upper margin of the acetabulum.

CASE 9. J. S. Well developed man of thirty-one years. Laborer.

At operation the capsule of the right hip was found thickened, and the neck and head of the femur were covered with exostoses which were removed. The head of the femur was denuded of cartilage and squared to fit a shelf made in the acetabulum and solid ankylosis secured in twelve weeks.

Before operation all hip motions were painful and rotation limited very much. Four years and nine months after operation there was solid union in a position of 25 degrees flexion, 10 degrees adduction, and the foot was pointed straight front. He carried no cane and had no pain in the joint.

He came to the hospital with a history of rheumatism, tonsillitis and frequent colds, and x-rays showed hypertrophic changes about the hip joint.

THERAPEUTIC VALUE OF INJECTIONS OF WHOLE BLOOD.

BY J. SPENCER DAVIS, M.D., DALLAS, TEXAS.

NUMEROUS articles have appeared in medical literature recommending the use of blood serum in the treatment of various skin diseases, such as psoriasis, pemphigus and the dermatoses of pregnancy.

In some cases the patient's own serum was used while in others it was secured from a second person. In these cases only the serum was used, after being inactivated by heat, but the results of this method of treatment seems to vary greatly in the hands of different observers.

In 1908, Hiss pointed out that the injection of an extract made from leucocytes is capable of producing a leucocytosis. The leucocytic extract was obtained by injecting a mixture of meat broth, starch and aleuronat into the pleural cavity of an animal which is followed by a copious cellular exudate. The leucocytes accumulating in the pleural cavity are removed, mixed with water and kept at incubator temperature until auto-digestion occurs when the extract is put on ice until used. He found that many infections were greatly modified by injections of this extract.

The technic is not so very complicated, but has to be carried out in a laboratory, and besides the yield of leucocytic extract is not very great. Some observers think that the extract thus obtained is not so potential as it might be owing to the fact that the leucocytes are inflammatory leucocytes.

Archibald and Moore attempted to simplify the technic by withdrawing blood from an animal, mixing with a solution of sodium citrate, and separating the white corpuscles by centrifugalization. Further steps for making the extract were similar to that described by Hiss. Leucocytosis produced by this extract occurs very promptly reaching its height in a very few hours, to subside to normal in about 24 hours. The greatest increase is in the polynuclears, while the eosinophile increase ranges from 14 to 45 per cent.

Gay and Clappole under the title of "Specific Hyperleucocytosis," point out that injection of immunized rabbits with typhoid organisms is followed by a marked increase of the leucocytes. They point out that this leucocytosis is specific and only occurs when the animal is vaccinated with the same organism to which it is immune.

In tuberculosis the injection of tuberculin is followed by a similar response on the part of the leucocytes, but the eosinophile increase is, as a rule, relatively greater and more constant than that of any other cells. The leucocytosis produced by tuberculin is specific and does not occur in normal individuals. The repeated injection of any foreign protein produces a leucocytosis.

There seems to be some difference in the leu-

cocytosis produced by the injection of foreign proteins and of leucocytic extract made from the animal's own blood. In the former, with a second injection, the eosinophile cells usually are markedly increased; while in the latter, it is the polynuclear variety which has the greater increase. It seems probable that the leucocytosis produced in all the above mentioned conditions is due to the fact that we are either injecting a foreign protein or an extract of a protein.

On the account of the difficulty of obtaining leucocytic extract according to the original method of Hiss we attempted to use an extract made according to Archibald and Moore.

Injections of this extract in normal persons increase the leucocytes a moderate degree, but frequently, in the presence of an infection, it produces no demonstrable effect. With the view of obtaining such a leucocytosis we decided to try the effect of whole blood. This was begun about a year ago. Blood examinations were made before and after the injections. The effect noted on the blood is the same as that produced by injections of leucocytic extract, viz: The leucocytes are rapidly increased, sometimes to 500 or even 600%. The increase reaches its height usually in about six hours, but instead of going back to normal in 24 hours, it is apt to persist for two or three days. The physical condition of the patient also seems to be a factor in the time and the amount of response to the injection.

One of the tables shows a case of diabetes which even after 20 injections of 40 c.c of blood each time, showed only a very slight increase in the total count. A great many times the height of the leucocytic curve would not be reached in six hours but would be delayed for 12-24 hours. In the presence of infection, the leucocytosis persists even beyond the 24 hours, but occasionally in the presence of severe infection the leucocytosis does not occur until after two or three injections, in which case, the response may be greater than would be expected from a single injection. As a rule eosinophile cells are not so markedly increased as they are in anaphylaxis but the polynuclear cells are practically always increased both absolutely and relatively. Sometimes the polynuclears are increased without any actual increase in the total cell count, in which case the increase in polynuclears is accompanied by a decrease in small lymphocytes. This is not the only effect which is observed. In many cases of infection, a crisis seems to be brought on, the patient having a profuse perspiration and marked fall in temperature. At times it has considerable pain-relieving properties, and is of great value in the treatment of infectious arthritis. The pain is sometimes greatly relieved, even when the leucocytes are not markedly increased, while at other times, even though the leucocytes are enormously increased, pain is not relieved, and the clinical condition of the patient is not improved.

TECHNIC.

Blood is withdrawn by a 20 c. c. Lure-glass syringe attached directly to a "Neo Needle." The needle is introduced into a vein of the arm of the donor and as soon as the syringe is filled with the blood, the Neo Needle is removed and a straight needle applied to the syringe and the blood is injected into the loose tissue of the abdominal wall.

Some experiments were carried out to determine how small a quantity of blood would be effective, and if a greater response could be induced by altering the blood after it had been withdrawn from the donor. The smallest quantity of blood capable of producing a noticeable response was 1 c. c., but in many cases this was not sufficient, and larger quantities had to be injected. The increase in leucocytes is not directly proportionate to the quantity of blood injected, and the injection of a pint of blood was found to produce no greater response than three or four ounces.

Any substance which alters the blood after being withdrawn seems to enhance the effect of the injection. Blood which is kept in the syringe until clotting has begun seems to cause a greater response than if it is injected immediately after withdrawal and before clotting has begun.

Normal saline mixed with the blood to be injected does not seem to be of any assistance, but sodium citrate solution mixed with the blood causes it to produce a greater leucocytic response. A number of other substances were tried, but no marked difference between them and the sodium citrate was noted. The pain-relieving properties seem to have some relation to the quantity of blood injected, but the patient's own blood does not seem to have any marked pain-relieving properties. On several occasions we attempted to use the blood of the patient which was withdrawn and reinjected hypodermically. The response is not nearly so great as when blood is obtained from another individual, but if the blood of the patient is changed by admixture of strong sodium citrate solution the leucocytic increase is very much greater.

The blood used for injection has been kept for several days on ice after the addition of a preservative, without destroying its therapeutic value.

TABLE I.

CLINICAL DIAGNOSIS. PNEUMONIA AND EMPYEMA. BABY H. AGE THREE YEARS.

	Time.	Substance Injected.	Amount.	W. B. C.	Poly.	S. L.	L. L.	Trans.	Eosin.
Before injection				15,000	40	27	33		
After injection No. 1	24 hours	Leuc. extract	1 c.c.	10,000	21	39	34	4	2
After injection No. 2	24 hours	Leuc. extract	1 c.c.	11,000	14	15	63	7	
After injection No. 3	24 hours	Father's blood	5 c.c.	16,500	20	44	34	2	
Four days after daily injection	4 days later	Father's blood	5 c.c.	19,000	34	44	19	3	
After daily injection	4 days later	Father's blood	5 c.c.	36,000	85	12	3		

TABLE II.

CLINICAL DIAGNOSIS. SCIATICA. J. C. AGE 63 YEARS.

	Time.	Substance Injected.	Amount.	W. B. C.	Poly.	S. L.	L. L.	Trans.	Eosin.
Before injection				11,500	52	33	10	3	1
After injection	6 hours	Patient's blood	40 c.c.	18,000	56	32	7	3	1
After injection	6 hours	Donor's blood	20 c.c.	15,000	73	17	4	3	2
	24 hours later			12,000	73	24	2		1

This chart shows greater response to donor's blood.

TABLE III.

CLINICAL DIAGNOSIS. HYPERTHYROIDISM AND MULTIPLE ARTHRITIS. M. H. AGE 25 YEARS.

	Time.	Substance Injected.	Amount.	W. B. C.	Poly.	S. L.	L. L.	Trans.	Eosin.
Before injection				6,800	46	48	4	1	1
After injection	24 hours	Brother's blood	40 c.c.	9,800	67	29	4		
After injection	48 hours			7,500	66	28	5	1	
After injection	4 days			8,800	46	48	4	1	
After injection	36 hours	Brother's blood	40 c.c.	8,400	62	33	2	1	2
After injection	3 hours	Brother's blood Sodium citrate 10%	10 c.c. 2 c.c.	7,100	71	26	3		
After injection	24 hours			9,000	72	25	3		

TABLE IV.

CLINICAL DIAGNOSIS. MAL-NUTRITION AND ANEMIA. BABY T. AGE 6 MONTHS.

	Time.	Substance Injected.	Amount.	W. B. C.	Poly.	S. L.	L. L.	Trans.	Eosin.
Before injection				11,000	20	60	19	1	
After injection	24 hours	Mother's blood	20 c.c.	11,400	22	59	17	1	
After injection	48 hours			10,300	32	52	13	1	2
After injection	6 hours	Mother's blood	15 c.c.	9,700	30	66	3	1	
After injection	48 hours			8,200	41	38	1		
After injection	6 hours	Sodium citrate Mother's blood	1 c.c. 15 c.c.	15,000	39	52	8	1	
After injection	6 hours	Sodium citrate Mother's blood	2 c.c. 10 c.c.	17,000	42	54	4		

TABLE V.

CLINICAL DIAGNOSIS. DIABETES AND NEURITIS. J. R. W. AGE 55 YEARS.

	Time.	Substance Injected.	Amount.	W. B. C.	Poly.	S. L.	L. L.	Trans.	Eosin.	M.
Before injection	-			9,000	72	19	5	1	1	2
After injection	6 hours	Patient's own blood	10 c.c.	9,200	74	17	5	1	1	2
After injection	6 hours	Patient's own blood and normal saline	5 c.c.	10,000	71	19	10			
After injection	24 hours			8,800	69	21	8		1	1
After injection	6 hours	Patient's own blood	10 c.c.	8,700	69	24	7			
After injection	24 hours			6,400	76	17	6	1		
After injection	3 hours	Patient's own blood	10 c.c.	7,500	79	16	5			
	24 hours later	Sodium cit. 10%		10,800	77	22	1			

Note greater response to citrate solution.

TABLE VI.

CLINICAL DIAGNOSIS. DIABETES AND SCIATICA. J. W.D. AGE 50 YEARS.

	Time.	Substance Injected.	Amount.	W. B. C.	Poly.	S. L.	L. L.	Trans.	Eosin.	M.
Before injection				7,700	58	34		4	2	2
After injection	24 hours	Patient's own blood	20 c.c.	6,800	68	22	6		2	2
Before injection				6,000	73	22	2		1	2
After injection	24 hours	Son's blood	40 c.c.	8,275	83	9	6		1	1
Before injection				6,000	69	22	7		1	1
After injection	24 hours	Son's blood	40 c.c.	8,600	78	16	6			
Before injection				7,300	66	19	15			
After injection	24 hours	Son's blood	40 c.c.	8,800	79	15	5		1	

Pain relieved in 24 hours but no marked increase of leucocytes.

MASSAGE AND REMEDIAL EXERCISES IN THE TREATMENT OF CHILDREN'S PARALYSES. THEIR DIFFERENTIATION IN USE.*

BY JENNIE M. COLBY, BOSTON,

Recently Director of the Clinic for Muscle Training of Paralytic Cases, Children's Hospital, Boston.

SINCE, in some types of paralyses the nerves are over-stimulated and in others unresponsive—and in some the muscles are limp and wasted, in others firm and well nourished, it is reasonable to presume a difference in the use of the massage, friction, etc. And since some types lack initiation and others possess normal power of co-ordination that there would be ground for distinguishing between the exercises employed.

* Read before the Massachusetts Therapeutic Massage and Gymnastic Association, Inc., Boston, May 11, 1915.

Results in my own experience seem to justify this view and I differentiate as follows in applying treatment by means of massage and exercises:—

In the anterior-poliomyelitis cases, where the muscles are limp and wasted and the reflexes absent, the aim is to encourage muscular growth and development, therefore I use kneading of the light, rapid, stimulating form, friction, nerve vibration, all gently applied, and in old cases sometimes—but not habitually—percussion. The kneading and friction I apply to the limb as a whole, the vibration and percussion only locally.

In spastic cases, on the other hand, where the muscles are firm and well nourished and the reflexes exaggerated, I quite reverse my choice of procedures, omitting entirely friction, vibration and percussion, and using kneading in a modi-