sulphate solution in small successive portions. The resulting compound is a tacky homogeneous mass, and samples have kept very well for at least twelve months. The pH of the final compound, determined electrically, is 8.65 at 19° C. and 8.24 at body temperature.

Sapo mollis *B.P. Add. III* is described as the sodium or potassium soap of a suitable vegetable oil or oils or the fatty acids therefrom, other than coconut oil, palm-kernel oil, or their fatty acids. The sapo mollis used in the above preparation was supplied by British Drug Houses Ltd., and has proved very consistent and suitable for the purpose.

British Drug Houses Ltd. sent us an analysis of the sapo mollis as follows: 51.7% of fatty acids, as compared with the *B.P.* recommendation of not less than 44%. The fatty acids have a solidifying point of 17° C. (*B.P.* not higher than 31° C.), an acid value of 191.5 (*B.P.* not greater than 205), and an iodine value of 146.5 (*B.P.* not less than 83). Resin acids are absent. The soap contains no free alkali hydroxide and no free fatty acids. The total free alkali, calculated as Na_2CO_3 in 10 grammes, is equivalent to 0.2 c.cm. N/1 sulphuric acid, as against the *B.P.* limit of 1 c.cm. N/1 acid.

Conclusions

The copper-soap compound is an effective first-aid treatment of phosphorus burns.

Being a viscous and compact substance, it can be carried about easily by nurses, fire guards, etc.

In experiments, using the copper-soap compound, the healing time of wounds was substantially reduced as compared with the standard treatment.

We express our thanks to Prof. Sir Francis Fraser, Director-General of the Emergency Medical Services, and to Mr. J. B. Hunter, F.R.C.S., Sector Hospital Officer, for their great interest and help. We gratefully acknowledge the work of Prof. G. R. Cameron, Mr. F. Burgess, and Lieut.-Col. Collumbine, who carried out experiments; and also the arrangements made by Surg. Capt. A. Fairley. We are much indebted to the Medical Research Council for the help given us through Dr. F. H. K. Green and members of the Burns Subcommittee. We also wish to record our appreciation of the helpful advice and criticism given by Mr. R. F. Nunn, B.Sc., biochemist to this hospital.

REFERENCES

- Godding, E. W., and Notton, H. E. F. (1942). *British Medical Journal*, 1, 433.
Goldblatt, M. W., and Oakeshott, S. H. (1943). *Ibid.*, 1, 128.
Tomsaki, H. W. (1943). *Pharm. J.*, 150, 76.
Stadlinger, H. (1944). *Chem. Ztg.*, 68, 49.

GLOBIN INSULIN: CLINICAL TRIAL

BY

J. M. MALINS, M.B., M.R.C.P.

In the present trial globin insulin (G.I.) has been used in single daily doses in 36 cases, of which 33 had had no previous treatment. All the patients gave a history of acute onset of diabetes with thirst and wasting. The diet was approximately the same for all; it contained 180 g. of free carbohydrate with an average proportion of protein and fat, and allowed patients to use the normal resources of the home kitchen or works canteen. The carbohydrate was spaced as follows: breakfast, 50 g.; dinner, 50 g.; tea, 30 g.; supper, 50 g. The range of insulin dosage was 10 to 40 units, with an average of 24, the injection being given half an hour before breakfast.

Results.—(a) In 10 cases perfect control, both clinical and biochemical, was obtained. The health remained normal, the blood sugar did not rise above 180 mg. per 100 c.cm., and the urine contained not more than a trace of sugar. The average dose of G.I. in this group was 20 units. It is notable that seven of these ten patients were regarded as exceptionally co-operative. (b) In 16 cases control was only fair. Hyperglycaemia and glycosuria persisted, although the weight and general health were on the whole maintained. The main difficulty in this group was the frequent occurrence of insulin reactions, even when the dose of insulin was increased only to control the symptoms while hyperglycaemia persisted. Six of these cases have been changed to a P.Z.I.-S.I. mixture with satisfactory results. (c) In 10 cases the control was certainly inadequate and diabetic symptoms persisted—e.g., pruritus, weakness, or occasional thirst. Five of these have been changed to a

P.Z.I.-S.I. mixture, and the others will almost certainly be treated likewise in the near future.

Hypoglycaemia.—Eighteen patients complained of insulin reactions, the symptoms in general being those common with S.I.—sweating, trembling, weakness, and hunger, relieved at once by food. In 12 cases the symptoms occurred between 11 a.m. and noon (four to five hours after the injection). In three cases the symptoms began at 6 p.m. and headache and weakness were outstanding, while relief from food was not immediate—features which resemble the P.Z.I. reaction. In one case the incidence was at 4 p.m., in the other at 8 p.m., and one man stated that he felt identical symptoms twice in one day—at 11.30 a.m. and 6 p.m.—which must be a rare event with any type of insulin. Local reactions occurred in two cases only, and were transient.

Blood-sugar Readings.—In 11 in-patients the blood sugar was studied throughout 24 hours at approximately two-hourly intervals. The diet was that described above and the average dose of G.I. was 24 units. The results were inconstant, but three average curves are shown (Figs. 1-3) which suggest that

FIG. 1.—Blood-sugar readings with 16 units of G.I.

FIG. 2.—Blood-sugar readings, 32 units G.I.

FIG. 3.—Blood-sugar readings, 40 units G.I.

with increase of dosage of G.I. the insulin activity is delayed in onset and prolonged. (1) With 16 units hyperglycaemia occurred after breakfast, but not after the midday or evening meals, while the fasting blood sugar was well above normal the next morning. In this particular case good health was maintained for six months on this regime. (2) With 32 units there was still hyperglycaemia after breakfast, but later in the day (15 hours after the injection) the blood sugar fell to dangerous levels, while the fasting sugar next morning was not grossly raised. (3) With 40 units hyperglycaemia occurred after breakfast and the midday meal, the insulin action being delayed, with very low figures throughout the early hours of the following morning (lowest figure 24 hours after injection).

Discussion

The action of G.I. has been compared with that of other insulins under experimental conditions by Bauman (1939) and Duncan and Barnes (1941), and in both papers was found to be intermediate between P.Z.I. and S.I., with maximum hypoglycaemic effect eight hours after the injection. In clinical use it has been commended by Bauman (1939, 1940) and Andrews and Groat (1940), who were able to control mild and moderately

severe cases with a single dose. Relatively high carbohydrate diets were used (250 g.) and some extraordinarily high doses of G.I. are quoted; one case received 200 units of G.I. in a single dose (Bauman).

The present investigation is concerned only with the place, if any, of G.I. in the treatment of diabetic patients. To have any value it must be shown to have advantages over either S.I. or P.Z.I. in single daily doses. Lawrence (1943) suggests that G.I. is not significantly different from P.Z.I., but results in the present series do not agree with this conclusion. G.I. has been found to be more active than P.Z.I., often with embarrassing results, as the frequency of insulin reactions has been the greatest difficulty in reaching an adequate single daily dose.

With the dietetic regime used in this clinic globin insulin has a limited place in treatment. It is suitable for mild or moderately severe cases requiring less than 30 units daily, and only for those who are regular in their dietetic habits. The absence of local reactions may be an indication for its use instead of P.Z.I.

Summary

The results of treatment with G.I. in 36 diabetic patients are described. The greatest drawback to its use has been the frequency of hypoglycaemia. G.I. is considered to have a limited place in the treatment of mild and moderately severe diabetes.

I would like to thank Dr. A. P. Thomson and Dr. G. H. Knight, under whose care these patients were treated.

REFERENCES

- Andrews, G. B., and Groat, W. A. (1940). *N.Y. St. J. Med.*, **40**, 913.
Bauman, L. (1939). *Amer. J. med. Sci.*, **198**, 475.
— (1940). *Ibid.*, **200**, 299.
Duncan, G. G., and Barnes, C. E. (1941). *Ibid.*, **202**, 553.
Lawrence, R. D. (1943). *British Medical Journal*, **2**, 103.

A CASE OF PARAPLEGIA AFTER CEREBROSPINAL MENINGITIS

BY

H. HILTON STEWART, M.D., M.R.C.P.

Paraplegia is one of the many nervous complications of cerebrospinal meningitis, and may be organic or functional (Rolleston, 1919). Most cases occur during the course of the acute phase of the disease and gradually tend towards recovery, although permanent paraplegia is recorded. The pathology may be pressure on the cord due to exudate, haemorrhagic or purulent, and not matting of adhesions or a diffuse meningomyelitis (de Massary and Chatelin, 1910). Lesions localized both to the brain and to the spinal cord have been described (Ribadeau-Dumas *et al.*, 1938).

Onset of paraplegia after the acute phase of the disease has passed off does not seem to have been recorded, but a case of syringomyelia occurring four months after cerebrospinal meningitis has been observed (Guillain *et al.*, 1939). The case here reported is therefore unique in that it occurred one year after the acute phase of the meningitis, and was due to organized adhesive meningitis causing diminution of the blood supply to the mid-dorsal area. Division of these adhesions presumably restored the blood supply, and function very slowly recovered. It must be excessively rare for any spinal compression case to make complete recovery after an interval of 1½ years from the removal of the obstruction, but such is the fact in this case, and the only departure from normal demonstrable in this patient now is a scar on her back.

Clinical History

A child about 12 years old was admitted to Lurgan and Portadown District Hospital isolation ward on March 29, 1940, suffering from acute meningitis. While no meningococci were cultivated, the C.S.F. was slightly turbid and contained pus cells, and was thought to be definitely meningococcal. She was treated with a full course of sulphapyridine orally and antimeningococcal serum intravenously. Her affection ran a subacute course and she was in hospital 5½ weeks, being discharged cured on May 14, 1940.

In March, 1941, the patient began to have difficulty in walking. She first noticed that her right foot was trailing and catching the ground so as to trip her. The weakness gradually increased in both legs. The only other symptom was difficulty in starting micturition. She was admitted to Lurgan and Portadown District Hospital on

May 7, 1941, paralysed in both legs. On examination she was well nourished and in good general condition.

The fundi were normal, and above the waist she was normal in every respect. There was a spastic paresis of both legs, without local wasting. The right leg was more affected than the left. She was unable to sit up from the lying position without assistance. Sensation to light touch was preserved in both legs anteriorly and posteriorly. Appreciation of pain and temperature was lost below the middle of the thigh on both sides. Appreciation of vibration sense was lost below the knees. Muscle and joint sense seemed normal. The abdominal reflexes were absent. The right knee-jerk was brisker than the left. Ankle-jerks were present. Ankle clonus was present on the right side and plantars were bilaterally extensor. The C.S.F. was examined on May 8, 1941, when only a few drops of clear fluid came out under jugular compression. The test was repeated three days later, when, with difficulty, a larger specimen was obtained. It contained 250 mg. of protein per 100 c.cm., a trace of globulin, 700 mg. of chloride per 100 c.cm., 0.025% sugar, and no pus cells. The culture showed a few contaminants.

The sensation now altered, and for a time the patient's replies were unreliable. From the umbilicus upward, sensation was normal; but downwards from the umbilicus sensation became progressively worse until the mid-thigh was reached. From there to the periphery sensation was almost lost. Radiographs of the spine were normal.

On May 28 2 c.cm. of lipiodol was injected into the cisterna magna, and the opaque material was found to be held up at the lower border of the body of the 6th dorsal vertebra. Radiographs six days later showed no further descent of the lipiodol.

On July 3 a spinal exploration was carried out by Mr. W. W. Bassett. The spines of the 3rd to 9th dorsal vertebrae were removed. The dura was exposed and incised vertically, but the arachnoid failed to bulge out. It seemed as if the latter were adherent to the surface of the pia, for the usual "floating" appearance of the cord in the C.S.F. was not seen. The slit in the dura was extended downwards, but no other obstruction was found. About the level of the 7th dorsal vertebra the posterior aspect of the cord looked pale. The adhesions between the dura and arachnoid were separated by blunt dissection, and it was concluded that the lipiodol hold-up had been due to these adhesions. The dura was closed without opening the arachnoid. The patient made a good recovery from the operation, but no improvement occurred in the legs. On Aug. 1 it was noted that they were still spastic. Muscle and joint sense was gone. Vibration sense was present, reflexes were increased, and plantars were still extensor. Pressure sores developed on the skin of the heels.

No further recovery ensued, and the patient was transferred to her home to be nursed there. Nothing more was heard from her until Jan. 18, 1945, when she walked up to the hospital to allow me to examine her. Her subsequent history is interesting.

It is now 3½ years since the operation. Three months after leaving hospital sensation slowly began to return. She lay in bed unable to move for 1½ years after operation and then began to move her legs. Shortly after this she started to crawl around the house. This stage lasted three months, and then she got two sticks and walking improved further. The sticks were used until Sept., 1944, since when there has been no disability. Her longest walk up till now has been three miles, but she says she could go much further. Examination showed no spasticity in either leg and no wasting; co-ordination was normal. Sensation to all forms was normal. The reflexes were present and equal and the plantars were flexor. The cranial nerves and upper limbs were also normal. Apart from the healed wound on the back it would have been impossible to say that the patient had ever had spinal compression.

I am indebted to Mr. W. W. Bassett, F.R.C.S., surgeon at Lurgan and Portadown District Hospital, for his valuable help in this case.

REFERENCES

- de Massary, E., and Chatelin (1910). *Rev. neurol.*, **18**, 613.
Guillain, G., Mollaret, P., and Délay, J. (1939). *Bull. Mém. Soc. méd. Hôp. Paris*, **55**, 56.
Ribadeau-Dumas, L., Siguier, M., and Gharib (1938). *Pratique méd. franç.*, **19**, 35.
Rolleston, Sir H. (1919). *Lancet*, **1**, 541, 593, 645.

A report in the *Scotsman* states that the trustees of the Nuffield Provincial Hospitals Trust have agreed to make a substantial annual grant for a period of years towards the work of the rehabilitation department of Glasgow Royal Infirmary. The grant will be used to establish associated clinics in some of the outlying parts of Lanarkshire and neighbouring counties. It has been found that many patients attending the department did not complete their treatment at the Infirmary owing to difficulties and expenses of travel, and the new clinics should be of great value in encouraging patients to attend for the follow-up treatment and regular examination essential to the restoration of injured workers to full capacity for work. The facilities of the clinics will be available to all patients irrespective of the hospital they may be attending.