figures are rather small. However, if we suppose that the serious amnesias in the two groups are in fact equal, then, since there are twice as many pulp helmets as vulcanized helmets in use, the serious amnesias per accident are twice as great in the vulcanized group as in the other.

Conclusions

In all, 106 examples of head injury in motor-cyclists wearing crash helmets have been examined.

The site of the blow on the helmet and the injury to the underlying scalp and skull correspond.

Over 50% of the blows are on the front of the helmet. The least common site of injury is the crown of the helmet.

Blows on the occipital region are least dangerous and those on the temporal region most dangerous to life. Blows on the crown may be associated with crush fractures of the vertebrae.

In 40% of the cases the head receives more than one blow.

In motor-cyclists it is very rare that brain injury results from a blow limited to the face.

The crash helmet is effective in diminishing local damage to the brain and its coverings at the site of impact, and it tends to lower the incidence of cases of prolonged amnesia.

Though our figures are rather small they suggest: (a) that the incidence of fractures of the skull is quartered by the better (pulp) type of helmet: the severity of those that do occur is less; (b) the incidence of prolonged amnesia (one day or more) is only one-third of that in accidents in which no crash helmet is worn; (c) in non-lethal accidents the pulp crash helmet so alleviates the injury that one-half of the dispatch riders who without its protection would have to go to hospital do not need to do so.

Of the two types of crash helmet in common use the pulp helmet is superior to the vulcanized rubber helmet.

Further improvements in the design of helmets offer a profitable field of preventive medicine.

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A practical example of rehabilitation was mentioned at the sixty-third annual meeting of the Mental After-Care Association. The superintendent of one of the homes for convalescent male patients arranged with a local factory doing war work of much importance, first to train him in some semi-skilled processes with light and portable material, and then to send such material to the home in order that he might teach the patients to work upon it. Although this experiment was started only towards the close of last year, already the finished work sent back to the factory by the patients has greatly exceeded the firm's expectations alike in its accuracy and in the speed with which it has been done. Even more gratifying is the beneficial effect apparent in the patients. Their conversation at table is no longer about nerves and insomnia, and the reflection that they are taking some active part in the national effort is a great stimulus to their conversation, self-respect, and mental health. Col. Henry Yellowlees, chairman of the association, said at the meeting that the original object with which the association was founded was curative work, and the council had aimed at turning ex-patients into useful citizens, constructing a bridge over which the patients might pass from the restraints and seclusion of mental treatment to the freedom of responsible working life. Mr. R. Sargood, chairman of the Mental Hospitals Committee of the L.C.C., said that his council had no intention of doing this work itself, but was content to leave it in the hands of the association. The Bishop of London also supported the objects of the association (of which 13 bishops are vice-presidents), and spoke of the function of the pastoral office in helping people to regain mental health. During last year the association dealt with 2,500 patients, of whom over 1,000 were sent to the homes.

THE DIET IN DIABETES

BY

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Recent correspondence in the *Journal* has shown that some physicians are doubtful about the necessity for accurate dietetic control in the treatment of diabetes; it follows that they must be prepared to doubt the importance of maintaining the diabetic's blood sugar at a level near to normal. To all those who share this scepticism and to all those who are interested in the study of their less docile diabetic patients I offer, in full consciousness of all that I have still to learn, this short summary of my experience, conclusions, and practice.

Early in my experience as a physician, nearly 20 years ago, I found that it was possible to maintain excellent health and vigour in those rebellious severe diabetics who refused to follow any regulated diet, no matter how liberal it might be. Some of them made no secret of their refusal to follow directions, but others tried (often successfully) to pass themselves off on their doctor as model patients. About 12 years ago I began to approve of the abandonment of strict dietetic control for those patients who found that they could succeed in maintaining a sugar-free urine only at the cost of hypoglycaemic attacks. Finally, during the last eight years I have never (except in the case of diabetes of very recent onset) advised a diabetic patient to eat a regulated diet, and I have often transferred a conscientious but worried patient from controlled to uncontrolled diet without deterioration in his condition. At the present time none of my diabetic patients are on a controlled diet.

General Principles of Treatment

My experience has been that in all cases of diabetes seen by me the maximum attainable degree of health and vigour could be maintained despite a persistently high blood sugar. The chief aim of diabetic treatment seems therefore to be not a sugar-free urine or a low blood sugar but the maintenance of the patient in health and vigour. This can be accomplished in severe diabetes only by insulin. The object of regulation of meals should be not the maintenance of a carbohydrate balance but the avoidance of hypoglycaemic attacks. Glycosuria implies a regrettable waste of good foodstuffs, but an abundant glycosuria is not incompatible with sustained health and vigour.

Overriding all rules should be the maxim that the right line of treatment for each individual diabetic is that line of treatment on which he is best able to maintain health and vigour over a prolonged period. A lifetime of study may be necessary to make sure that years of apparent good health do not conceal the insidious development of arteriosclerotic or degenerative processes. For that reason I make a plea for the prolonged study of the group of persistently hyperglycaemic (but otherwise healthy) diabetics, for in this study lies the final justification or refutation of the need for strict dietetic control.

Insulin

Insulin in solution is usually given in preference to insulin suspension, the chief reason for the preference being that it demands less complicated instructions as to the prevention of hypoglycaemic attacks. In most cases of severe diabetes in adults two injections daily are found to suffice, but in many children a third (evening) injection is required to prevent a morning ketosis. The total daily dose varies with different cases between 10 and 60 units. If the dose is too low polyuria will probably attract the patient's attention, the urine at some periods of the day will contain ketones, and the weight will fall. If the dose is too high hypoglycaemic attacks will occur in spite of the fact that the patient is eating freely and frequently.

Patients are taught to weigh themselves often and to report at once any substantial change of weight. They are also taught

that an illness of any sort (especially a pyrexial illness or an illness accompanied by vomiting or dysphagia) must be looked on as a serious threat to life entailing probably immediate admission to hospital.

Diet

The first rule taught to a diabetic is that, while no harm follows an occasional omission of the insulin injection, very grave harm will follow if insulin is injected and no accompanying meal taken. This warning makes it clear to him what he should do if compelled by emergencies to miss a meal. The second rule is that a small carbohydrate meal, which need be no more than a hunk of bread, should be taken between each of the three chief meals of the day. The diabetic taking insulin at breakfast and after his midday meal should always have something more to eat in the middle of the morning and in the middle of the afternoon. This rule safeguards him from occasional attacks of hypoglycaemia, especially those which occur from inevitable postponement of one of his chief meals. The third rule is that unwonted bodily exertion should always be followed by ingestion of a little carbohydrate. This precaution is particularly important for those engaged in intermittent heavy manual work or in athletics.

When the patient is first admitted to hospital the state of coma or severe ketosis so often present on admission is corrected, and then he is allowed to eat as he likes. The calorie content of his diet is calculated in order to observe (and if necessary correct) any marked eccentricities of personal taste, and to make sure that it is not inadequate. As a rule two daily injections of insulin of from 10 to 30 units each are given, and this trial dose is increased if there is not a steady gain in weight or if ketosis appears. Usually at some period the patient (unless elderly) is deliberately allowed to experience a mild hypoglycaemic attack.

Urine-testing is never taught, and those patients who insist on testing their urine are cautioned that a sugar-free urine may be a warning of hypoglycaemia.

Most of my patients eat a diet with a high carbohydrate and a minimal protein content. Gluttony is almost unknown. Many are engaged in fairly heavy manual work and have very irregular hours of duty.

Coma

No clinic has been able to produce statistics of recovery so good as those of Joslin, and his doctrine of plenty of insulin and plenty of intravenous saline summarizes, I am convinced, the decisive measures in the treatment of coma or threatened coma. During the first few decisive hours of treatment insulin and saline are administered in amounts dependent on the rate of improvement in the patient's mental state, respiration, and circulatory condition. During these few hours there is little risk of hypoglycaemia. But if the dosage of insulin has been high hypoglycaemia may readily occur at a later stage, for the duration of effect of a large dose of insulin is much longer than that of an ordinary maintenance dose.

I have found that, once the acute stage of coma has been corrected, there is nothing to be feared from the free administration of glucose in amounts considerably above what is required to prevent hypoglycaemia. Coma must often be treated without facilities for blood-sugar estimations, and it seems to me that the permission to administer glucose freely is an essential simplification of treatment; the physician cannot allow himself to be in the position of feeling uncertain whether cerebral disturbances are due to ketosis or to hypoglycaemia. The young doctor must be taught that it is the profound metabolic disturbance in which untreated diabetes culminates that is the cause of coma, and not the accompanying hyperglycaemia; otherwise he may well look on the precautionary administration of glucose to a patient under treatment for coma as a dangerous procedure, or, even worse, may hesitate to give heroic doses of insulin for fear of a hypoglycaemia which he may not succeed in controlling.

Children

The problem of managing the diabetic child is obviously simplified by allowing frequent feeds of normal composition

and administering insulin often enough and in large enough doses to prevent ketosis and achieve a gain in weight. But in one important respect the position as regards dieting in children is different from that in adults. Any child, whether diabetic or not, may overeat grossly on occasion, filling his stomach till he vomits. Such "gorges" in the diabetic child are usually the cause of a stormy attack of coma, not, I suspect, provoked by the absorption of too much carbohydrate but by the vomiting. My impression is that the diabetic child to whom the tasty foods of normal children are not forbidden is less likely to indulge in occasional outbreaks of gross gluttony than the controlled diabetic, but if he does indulge he will suffer for it just as certainly.

Acute Diabetes

It is possible that occasionally diabetes is seen at so early a stage that prompt treatment will avert degenerative changes in the pancreas. Though of course it is not easy to prove that the rare cases of complete recovery under treatment might not have recovered spontaneously if untreated, it is obviously wise in all cases of very recent onset to insist on complete rest in bed and very careful control of the blood sugar by means of insulin and a measured diet; only when the passage of time has made it clear that the condition is an established one should the patient be allowed to resume normal activities and an uncontrolled diet.

The Mild Diabetic

By a "mild diabetic" is meant a patient who is able to maintain as high a level of health and vigour without insulin as when taking insulin. Putting aside the regulation of the diet for such conditions as obesity, my experience is that these patients, the elderly, the obese, the arteriosclerotic, and the hypertensive, are none the worse for a high blood sugar. I am very doubtful of the wisdom of restricting the intake of the mild diabetic. In some such patients a sugar-free urine can be achieved only at the cost of under-nutrition. Yet such patients, if allowed a normal diet, may lead an active life without the help of insulin. The borderline patients, who can live without insulin but are better on insulin, sometimes insist on dropping it for a spell. It is my experience that, when they do this and later consent to start injections again, their (small) insulin requirements are not increased by the period of omission.

It is of course important to warn every mild diabetic of the possibility that acute intercurrent illness may bring about a rapid change for the worse and precipitate diabetic coma.

Complications

When the complication is one the danger of which lies in its tendency to provoke coma—e.g., septic infection—the same line of treatment which is successful in the treatment of coma may be applied to its prevention. When the diabetic has to undergo a major surgical operation the physician's attention should be directed not towards keeping the blood sugar low but towards averting ketosis. Tuberculosis is, in my experience, neither more nor less difficult to treat than in the normal subject.

The aetiology of the retinitis, the cataract, and the arterial thickening so common in elderly diabetics is still unknown. There is not, I think, any evidence as to whether such complications are commoner in patients with persistent hyperglycaemia than in the controlled group. But the evolution of these lesions, once they have appeared, does not seem to be affected by the level of the blood sugar. In so-called diabetic gangrene the level of the blood sugar does not appear to have any effect on the progress of the lesion.

Discussion

Against the conclusion which I have drawn from the sustained good health of diabetics whose diet is not controlled—namely, that adequate insulin dosage and the avoidance of hypoglycaemia are the only essentials in the treatment of diabetes—several arguments may be advanced.

1. It may be argued that the health of my patients would have been still better if their blood sugars had been lower. In reply to this it should be noted that the change from a

measured to a free diet has often been made without deterioration in health or vigour.

2. It may be argued that the patients believed to be eating an uncontrolled diet were in fact unconsciously eating a diet which maintained a fairly accurate carbohydrate balance. This is not so.

3. It may be argued that the insulin requirements of my patients are greater than they would be on a measured diet. This may be so, but, as none of my patients need more than 60 units a day and the majority take between 10 and 40, the point is not very important. (This point would be important if it could be shown that cases of established diabetes under control gradually progressed towards complete cure. This question has already been dealt with in the paragraph on acute diabetes.)

4. It may be argued that in 20 years' time the fate of the surviving uncontrolled diabetics may be worse in respect of late complications than that of the controlled group. That is certainly possible. It is no answer for me to claim (as I do) that over 10 years' observation reveals no evidence of premature arteriosclerosis, for it may be that in the development of late diabetic complications there is a clinically silent stage analogous to that in the development of syphilitic aortitis.

If it were not for this objection I would have no hesitation in proclaiming that the maintenance of a carbohydrate balance was an unnecessary adjunct to the treatment of diabetes. But time will settle the question. Twenty years have already elapsed since the isolation of insulin, and soon many young diabetics treated in the first decade after its introduction to therapeutics will be reaching middle age. It will then be possible to judge between the rebellious and the docile, and for that very reason I wish to repeat my plea for a continued careful observation of the former class.

Summary and Conclusions

A plea is made for the study of the group of severe diabetic patients who refuse to follow any regulated diet but will take insulin. Prolonged study of these uncontrolled but otherwise healthy diabetics will show whether their persistent hyperglycaemia favours the onset of arteriosclerotic or degenerative complications. Observations during a period of over ten years yield no evidence that it does so.

Study of this group has convinced me that regulation of the diet with a view to maintaining a normal blood sugar is unnecessary; this opinion is based solely on the sustained good health of patients on uncontrolled diet. The patient must take enough insulin to prevent ketosis, and arrange his meals so as to avoid hypoglycaemia. If he does this his condition is not improved by maintaining a carbohydrate balance. The mild diabetic who does not require insulin does not benefit (unless obese) from strict dietetic control.

In diabetes of very recent origin it should, however, be assumed that accurate dietetic control will favour whatever chance of complete cure may exist.

Normal (uncontrolled) diet in the child is not associated with frequent attacks of coma. Outbreaks of gluttony in the diabetic child are dangerous and lead to coma, not because they produce hyperglycaemia but because they are followed by vomiting.

In the treatment of coma insulin and intravenous saline are the two essentials. If at any stage the onset of hypoglycaemia is feared, then glucose can be administered freely and without blood-sugar control.

Two grants of £1,000 each have been made by King Edward's Hospital Fund for London to assist in the establishment of two group preliminary training schools for nurses—one at Hampstead to serve a North London group of hospitals, and the other at Blackheath to serve a group south of the river. Additional financial help will be given during the next three years should such further help be necessary. The King's Fund is prepared to consider similar schemes by other groups of hospitals in its area and to make grants up to a total of £5,000 for this year, with assurance of continued help for three years in case of need. Further particulars may be obtained from the Nursing Recruitment Centre, 21, Cavendish Square, W.1.

TREATMENT OF ASTHMA BY NICOTINIC ACID

BY

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Maisel and Somkin (1942) have recently published a preliminary report on the treatment of the asthmatic paroxysm with nicotinic acid. Relief of the paroxysm was obtained in 21 out of 30 cases treated with the drug, either by intravenous injection (16 out of 21 patients relieved) or orally (5 out of 9 patients relieved). Eighteen patients who had received intravenous therapy were subsequently given the drug orally, and 11 of these cases were definitely improved. Neuwahl (1942), who had obtained satisfactory results with the drug in angina pectoris, also used it in 7 cases of asthma in order to note its action on smooth muscle. Of his patients 4 were improved and 3 were made worse. It is not known whether the drug acts by relieving bronchospasm or by affecting the pulmonary vessels, or whether it is converted into or liberates another substance which is the physiologically active agent. Neuwahl suggested a pharmacological similarity to histamine; but, as Maisel points out, this does not appear to explain its action in asthma.

For some months before either of these reports came to my notice I had been treating asthma with nicotinic acid, both during the paroxysm and between the attacks. It was hoped that its action in dilating blood vessels might be accompanied by a similar action on the bronchioles.

Treatment of the Paroxysm

Of 19 cases which received treatment during the paroxysm 7 had had slight or no relief from adrenaline or had relapsed. Most of the attacks treated were severe ones. The possibility was considered that improvement following the treatment might be due to psychological influences associated with coming into hospital and receiving injections, and an attempt was made to control this factor by giving an intravenous injection of sterile water, preferably before nicotinic acid, to 12 of the cases. In some instances a control injection was given in a later attack. The effect of the control injection was then compared with that produced by nicotinic acid. Slight transitory improvement was noted in 7 cases after the use of sterile water. Two patients not included in this series had their attacks completely relieved though they did not receive nicotinic acid. In order to be sure of a rapid action, nicotinic acid was as a rule given intravenously in doses of 50 mg. (half those used by Maisel). One ampoule was dissolved in 10 c.cm. of sterile water and the injection was given very slowly. Two cases received intramuscular injections, and in one of these the dose employed was 100 mg. One case received 50 mg. intravenously and 50 mg. intramuscularly. A second intravenous dose was given to many of the patients during a relapse or a succeeding attack, sometimes within a few hours of the first dose. Six cases, 4 of which had already received nicotinic acid intravenously, were given the drug orally in doses of 50 or 100 mg. (1 or 2 tablets) during a paroxysm.

Results.—The effect of nicotinic acid in 16 of these patients was to produce definite improvement in at least one of the attacks for which the drug was given. In 8 cases the relief was practically complete; in the other 8 there was a residual wheeze for many hours. In all cases adventitious sounds persisted in the lungs—a fact noted by Maisel. Improvement usually began to manifest itself within a few minutes of the injection, the patient falling asleep in many instances and awaking the next morning much relieved. The duration of relief varied considerably and did not always appear to be dependent upon further doses, parenteral or oral. The period of relief was sometimes as short as half an hour, but in other cases there was no further attack for some days, even when the attacks had been frequent before admission. On the whole a relief of several hours was obtained. Further injections sometimes repeated the improvement resulting from the first one, but in 5 cases later injections resulted in little or no