He suggests that in the last analysis all the changes produced by genes are expressed through a series of chemical reactions and that there is a growing belief that in some way each gene controls no more and no less than a single type of enzymic action. If the generalization "one gene—one enzyme" is finally established it will represent one of those great simplifying concepts like the idea of evolution by natural selection or the quantum theory.

This view, when considered with Harris's suggestions, can be related to the problem of human diabetes. Some few years ago Himsworth (1949) suggested that diabetes should be regarded as a symptom-complex rather than as a disease *sui generis*. Hyperglycaemia, the common factor in all diabetes, may not necessarily arise from the same cause in every diabetic patient. Likewise, no satisfactory attempt has yet been made to reconcile the arteriosclerotic complications of long-standing diabetes to genetic defects, yet no clinician of experience can deny that this is an inexplicable problem. For many years attempts have been made to relate it to adequate control of diabetes as measured by maintenance of normoglycaemia. It falls within the knowledge of us all that, although strict control of diabetes seems to offer some protection against vascular damage, it is by no means proved that it does so in all cases. This may be related to different types of diabetes arising from insulin deficiency or from disturbed utilization, or to genetic influences suspected but as yet unproved.

Conclusion

Medicine in the present day is becoming increasingly indebted to the developments of science and has need to keep pace with the ever-expanding frontiers of knowledge which are opening before it. Yet it seems that the sense of perspective, so necessary to any critical appraisal of new knowledge, must constantly be related to clinical experience. Cawadias (1953) has said that "the history of medicine has shown that, whenever medicine has strayed from clinical observation, the result has been chaos, stagnation, and disaster." This represents a serious challenge to those of us charged with the management of diabetic patients. The clinical concepts of diabetes at present rely heavily upon the interpretation of the glucose-tolerance test to determine the existence of this nebulous entity, diabetes, which, in the words of F. G. Young, cannot be precisely defined. The twin sisters clinical observation and laboratory experiment must obviously continue to walk together very closely, the one to produce concepts of reversible or curable diabetes, the other to produce techniques which, applied to the patient like Mackenzie's polygraph, will enable us to plot the course of the disease with ever greater accuracy. The need for long-term genetic studies of diabetes of fluctuating intensity must surely lead to greater understanding, while the development of new techniques which, for example, could provide an easy and rapid estimate of pancreatic, adrenal, and pituitary activity, would place into the hands of the physician weapons with which the problem of diabetes might be solved.

Surveying the development of our knowledge of this most fascinating and baffling subject, the secret of diabetes mellitus, we are reminded of the contributions of the great men who have passed. Of these Frederick Banting, whose memory we honour this day, must serve as an example of one who combined a concept with a new technique and so placed the world in his debt. The stimulus of his discovery is still felt throughout the world, while millions of patients owe their health and existence to him. It can be truly said that he has joined

The choir invisible
of those immortal dead who live again
in minds made better by their presence, live
in pulses stirred to generosity,
in deeds of daring rectitude, in scorn
for miserable aims that end with self,
in thoughts sublime that pierce the night like stars
and with their mild persistence urge man's search
to vaster issues.

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THE DECREASE IN SURGICAL PAEDIATRIC DEATH RATE

BY

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The decrease in the mortality rate from various diseases and operations is an insidious process. Although one may suspect it, it is dramatically evident only when definite figures are produced. Coincident with a reduced death rate there is always a lowered morbidity rate, and in proportion to the latter there is an increased turnover in the bed state due to the shortened time in hospital. Unfortunately, other factors have crept in to counter-balance this, so that the waiting-list for the average hospital is greater to-day than it was 10–20 years ago; but a National Health Service, a Welfare State, and other personal economic factors have, in the meantime, come to play their part in the life of the private individual.

In the Royal Belfast Hospital for Sick Children the figures seemed striking enough to warrant publication. They probably represent merely what has happened in all similar institutions. The number of surgical beds in the unit has remained fairly constant. Two seven-year periods were selected, 1931–7 and 1947–53.

A series of those diseases which recur with sufficient frequency to warrant classification has been selected, and the results are shown in the Table and Fig. 1.

It may be argued that with some of these—for example, cleft-palate and pyloric stenosis—where the disease and the time for operation are under the control of the surgeon, the death rate should be nil. On the other hand, with others, such as burns, trauma, and the toxic conditions, the outlook must depend to a certain extent upon the insult the body has received in the way of shock and infection before treatment was started. Fig. 2 shows that there has been a steady decrease in the average age of death, largely due to the fact that surgery is being carried out for congenital abnormalities—that is, oesophageal atresia—which, in the first period, did not

even enter the surgical ward. Fig. 3 shows that for one week spent in hospital to-day one month was so spent in the period 1931-7. This is further proof that a decreased morbidity has accompanied the all-round decrease in mortality.

Surgical Ward Mortality Figures

Disease	1931-7			1947-53		
	Admissions	Deaths	% Mort.	Admissions	Deaths	% Mort.
Acute appendicitis and complications	1,104	45	4.1	3,059	8	0.26
Intussusception	210	29	13.8	357	6	1.68
Burns	573	58	10.1	1,442	12	0.84
Injury	1,577	21	1.3	2,807	24	0.85
Cleft-palate and lip	202	10	4.9	427	5	1.17
Acute infections (cellulitis, osteomyelitis, arthritis, septicaemia)	887	25	2.8	1,939	2	0.10
Pyloric stenosis	67	8	11.9	252	2	0.8

FIG. 1.—Showing the decrease in surgical paediatric death rate in various conditions.

FIG. 2.—Showing the steady decrease in the average age of death in children undergoing operation.

FIG. 3.—Showing the increase in the number of admissions to hospital.

Acute Appendicitis and its Complications

What are the factors that reduced the deaths from 1 child in 25 to 1 in 400 (see Table)? Are parents more enlightened or has the doctor become more skilled in diagnosis? Actually the number of children admitted to hospital with a perforated appendix and local abscess formation or peritonitis is still very high, although perhaps not so many are admitted almost moribund with practically no pulse, with a distended abdomen, and vomiting—the picture of complete ileus. With a disease which, unfortunately, presents without fulminating signs and symptoms, in an organ which can be found in many and varying anatomical situations, the onset cannot be expected to follow always the classical textbook picture.

In the child the appendix has a small lumen, the transverse colon a poor omentum; and, since the patient is often inarticulate and not intentionally uncooperative, I am afraid that the perforated appendix, even with the most intelligent co-operation of parent and doctor, will still appear.

The surgeon has changed little in his dexterity or in his tools. The incision and operative manœuvres are much the same. There is still the problem of whether to operate in the presence of an appendix abscess or appendix mass when the patient is not showing signs of disordered peristalsis. There are those, perhaps, who are capable of differentiating these two conditions—the perforated appendix with local abscess and the gangrenous appendix clothed with a mass omentum. Both are rare in the child as compared with the adult: so that it is doubtful indeed if there is the same possible justification for delay in operating in a child. Having operated, there is the second problem: when is it justifiable simply to drain, and when to open up fresh tissue spaces, especially retroperitoneally, to have the satisfaction of removing the gangrenous appendix? Some people lack the moral courage to admit that they have failed. A chief should always give commendation rather than create the impression that if he had been there he would not have failed.

Finally, what degree of peritoneal infection requires drainage and what can the body resistance deal with?

The secondary abscess still does occur sometimes in the pelvis, in the left iliac fossa, in a subphrenic space, or occasionally above the old abscess. It does not seem to occur more frequently in the undrained than in the drained case—perhaps it is more common in the drained case.

What are the factors now saving the children with ileus and peritonitis who formerly often died? Probably in order of value they are: (1) Parenteral fluids, especially intravenous glucose and saline; in addition, hyaluronidase subcutaneous, rectal, and ordinary subcutaneous transfusion still have an occasional place. These are first-aid measures, and tide over the short period till blood, plasma, and balanced electrolytes are available. (2) Gastric suction with a Ryle tube to decompress the paralysed gut, to allow it to rest and to permit it to recover its elasticity and peristalsis. (3) Selective anaesthesia, non-irritating to the lung, short-acting, but with adequate relaxant of proper duration. (4) Antibiotics—possibly in order of value, chlortetracycline or oxytetracycline, streptomycin, the sulphonamides, and penicillin. (5) Early ambulation. (6) Vitamins, especially vitamin C for wound-healing and vitamin B if the patient has been long on any of the “mycins” or “cyclines.” (7) The haemoglobin kept constantly over 80% and the blood pressure maintained at a constant level by noradrenaline or other method. (8) Sedatives, especially morphine (at one time greatly disproved). (9) Avoidance of all forms of parasympathetic stimulation—for example, pituitary “pitressin,” carbachol, etc.

A child should never die from paralytic ileus if it can be kept alive long enough for normal peristalsis to recover. Gross states that no child has died from appendicitis in the Boston Children's Hospital in a recent seven-year period. During 1953 we had one death due to an ether convulsion. The child recovered from the anaesthetic, but was decerebrate until he died some seven days later.

Intussusception

This condition is now better recognized by the parents, and, with an increasing number of baby clinics, paediatric units, and postgraduate lectures and courses, the medical profession is better prepared.

Most hospitals now have a 24-hour x-ray service and all the facilities for diagnosis. The Welfare State, with its ambulance service and the domiciliary consultation scheme, has put free paediatric consultant advice into every home. Why, therefore, are there any deaths from intussusception? The deaths occur nearly always because the patient reaches surgical help too late. In some cases it is due to distance: the household is isolated miles from medical help or the onset has coincided with an epidemic of diarrhoea or dysentery. In other cases the child has previously had rather similar attacks of colic and wind which had been diagnosed as “teething”; consequently, when the genuine intussus-

ception does appear it is missed. In many cases no one is to blame, since the sequence of events has not shown the classical picture.

Recently, in a series of 200 cases treated in this hospital, blood was present in less than 80%—that is, 20% did not show the classical blood-stained stool, without which many will refuse to diagnose the condition. In a recent case the apex of the intussusception was in the rectum without obvious blood having been passed. Of the 200 cases analysed, 142 had symptoms of less than 24 hours, and in this group there were no deaths; 28 had symptoms between 24 and 48 hours, and of these 8 died (29% mortality); while 19 had symptoms exceeding 48 hours, and of these 7 died (37% mortality). It would seem that we have 24 hours in which to diagnose an intussusception and save a child's life. In this series 71% were diagnosed within that period—that is, about one-quarter were missed. It is to this group of very ill children that modern surgery has something to offer. Correct preparation of the patient and balancing of his fluid and electrolytes is time well spent. The surgical technique basically depends on (1) the removal from the body of gangrenous tissue; (2) a safe surgical technique which avoids peritoneal soiling; and (3) a final state where no external uncontrolled drainage of small-gut contents is allowed to discharge on the surface or produce skin irritation. The sick child cannot tolerate the loss of its valuable intestinal content nor can it stand digestion of its skin.

Immediate anastomosis is to be preferred after resection when possible; or, if not possible, re-establishment of the continuity of the gut must not be long delayed. Selective anaesthesia and the "polythene" tube for intravenous infusion make the post-operative period a less anxious time and more easily controlled.

Burns

The mortality rate has been reduced from 10.1% to 0.84% (see Table). Figures can be made to prove anything, not necessarily the truth. The addition to the staff of a plastic surgeon and a physician responsible for the metabolic side of burns, together with the formation of a specialized burns unit, might be said at first sight to account for this improvement. Analysing this further, we also see another factor. In the early series burns were chiefly from the urban area of Belfast and adjacent rural districts. With the development and centralizing of a burns unit we naturally draw from a large area—a radius of 100 miles—but against this is the fact that the children who reach us are those that are fit to travel and that the moribund have died elsewhere. It is just as sensible to compare the mortality rate in a F.S.U., F.D.S., or C.C.S. with a base general hospital. The deaths are filtered off at each stage.

Dupuytren's six-grade classification of burns has been discarded after holding the field for almost 200 years. Now they are graded into two simpler categories—(1) skin damaged but recoverable, and (2) skin lost and irreplaceable. In group (1) the treatment is to prevent the damaged skin deteriorating into complete skin loss. In group (2) provision of a skin cover as soon as feasible is the only treatment.

Picric acid in water, tannic acid solution, tannic acid jelly, gentian violet, petroleum wax, ambrine, Bunyan's bags, pressure bandages with cotton-waste, marine and synthetic sponges all spring to the mind as milestones along a very troublesome journey. They show by their number and transitory nature how unsatisfactory and impracticable on the whole the treatments have been.

To-day the techniques are fewer, but the principles are based on a sounder concept: (1) Correct the haemo-concentration by replacing the lost plasma. (2) Control infection by antibiotics—the large exposed surfaces form a perfect Petri dish for every invading organism. (3) Give a cover to prevent reinfection. This cover may be (a) by skin in any of the various forms of skin transference—whole skin, half-thickness skin, complete skin cover, or islands of skin cover; (b) by coagulation—a crust or scab, produced by the drying and exposure of the natural protein exudate;

and (c) by some textile material cover—tulle gras, petroleum jelly, or net, or other protective cover where (b) is not a feasible method.

Thus plasma, blood, antibiotics, cetrimide, skin cover, rapid healing, lack of dressing, and abolition of pain have transferred the problem and treatment of the burnt child from being an agonizing nightmare to both doctor and patient to being a well-balanced and surgically staged procedure, in which the physician and the anaesthetist have a large share in the successful result. The anaesthetist, with rectal thiopentone, can allow the dressing to be done painlessly; and with hypotensive drugs vast areas can be de-nuded, giving large areas of skin of regular thickness. As in other cases, the surgeon's tools have been of less importance than the physiological outlook which now controls their use.

Injury

The death rate from injury is a little lower, but it does not show the dramatic fall of the preceding examples. Here is a problem in which prevention is the only cure. With the tempo of life increasing, with the greater number of private cars and public vehicles on the roads, with home help and home conditions less easy, and with more parents engaged in gainful labour, children have less protection and the areas into which they stray are more dangerous. This is one of the aspects of life not adequately protected by the Welfare State. Therefore, accidents under these conditions must increase. The motor-car and the internal combustion engine are more lethal weapons than a "tommy gun." The "knock-down" accident and the "run-over" accident should be segregated. With a child the "knock-down" accident carries a smaller mortality. The child's body weight is brushed aside by a vehicle and he has a shorter distance to fall. An adult 6 ft. (1.8 m.) tall and weighing 14 st. (89 kg.) offers a large bulk of resistance, so that when his head strikes the ground—through an arc of 6 ft.—it does so with considerable force. It is a constant surprise that head injuries in children in actual fact do so well. The "run-over" accident in the child, on the contrary, is a serious problem—the frail bony cage offers little resistance except to the lightest of vehicles.

Fatal injuries must arise. One cannot damage an organ at its hilum, be that lung, liver, kidney, or spleen, without producing catastrophic haemorrhage, which allows little or no time for even the most efficient first-aid service to be of any help. Injury at the periphery of these organs, on the other hand, may give the surgical team the short period of grace necessary.

Thus, although surgical skill may have increased along with surgical courage, thanks to the experience and training of a recent war, and although a blood transfusion service is immediately available, the problem is still mostly one of time and resuscitation.

The figures given in the Table, again, are not a true indication of the effects of trauma and road accidents, since they do not include those admitted direct to the mortuary. They tell of the deaths of those patients reaching hospital alive, and so do not reflect the value of modern resuscitation. One should include those admitted to the mortuary; then and only then will we be able to see whether trauma and its effects is on the increase or not.

Cleft-palate and Cleft-lip

The value of modern surgery is really reflected in the results shown in the Table. The plastic surgeon is able to centralize his cases, the theatre technique can be standardized, and nursing can be carried out according to one man's plan and not with modifications to please the wishes and whims of several operators—each sure in his own mind that his is the only method. Correct timing of the operation and stages, intratracheal anaesthesia (originated by Ivan Magill) and an electric sucker, physiotherapy, and antibiotics are all links in the surgical chain. They have allowed the operation to be carried out with the utmost care, in a bloodless field, and with a dry pharynx. Since 1950 we have had no deaths from this operation.

Acute Infections

Towards the end of the 1931-7 period the sulphonamides were just coming in, with a dosage not fully understood, with some dangers overemphasized and others not realized. When one remembers the horrible problems of septicaemia, arthritis, and osteomyelitis, a total of 25 deaths was not larger than one would expect. In 1947 penicillin was becoming cheaper and more fully available, and in the intervening years its successors have kept appearing with gratifying regularity. In addition, all through this second seven-year period we have had the steady support of readily available blood transfusion—available in quantity to sustain the patient until the specific remedy was found and had time to take effect.

Not only did this disease group almost vanish, to a mortality of one death in a thousand patients, but in the second seven-year period there were double the number of admissions; and an acute infection which in the first period took days, weeks, or even months—for example, in the case of bone diseases—to clear up now suddenly disappears after a few days' treatment with one of the "wonder drugs." This has been accompanied, too, by the almost total disappearance of gross subsequent deformities.

Osteomyelitis suddenly changed; from a septicaemia with simple or multiple local manifestations, it became a disease with a sterile blood stream. The bony lesions still showed necrosis—perhaps a sterile necrosis—till the suitable combination of decompression of the bone by minute drill-holes and the use of an antibiotic was established.

Perhaps another seven-year period 20 years from now may not show as good results if a population of antibiotic-resistant patients has by then been produced. Or will there still be bigger and better spectra of antibiotics?

Congenital Pyloric Stenosis

In surgery the best results are obtained from the relief of mechanical obstructions, and this condition is a perfect example. With suitable pre-operative preparation of the patient, with adequate hydration, with a basal narcotic—for example, rectal thiopentone—with the operation performed under a local analgesic, with a transverse incision, and with the abdominal wound closed by a suitably non-absorbent suture—for example, nylon—a simple surgical technique can be evolved. Staining and shock are avoided. The patient should be awake at the end of the operation. There is no fear that the abdominal wound will burst apart, and yet the child is given full freedom. The operation should have a mortality of nil, but the missed diagnosis, the neglected case, and the wasted child with intercurrent disease still appear to make the operation a hazardous procedure, no matter how well carried out.

Summary

The death rates from some of the more frequent surgical conditions are compared in two seven-year periods, 1931-7 and 1947-53. Some of the factors responsible for this improvement are discussed.

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Children starting school at the age of 5 have, on average, five of their teeth missing, decayed, or filled, said Miss PAT HORNSBY-SMITH, Parliamentary Secretary to the Ministry of Health, when she opened the new Stroud Green Dental Centre at Croydon on September 28. There was no doubt, she said, that one of the main causes of the increase in dental decay since the end of the war had been the greatly increased consumption of sweets. Children should not eat sweets all day, and teeth should be brushed or the mouth rinsed after they had been eaten. To clean their teeth before retiring and send them to bed with a mouthful of sweets or biscuits was asking for trouble.

MANAGEMENT OF THE PREGNANT DIABETIC*

BY

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Problems relating to pregnancy in diabetics have in the past two decades aroused a greater interest and achieved a greater importance than the frequency with which pregnancy and diabetes are associated in clinical practice appears to justify. Some years ago Dr. W. G. Oakley and I had occasion to collect information on this subject in Great Britain. We collected details of all the cases treated in 26 different teaching centres, where they tend to concentrate. Over a seven-year period there were only 458 diabetics cared for during pregnancy, which works out at about three cases per annum in each hospital. At my own hospital, King's College Hospital, we have a very large diabetic clinic under the direction of Drs. R. D. Lawrence and W. G. Oakley. We have therefore a great concentration of clinical material, and for many years now I have looked after 20-30 cases a year. I shall quote from my personal experience of a series of 298 pregnancies in diabetic women seen during the last 11 years.

Why are we, as obstetricians, taking a so much greater interest in this subject? I think it is because in this relatively small group of patients we encounter problems relating to foetal size, placental function, intrauterine foetal death, hydramnios, toxæmia, congenital foetal abnormalities, and neonatal mortality. The solution of any or all of these problems in the diabetic will, we hope, help us to understand more about foetal physiology and pathology in general. But knowledge is slow to accumulate, and there are many riddles still awaiting elucidation before we can explain fully why for the diabetic woman reproduction is such a relatively unproductive enterprise.

The control of maternal diabetes by means of insulin and dietary measures has reduced enormously the maternal risks during pregnancy. The maternal mortality is now as little as 1% or less—0.4% Joslin (1946)—compared with 45% quoted by Whitridge Williams (1909) 45 years ago. Yet such figures tend to disguise the seriousness of pregnancy as an episode in the life of the diabetic. We have become accustomed to seeing these patients so cared for and their diabetic lives so organized that we fail to appreciate how closely they often come to disaster for themselves as well as their babies owing to the profound metabolic and endocrinal changes that accompany pregnancy. The hazards of repeated pregnancies in the diabetic in terms of morbidity are on the whole under-emphasized. Good control of diabetes throughout pregnancy can reduce the foetal mortality, as Lawrence and Oakley (1942) showed, but cannot abolish it.

Foetal mortality can be considered in relation to avoidable and unavoidable factors, the most important avoidable factor being control and supervision of maternal diabetes. But there are still unavoidable factors which make it impossible to reduce the foetal loss much below 20%. The last ten years have seen a

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