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THE NOVA SCOTIA MEDICAL BULLETIN

THE TIME HAS COME. . .

the walrus said,
to talk of many things;
of ships and shoes
and sealing wax,
and cabbages and Kings.

With due apologies to Lewis Carroll, the time has come to talk of the many things encompassed by the subject of Anaesthesia in Nova Scotia (and New Brunswick and Prince Edward Island), as it relates to the only training centre in the region.

These provinces have started down the road of regionalizing medical care. With the growing concentration of surgical and obstetrical services by specialists, and of intensive care units, in a dozen or so hospitals in Nova Scotia, to the present there has not been a parallel development of anaesthetic services by fully trained anaesthetists. It is inappropriate and should be unacceptable to allow the provision of safe anaesthetic health care to fall behind advances in the rest of medicine.

Consider that in 1973 fifty-six per cent of all anaesthetic services in Nova Scotia were given outside the training centre. This is in round numbers 30,000 people given an anaesthetic of some type.

Consider that outside the training centre, there are to my knowledge, two anaesthetists practicing in Nova Scotia with the certificate from the Royal College by examination (C.R.C.P.).

Not that I believe everyone giving anaesthetics in every hospital must have a C.R.C.P.; that is impractical at present and quite possibly unnecessary. But everyone giving anaesthetics should have some minimum length of formal training. In addition everyone giving anaesthetics should be in a continuing educational process that helps him to become a better anaesthetist.

Not that I am blaming those doctors presently providing anaesthesia in the regional hospitals without full anaesthetic training. As one who struggled as a general practitioner-anaesthetist, I have great respect for those doing it, along with busy practices. It is a tough way to make a living.

But the system is wrong. There ought to be formally organized Departments of Anaesthesia in every regional hospital. The combination of surgical and obstetrical anaesthesia, plus intensive care involvement needs to be fostered as full time occupation of the anaesthetist, who has then a fully hospital-based practice. Income for such a practice must be equal to other types of practice, so that the anaesthetist is not forced to general practice for economic reasons.

First and foremost, the only training centre for Anaesthesia in these three provinces needs to build a well travelled two-way street to every practicing anaesthetist. From refresher courses, short and long clinical traineeships to full residency, the training centre has an obligation to help the provincial anaesthetists to wider capabilities and safer practices. I also believe that there should be subsidized training to encourage practitioners to enter Anaesthesia as a specialty. The training centre should have staff travelling to regional Departments for on the spot teaching.

One immediate evidence of our desire to be of service to the regionally practicing anaesthetists is that beginning with this issue, a short review of pertinent clinical subjects will be presented regularly in the Bulletin.

So there is a need in the Maritimes for more anaesthetists with greater lengths of formal training. We have a training programme grossly underused by Dalhousie graduates. Surely the need and the facilities can be fitted together.

The saying goes: if you are not part of the solution, you are part of the problem. I believe that we in the training centre can be part of the solution. Which are you?

□

Emerson A. Moffitt, M.D., Professor and Head,
Department of Anaesthesia, Dalhousie University.

Getting the Picture into Focus

E. A. Moffitt,* M.D., C.M., M.Sc.,
Halifax, N.S.

A clinical Department in a Medical School exists for three reasons: clinical practice, teaching, and research. Consider them as the legs of a camera tripod. Without the reasonable support of all three, the camera is unbalanced and out of focus; a desirable picture can not be presented to perceptive peers: the medical profession as a whole.

The Department of Anaesthesia at Dalhousie has had a tilted camera; we needed a major effort to even up our tripod. I suspect that other clinical Departments have the same problem to varying degrees. Everyone seems to have the strong leg of clinical practice and the weak one of research, with teaching somewhere in between.

The reasons for this in Anaesthesia were quite understandable. Too few anaesthetists have been trained or attracted to Dalhousie to expand the staff even to fill the clinical needs of the University hospitals. A major reason for this has been poor income, relative to the rest of Canada. Only since 1972 have anaesthetic fees come close to those in Ontario, with whom we must compete. However, by the end of 1974, all the University hospitals should be fully staffed by experienced people. In two years we will have added 9-10 in Halifax, and 6-7 anaesthetists at Saint John.

Only now are we able to strengthen our other two legs. Do not get me wrong. Safe clinical anaesthesia for all who need it in University hospitals must come first, and remain so. But that alone cannot produce a strong, viable Department.

Our teaching leg was atrophied and needed major rehabilitation. That conclusion is self evident. In recent years we have not attracted Dalhousie graduates into our training programme, either upon graduation, or after general practice, which quite possibly included forced exposure to anaesthetic practice. Plus the fact that there are almost no certified anaesthetists in Nova Scotia outside the University training centre. We should be training anaesthetists for the regional hospitals in the Maritimes.

So what have we done? Dr. Ian Purkis began on July 1, 1974 a committment of spending half his time on the teaching programme. We will contribute more to undergraduate teaching. We have rebuilt our residency so that the resident follows a course fitted to his learning needs and independent of the service load. The resident spends solid blocks of time in paediatric anaesthesia, and in obstetrical anaesthesia, including experience in epidural blocks. The year of internal medicine has six months in Intensive Care and six months of involvement with surgical patients needing consultation and management by internists. The didactic teaching has been "beefed up" at all levels with a core of motivated teachers. The didactic course taken by fourth year residents is aimed at all candidates passing the Royal College exams. Another area to be developed is that of better liaison with, and support of, the people providing anaesthesia in the regional hospitals. We need to be of more help in the continuing education of all people giving anaesthesia in the Maritimes.

Our research leg is about to become a medical miracle: we will grow a live leg where only a nubbin was present. Dr. Ian Nisbet will become Research Professor in September, 1974. He will establish his basic Research programme at the Sir Charles Tupper Medical Building and foster others in clinical investigative projects. Doctor Moffitt will continue his clinical studies of the hemodynamic and metabolic alterations of the critically-ill after operation and after trauma. Other staff members will be involved. There is no question that an active investigative programme contributes to teaching success and rubs off on the full-time clinicians. It is not the frosting on the cake, but an essential ingredient of wholesome product.

This is what the Department of Anaesthesia has done to focus on its role and obligations. We fully believe that you will get a better picture. Come and try us.

□

*Professor and Head, Department of Anaesthesia, Dalhousie University.

"There is a great tendency for the medical profession and the laity to think that clinical research can be carried out only in hospital, where modern equipment is at hand and every aid to diagnosis is provided. But this is very far from the truth. Let us consider for a moment what is meant by clinical research. It is the painstaking investigation of individuals in the course of treating and caring for patients; it leads to an accumulation of knowledge which may be invaluable in the prevention and treatment of disease and in the maintenance of health. This knowledge may aid the advance of the practice of medicine in any of its many branches. It may confirm or refute established practice. It may point the way to new discovery or treatment. The essence of clinical research is that it is carried out by a clinician — be he general practitioner or specialist."

Sir Cecil Wakeley

Changes in the University Department of Anaesthesia

On March 1, 1973, Dr. Carl Stoddard retired as Head of the Department after twenty-four years in that post. He was the first Head of Anaesthesia and must be congratulated for his long years of developing the Department.

On that date, Dr. Emerson Moffitt became Professor and Head of the Department. Doctor Moffitt graduated from Dalhousie in 1951, took his training in anaesthesia at Mayo Clinic, and has been on the staff there since 1957. He had worked in the field of cardiovascular anaesthesia and extracorporeal circulation, with ninety publications.

Dr. Ian Nisbet will become Research Professor of Anaesthesia in September, 1974. He is a medical graduate of Edinburgh University in 1951, and trained in Liverpool, Manchester, and Glasgow. Since 1968, Doctor Nisbet has been doing research in Anaesthesia at the Hospital for Sick Children in Toronto, and has thirty-six publications. He will coordinate all aspects of basic research and clinical investigation in the Department.

Dr. Ian Purkis advanced in rank to Professor, and became a geographic full-time member of the Department on July 1, 1974. Doctor Purkis graduated from St. Thomas' Medical School in London in 1953. After training in anaesthesia there and at McGill University, he joined the Department in 1958. In his new post, his primary responsibility is for all aspects of the undergraduate and residency teaching programmes.

Dr. Kenneth Fairhurst has become Head of Department at the Grace Maternity Hospital, and six other anaesthetists from the Victoria General Hospital provide anaesthesia at the Grace.

Other academic promotions are: Drs. John Feindel, Ralph Ballem, and Paul Fleming to Associate Professor; Drs. Peter Thompson and George Thomson to Assistant Professor.

Since January, 1973, fifteen new staff and fellows have joined the Department in Halifax and Saint John, bringing the total to thirty-nine.

At the I.W.Killam Hospital for Children are four new staff:

Dr. Clary Townsend, a Dalhousie medical and anaesthetic-training graduate, obtained his C.R.C.P. in 1969, and for three years was in the Department of Anaesthesia of Memorial University.

Dr. Albert Scott graduated from the Queen's University in Belfast in 1961. He was in their Department of Physiology for six years before taking anaesthetic training. He obtained his F.F.A.R.C.S. in 1972.

Dr. James Morrison also is a Belfast graduate of 1962, received his F.F.A.R.C.S. in 1966, and has been a Consultant Anaesthetist in Belfast since 1971.

Dr. Sydney Stubbs graduated from the University of Manitoba in 1965, and took her residency in anaesthesia there. She obtained her C.R.C.P. in 1971, and has been on the Manitoba staff since 1972.

At the Victoria General Hospital are:

Dr. Josephine Candy graduated from the University of Wales in 1950 and took anaesthetic training in Cardiff and London, receiving the F.F.A.R.C.S. in 1954. From 1963-1972 she was Head of the Department of Anaesthesia in Kuwait, Arabia.

Dr. Desmond Writer graduated from the University of Liverpool in 1958. He took his training also in the United Liverpool hospitals, received the F.F.A.R.C.S. in 1961, and has been a Consultant Anaesthetist at Birkenhead since 1967.

Dr. K. Sukumaran and Dr. Malcolm Margison are Fellows, to join the staff on obtaining the C.R.C.P. Doctor Sukumaran graduated from the Calicut Medical College in India in 1964. He took residency training in Epsom and Liverpool, England and Mount Sinai Medical School in New York, getting the F.F.A.R.C.S. in 1971.

Doctor Margison graduated from Dalhousie Medical School in 1959, and practiced in Woodstock, N.B., until beginning his residency in 1970.

The branch of the Department at the Saint John General have added seven people, to a total of eleven:

Dr. Richard Cain graduated from Dalhousie in 1967 and trained at McGill and Dalhousie Universities. He obtained his C.R.C.P. in 1972.

Dr. Jean Caron graduated from McGill University in 1952. After two years in Internal Medicine at Camp Hill, he trained in Anaesthesia at McGill. Since obtaining his Fellowship in 1961, he has practiced in Bathurst.

Dr. David Rideout graduated from Dalhousie in 1963, took his residency at the University of Toronto, and received his C.R.C.P. in 1974.

Dr. Preston Leavitt is a Dalhousie graduate of 1966, trained in Anaesthesia at McGill University, and qualified for his C.R.C.P. in 1974.

Dr. Henry Lok graduated from National Taiwan University in 1968. He had his residency in anaesthesia at Saint John and McGill, and obtained his C.R.C.P. in 1974.

Dr. C. Srinivasan and Dr. B. Srinivasan are Fellows. They trained in Bradford and Manchester, and both have the F.F.A.R.C.S.

Dr. Andre Pasquet has taken a leave of absence for a year, and Dr. Bojana Solaric has joined the Department of Anaesthesia of the University of Toronto.

□

The Renal Response to Anaesthesia

W. A. P. Thompson,* M.D., C.R.C.P.(C) and
K. R. Langille, M.Sc.,**

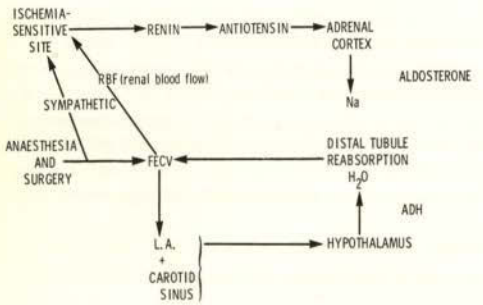
Halifax, N.S.

The effects of anaesthesia on any organ function are always difficult to isolate from the effects of the accompanying surgery. However, with regard to functional extracellular fluid volume (FECV), it appears that, whether or not the surgical procedure has itself altered FECV, the body behaves under anaesthesia as if a considerable decrease has actually occurred.

The Role of Extra-Renal Hormones

The feed-back mechanisms involving anaesthesia, FECV, antidiuretic hormone (ADH), and aldosterone are depicted in Figure 1. In addition, the possible effect of pain stimuli (nociception) and opiate drugs directly upon the hypothalamus with subsequent release of ADH has long been recognized. The possible effect of prolonged intermittent positive pressure ventilation (IPPV), especially with positive end-expiratory pressure (PEEP) on central blood volume, with activation of left atrial receptors and stimulation of hypothalamic ADH secretion has also been reported.

The result of the increase in ADH and aldosterone activity under anaesthesia is a retention of water and Na+ and a decrease in urinary output.

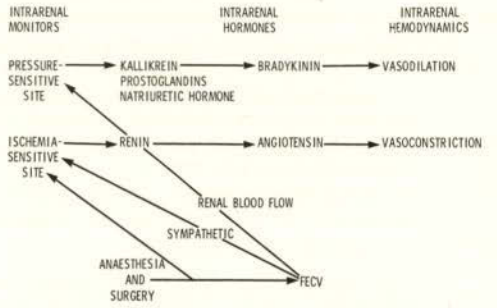


A decrease in FECV, with a corresponding fall in intra-vascular pressure, activates baroreceptors in the left atrium and carotid sinuses, promoting release of ADH from the hypothalamus. This, in turn, promotes reabsorption of water in the distal renal tube. A similar process operates by way of an ischaemia-sensitive site in the kidney leading to the release of aldosterone from the adrenal cortex and the reabsorption of sodium in the distal renal tubule. FECV is thus replenished and its tonicity maintained.

FIGURE 1

The Possible Role of Intra-Renal Hormones

A further mechanism by which the kidney may respond to anaesthesia is depicted in Figure 2. Shifts of blood flow from one part of the nephron to another may be a very important factor in the control of water and Na+ reabsorption. The pressure-sensitive and ischemia-sensitive sites appear to be part of what is usually called the juxta-glomerular apparatus. It seems probable that this sensing apparatus is also influenced by the sympathetic nerve supply to the kidney and that regional anaesthesia, such as epidural block, has less effect on renal hemodynamics and overall renal function than general anaesthesia.



A decrease in FECV, with a corresponding fall in intra-vascular pressure and renal blood flow, activates mechanisms within the kidney which control the distribution of renal blood flow.

FIGURE 2

Natriuretic hormone appears to be a separate substance with an action on the nephron opposite to that of aldosterone. In the same way bradykinin and angiotensin have opposite effects on the intra-renal vasculature. With increasingly more renal hormones being identified, the concept of the kidney as an endocrine gland is well established.

The Importance of Medullary Interstitial Osmolarity

In a certain percentage of nephrons the loop of Henle dips deeply into the renal medulla (Figure 3). The descending limb of Henle's loop is permeable to both Na+ and water, which can move freely out of the tubule into the interstitial fluid. The ascending limb, however, is impermeable to water so that active reabsorption of Na+ produces an osmotic gradient between tubular and interstitial fluid and continues against that gradient. This creates hypertonicity in the interstitial fluid which, in turn, promotes water reabsorption from the descending limb of Henle's loop, the counter-current mechanism.

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**Third Year Medical Student, Dalhousie University.

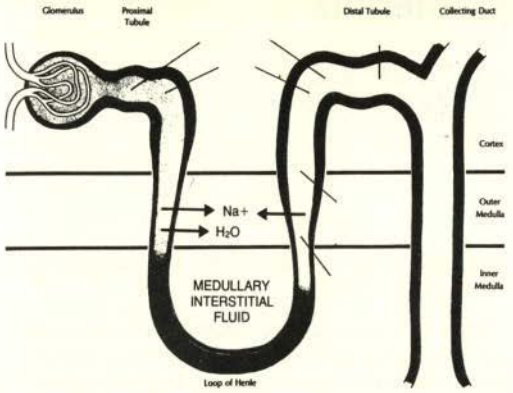

FIGURE 3

The Toxicity of Methoxyflurane

Since the introduction of methoxyflurane (Penthrane) as an inhalation anaesthetic, evidence has appeared in the literature concerning the dose-related lesion of the renal countercurrent concentrating mechanism caused by the inorganic fluoride ion (F−), one of the metabolites of methoxyflurane.

In persons regularly drinking fluorinated water, there is a serum F−level of one micro M/L. Clinical anaesthesia with 2.5 MAC hours (1.0 MAC = 0.14%) methoxyflurane produces a serum F−level of 50 micro M/L, at which level biochemical evidence of renal insufficiency becomes apparent.

The principal site of the lesion is the proximal convoluted tubule. There is swelling of mitochondria and inhibition of cellular energy transfer systems, affecting the Na+ pump, allowing more Na+ to enter the descending limb of Henle's loop. Together with this, F− ion may cause a shift in intra-renal blood flow towards the medulla. Both processes decrease the osmotic gradient between tubular and interstitial fluid in the inner medulla, resulting in decreased water reabsorption. Because F− ion also inhibits the action of ADH on the distal tubule, water is also not reabsorbed further down the nephron. However, Na+ reabsorbing mechanisms further down the nephron appear to still function and the Na+ which is not reabsorbed proximally is recovered more distally. Sodium is also recovered somewhat by the increased medullary blood flow noted above. Thus, it is water, but not Na, which appears in the excreted urine in larger than normal quantity.

Decreased medullary interstitial tonicity can also account for the increased reabsorption of other solutes, resulting in poor clearance of urea nitrogen, creatinine, and uric acid.

The lesion is usually reversible in 1-2 weeks, but severe cases can go on to rupture of mitochondria and oliguric, rather than polyuric, renal insufficiency, possibly complicated by deposition of crystals of oxalic acid, another metabolite of methoxyflurane.

The biochemical changes are increases in serum Na+, Cl−, creatinine, blood urea nitrogen, and serum osmolarity. The urine shows increased water, decreased specific gravity, and a fixed osmolarity close to that of serum.

When the clinical syndrome appears, one sees negative water balance with polyuria, dehydration, weight loss, and mental confusion. The condition fails to respond to water deprivation or ADH, indicating failure to concentrate urine.

Enzyme induction, as in a patient who has been on barbiturates, may stimulate a greater than usual metabolic breakdown of methoxflurane to F− and thus enhance its toxicity. Concurrent treatment with nephrotoxic antibiotics such as gentamycin and tetracycline has also been shown to increase the renal effects of F−.

Other fluorine-containing anaesthetics, such as halothane, isoflurane, and enflurane appear to be considerably more stable with regard to yielding F−. Definitive studies to investigate the nephrotoxic potential of these agents have not been reported.*

The extensive investigation of methoxyflurane has given new insight to our limited understanding of how anaesthesia affects renal function. The further elucidation of intra-renal events, particularly changes in hemodynamics mediated by renal-produced hormones, is a wide new frontier.

*A search of the literature and the design of a project to assess renal function during and after isoflurane (Forane) anaesthesia was part of Mr. Langille's third year elective. □

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"Modern methods of travel have made visits all over the world feasible if not always desirable. The exchange of ideas is excellent; but without a genuine background of hard, unremitting work such activities can become a sterile habit. How many of us have heard the same people and the same ideas in places thousands of miles apart? Although I fully support reasonable liaison between medical and scientific workers all over the world, a good library and the capacity to select and read quietly and critically is certainly a far more efficient method than forever travelling, distracted by exhaustion, changing scenes and climates, and relentless hospitality.

The academician's tasks lie mainly in the ward, at his desk, and in the laboratory. Although he may become busier every day, unless he is working in these places, then, as an academician, he is truly becoming idler."

K. W. Donald,
Professor of Medicine,
University of Edinburgh.

Malignant Hyperthermia

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INTRODUCTION

Although malignant hyperthermia has become well known only in the last six years, many new insights into the pathophysiology, clinical features, treatment and prevention have developed in this short time. Because we are presently studying four Nova Scotian families with a total of about 500 family members, we felt that a review of this topic for physicians in the Province was in order.

CLINICAL FEATURES

Malignant hyperthermia is an acute pharmacogenic disease which results in a rapidly rising body temperature and usually a marked rigidity of skeletal muscles. Any anesthetic agent may precipitate the hyperthermic response in a susceptible individual, but most have occurred in patients receiving halothane with or without succinylcholine.[1,2] Occasionally malignant hyperthermia has developed during local or regional anesthesia, and one of our cases resulted from an overdose of oral tricyclic antidepressant medication.

An early warning sign of impending hyperthermia is a poor or abnormal response to succinylcholine at the start of anesthesia. The patient may relax poorly, have muscle twitching and develop rigidity of the jaw muscles that prevents easy intubation. Unfortunately this is sometimes taken to indicate a need for more succinylcholine.

The most consistent early sign of the developing hyperpyrexia is a ventricular arrhythmia (tachycardia, bigeminy, multifocal ventricular ectopic beats, etc.). Other early signs are the rapid deep respirations, the developing marked muscle rigidity, excessive heat of the soda-lime canister, hot skin and a mottled cyanosis. Most patients will show a marked rigidity of all skeletal muscles at this time.

The temperature elevation may intially be missed if it is not measured frequently during surgery. The temperature may rise as rapidly as 0.5°C. every five minutes. It has been found that the mortality rate correlates well with the level of hyperthermia. No deaths have been noted if the temperature is kept under 39° C., but there have been no survivors if the temperature was 44° C. or higher.

Most patients with malignant hyperthermia have marked skeletal muscle rigidity that develops after the temperature elevation begins. It has been noted that the development of rigidity is delayed if succinylcholine is not used during the anesthesia. About one patient in five with malignant hyperpyrexia has a non-rigid form.

Late events in the course of malignant hyperthermia may be hemolysis, consumption coagulopathy, acute heart failure, acute renal failure, decerebrate coma, peripheral edema with poor perfusion of the extremities, and muscle necrosis with or without myoglobinuria.

Laboratory investigations show arterial oxygen desaturation, respiratory and metabolic acidosis, hyperphosphatemia, hyperglycemia and impaired coagulation. An initial hypercalcemia and hyperkalemia may be followed by hypocalcemia and hypokalemia. Serum creatine phosphokinase (CPK), aldolase, transaminases, and myoglobin are markedly elevated.

Prior to the recent advances in prevention, diagnosis and management, the mortality rate in malignant hyperthermia was 65%. Good prognostic signs are the return of deep tendon reflexes and the return of consciousness. After recovery, the patients complain of severe muscle pains, stiffness and weakness. The muscles appear swollen and later may show some atrophy.

Kalow[3] has calculated the overall frequency of malignant hyperthermia in Toronto to be one in 15,000 anesthetics in children and one in 50,000 anesthetics in adults. Although more common in males, 4 of our 5 cases were females.

The patients with malignant hyperthermia have an underlying myopathy, often without symptoms, and this myopathic defect is usually transmitted as an autosomal dominant. Thus in the family of one of our patients, we have found 30 potential cases on the basis of the CPK screening test of 160 members of the family.

Susceptible individuals may have detectable myopathies which are usually mild or may appear entirely healthy. The myopathies described in association with malignant hyperthermia include Evans myopathy which is dominantly inherited and mainly affects the proximal limb muscles, Barnes myopathy,[4] myotonia congenita and central core disease of muscle.[5] In addition, in children a condition characterised by short stature, neck webbing, a peculiar facies and a mild myopathy has recently been described.[6] It is noteworthy that malignant hyperthermia has not to date been reported in association with the pseudohypertrophic form of muscular dystrophy. An increased incidence has also been noted in association with such anomalies as kyphoscoliosis, squint and hernias. Malignant hyperthermia may also occur in acute myopathic disorders such as tetanus.

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SCREENING METHODS

The development of specific indicators to perdict susceptibility to malignant hyperthermia is most important. The history of a case of malignant hyperthermia in the family, or signs on examination of a myopathy or of a syndrome that may be accompanied by a myopathy, should lead one to suspect a predisposition to malignant hyperthermia. Also, an unusual response to succinylcholine or any anesthetic should alert one to the possible development of this disorder.

Because the patient's underlying muscle disease is usually asymptomatic, some specific tests to disclose the abnormality are needed. Screening tests include CPK estimation and other enzyme studies. It is also possible to perform isoenzyme determinations of CPK which may be a more sensitive and reliable indicator and these are being carried out on the families we are studying.[7] In vitro muscle biopsy response to halothane, succinylcholine and caffeine is probably the most specific test but is not practical as a screening procedure. At the present time, CPK estimations remain the most practical screening test for families with a history of malignant hyperthermia, although we are concerned about the possibility of false negative results in some cases. There is also a possibility that patients will be falsely regarded as "at risk" due to an elevated CPK for other reasons (exercise, trauma, intramuscular injections, etc.). The use of other enzyme studies (SGOT, aldolase) has not added to the specificity of the screening procedure. Because of the possibility of false negative results on clinical and CPK screening, we explain the disorder to all family members and ask them to present a letter from us to their doctor whenever they require medical advice. Those with elevated CPK estimations are also asked to wear Medic-Alert bracelets.

THE UNDERLYING DEFECT IN MALIGNANT HYPERTHERMIA

The etiology of malignant hyperthermia seems to be related to an inherited abnormality which affects the binding of calcium in the sarcoplasmic reticulum, sarcoplasm and mitochondria of muscle. It is, as yet, unclear whether the abnormality is primarily in the muscle or secondary to some trophic neural influence over muscle. The subjects with this abnormal trait may show evidence of a myopathy, often subclinical.

If it is correct that malignant hyperthermia is characterized by a defect in calcium storing membranes, then drugs that lower myoplasmic calcium should be of benefit and this has been found to be so. Procaine and Procainamide rapidly reduce rigidity and the temperature usually dramatically drops, probably due to accelerating active calcium uptake into the sarcoplasmic reticulum, reversing the acute acceleration of muscle metabolism brought on by the high myoplasmic levels of calcium ion. An unresolved question in our minds is whether the non-rigid form of malignant hyperthermia is due to the same mechanism, though there is evidence that points in this direction.

MANAGEMENT

A. Prevention

1. Surgery that is not absolutely necessary should be avoided in patients with a positive family history and elevated CPK. A patient who has survived an episode of malignant hyperthermia may develop the syndrome whenever exposed to the same anesthetic or drug again. The patient who has had previous uneventful anesthetics may still develop malignant hyperthermia with subsequent operations.
2. Those at risk should be detected by examination and CPK estimation. This should be carried out on all family members when a case of malignant hyperpyrexia is diagnosed. This type of screening should also be carried out in anyone with a family history of unexplained surgical or anesthetic deaths. CPK studies should be performed on patients with musculoskeletal anomalies prior to surgery. It must be emphasised that a high CPK does not always indicate a predisposition to malignant hyperthermia and a normal CPK does not necessarily exclude the possibility.
3. Those at risk should be informed of the hazards. We have adopted the following procedure:-
   a) All family members are made aware of the disorder.
   b) All with elevated CPK levels are given a letter outlining the disorder, to be presented to any doctor they may visit.
   c) All those with elevated CPK levels are advised to wear Medic-Alert bracelets.
   d) The physician of the family members with elevated CPK levels receives a letter of explanation and a recent review of the disorder and its management. A similar letter is forwarded to the anaesthetic department in the hospital in their area so they are aware that a patient with this trait is living in the area.
   e) Other preventive measures relate to the operating theatre and we strongly recommend continuous temperature monitoring during surgical anesthesia. Further watch for early signs of this disorder should be made during anaesthesia and procainamide should be in all operating rooms.
4. If anaesthesia should be necessary in an emergency situation: the procedure should be carried out under local, regional or spinal block using procaine or amethocaine (tetracaine, pontocaine). Lidocaine, (lignocaine, xylocaine) and bupivicaine (Marcaine) should be avoided since they accelerate calcium release from the sarcoplasmic reticulum.

   If general anaesthesia is considered mandatory, the use of barbiturate, nitrous oxide oxygen techniques, supplemented with meperidne (Demerol) or neuroleptanalgesic drugs (Innovar, fentanyl, droperidol) or diazepam (Valium) may be safe, provided all muscle relaxants are avoided. Pretreatment of susceptible patients with procaine or procainamide should make these techniques safer.

B. Active Treatment

The treatment of malignant hyperthermia has been well outlined by Newson.[8] The best results occur when diagnosis has been early and specific therapy started rapidly before the temperature has climbed to high levels. Britt has noted that the

prognosis is good if the temperature is kept below 39.4° C (102.9° F). The best method of early detection is by constant temperature monitoring during anesthesia.

The diagnostic features of this syndrome form the rational basis of treatment.

1. Correction of metabolic acidosis.
2. Correction of hyperthermia.
3. Correction of muscular rigidity.
4. Correction of the complications due to systemic release of intracellular contents:
   a) potassium
   b) myoglobin
   c) intracellular thromboplastic substances that may cause coagulation defects, and
   d) intracellular edema.

1. Correction of the Metabolic Acidosis

Rapid sodium bicarbonate infusion followed by glucose is effective in reversing the acidosis. Respiratory acidosis is corrected by hyperventilating the patient through an endotracheal tube. Only oxygen should be used and all anaesthetics at this time are discontinued. It is well to remember that carbon dioxide is used up rapidly in malignant hyperthermia so that the soda-lime should be changed often in a closed circuit apparatus. The arterial blood gases should be repeatedly monitored.

2. Correction of the Hyperthermia

Surface cooling by an ice bath or by packing the body in ice cubes is an effective way to reduce body temperature. Other means are intraperitoneal cooling if the peritoneal cavity is accessible, intragastric cooling via a nasogastric tube or intracystic cooling via a uretheral catheter. The body temperatures should be monitored continuously as temperature rises of 0.5° C (° F) every five minutes have been recorded. After cooling should be prevented by stopping all cooling measures at 1° C above normal body temperature. The body temperature should be monitored for the next 24 hours in order to detect any tendency for the temperature to rise again.

3. Correction of Muscle Rigidity

Both procainamide and procaine have been shown to be useful in this syndrome. Conventional muscle relaxants should not be used.

Procainamide is given in doses of 250 mg. intravenously. The initial dose is 250 mg. which is repeated in increments of 250 mg. till relaxation commences (often after a dose of 750-1000 MG.)

Procaine is also useful but tends to have a greater risk of cardiac complications. It is given in an initial dose of 30-40 mg/Kg intravenously, of which half is given immediately and followed less rapidly by the remainder. This is followed by an infusion of 0.2 mg/Kg/minute until the rigidity lessens.

Both drugs must be given under ECG control because of the dangers of cardiac complications with these drugs. The complications are much less with procainamide. When these drugs have been used, the muscle rigidity lessens and the body temperature ceases to rise.

4. Correction of the Complications Due to Systemic Release of Intracellular Contents:

Potassium — The release of potassium from damaged cell membranes may cause cardiac arrhythmias or cardiac arrest. The potassium effects can be followed by ECG control. The best management is the treatment of the hyperpyrexia and rigidity as the potassium will often fall as soon as these are corrected. It is dangerous to use insulin and glucose to treat the hyperpotassemia. Also, the possibility of hypopotassemia after rigidity and hyperpyrexia have been controlled must be anticipated.

Myoglobin — Myoglobin escapes through damaged muscle cell membranes and the myoglobin may cause acute renal failure. Mannitol in a dose of 1 gm/Kg should be given prophylactically to protect the kidneys. A catheter is necessary because of the diuretic effect of mannitol and a constant check should be kept on urine output.

Thromboplastic Substances — A number of intracellular contents appear capable of acting as thromboplastins. A late complication in malignant hyperthermia is sometimes a consumption coagulopathy. This serious bleeding disorder should be watched for, particularly at the surgical site, as an early indication of this problem. Good results have been reported following the use of Heparin. If possible, the advice of a hematologist should be obtained.

Tissue Edema — Occasionally the intracellular edema in muscles has been severe enough to prevent proper limb perfusion and ischemic damage may occur. Some patients may require a surgical fasciculotomy to prevent serious ischemia of the limb periphery.

Long-Term Management — These patients often have marked pain and swelling in their muscles following recovery from this syndrome and they must be made as comfortable as possible. When the swelling subsides, they are often noted to have some degree of atrophy and weakness of the involved muscles. This necessitates an early and graduated physiotherapy program.

The follow-up management of these patients and their families include the CPK screen and examination and the education of the families and their physicians to the dangers of this syndrome.

SUMMARY

Malignant hyperthermia is an acute elevation of body temperature during anaesthesia, usually accompanied by marked muscle rigidity. In most cases, the underlying defect is a subclinical, dominantly inherited myopathy which can be detected by routine CPK testing. We are currently studying the families of four cases of malignant hyperthermia with several hundred relatives living in Nova Scotia. We are interested in investigating any other families with the syndrome in the Maritimes that are known and would appreciate being notified by physicians who may be aware of them. It is important that physicians recognize this disorder because of recent advances in the prevention, detection and treatment of malignant hyperthermia. □

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Harvey Cushing was approached by a young postgraduate student who had decided to go into research. Said he: "Can you tell me, Professor, what I must buy to equip my laboratory?." Cushing replied: "Running water, a basin, and some ideas."

What is Your Diagnosis?

B. St. J. Brown,* M.D.,

Halifax, N.S.

This 8 year old boy complained of pain below his left knee for about two weeks and more recently slight swelling had appeared. The area appeared to be a little warmer than the opposite side. He could not remember any incident of unusual trauma. The initial radiographs (fig. A) show subcutaneous edema and new subperiosteal bone formation extending several centimetres along the proximal shaft of the tibia. Five weeks later (fig. B) the subperiosteal new bone formation has matured and is well organized, and is most abundant over the posterior aspect of the lesion. There is also a slight but definite increase in overall density. The subcutaneous edema has disappeared. At this point the patient was asymptomatic. The patient had had no treatment except reduction in physical activity.

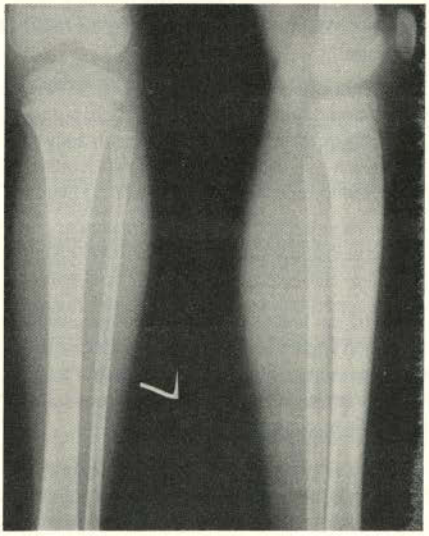

Figure A

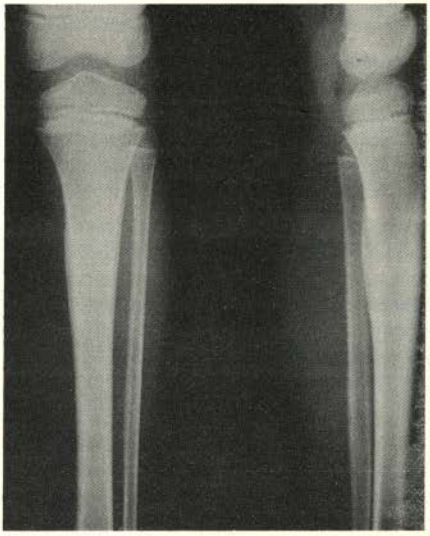

Figure B

*Department of Radiology, I.W.K. Hospital and Dalhousie University.

(Please turn to page 159 for answers)

Dr. J. A. George Talks With The Bulletin

"Physicians who feel we are moving into the era of socialized medicine are right in one sense but very, very wrong in another," according to Dr. J. Alex George, Antigonish, 1973-74 President of The Medical Society of Nova Scotia.

Dr. George told the Bulletin: "I like to think that medicine has always been 'socialized' to the extent that in pre'medicare days doctors — particularly the general practitioners — were ready, willing and able to provide care to certain patients, knowing all the while that they would receive minimum compensation or none at all. In fact, they just went ahead and did what had to be done.

"Now we do have a universal medicare plan but it is certainly not a scheme which inhibits freedom or service by government directive and I see very few indications that doctors will ever become employees of the state."

Dr. George said, "First of all, Nova Scotia's Medical Service Insurance Act is an act toward coverage of physicians' services. The act states quite clearly that it is an insurance scheme which will pay 85 percent of the cost of most procedures. Equally clearly, the act recognizes that the Medical Society's Fee Schedule is the prerogative of the society and that government has little if anything to do with it other than through tariff negotiations with the elected and nominated officials of our wholly autonomous organization. And that word 'autonomous' is important. Except in matters of licensing and regulations regarding the practice of medicine, we make our own decisions on policy and do our level best to encourage government to understand why we feel the way we do about certain things."

In what sense is medicine socialized today?

"Well," Dr. George said, "we have to recognize that a very large part, almost all of our health care services are either paid for directly out of the public purse or receive significant subsidies. Hospitals, public health clinics, ambulance services and a host of other elements fall into this category. In that sense medicine is socialized.

"But it would be a serious mistake to think that doctors themselves are becoming regulated or socialized through government edict. In fact, over the past few years the provincial government appears to have recognized that an independent voluntary medical organization made up of professionals is a pretty valuable thing to have around."

He pointed out, "First of all, it puts us in the position of being able to provide counsel to government on medical matters without restraint . . . and it has been my experience that the former minister of health and the present minister appreciate this and recognize that in talking with them we call a spade a spade. They have tended to respond accordingly and cooperatively government and the society have managed to get some pretty important health measures out where they will do the most good."

Dr. George cited some of the Society's activities at government conference tables.

"Let's forget for a moment our on-going and general tariff negotiations. Let's look at some other things.

"The Society has made presentations directly to the various ministers concerned or through the legislature's law amendment committee on matters which impinge directly on the welfare of Nova Scotians.

"We made three presentations to the Ministers of the Environment while environmental legislation was being drawn up and took an active part in the various task forces charged with drawing up recommendations for national application at the federal level.

"We have consistently voiced our concern about inadequate housing and the psychological as well as organic hazards it presents.

"It was the Medical Society which pushed for and in fact, opened Halifax's North End Clinic — a clinic which was sorely needed because of the high incidence of over-utilization of the Victoria General's out patient and emergency departments.

"We went to bat for the recipients of workmen's compensation when amendments to the act were before the house. Basically, we were after equitable assistance for industrial accident victims and for the recognition of certain high incidence hazards faced by firemen as insurable items under the act.

"The Society actively supported Halifax Interactions drug crisis and med-aid services for youngsters who, for one reason or another, were unwilling or unable to enter and cope with the more formalized mechanisms of the health care delivery system.

"Together with the Nova Scotia Hospital Association and the Registered Nurses Association, we drew up a bill of rights for patients in hospital . . . and we are currently maintaining a close liaison with the Nova Scotia Civil Liberties Association with a view to broadening and/or refining that bill.

"The Society office handles complaints and queries from patients across the province and, in nine cases out of ten, solves the various dilemmas which present themselves.

"We did our level best to help the ambulance operators' association upgrade attendants' skills and; incidentally, when physicians were criticized for the so-called 'abuse' of ambulance services we were quick to publicly point out some of the facts of life to our critics.

"The Society has made presentations to government committees on child abuse and has met with representatives of the Department of Social Services to determine what their plans for combatting this relatively high incidence problem are and to lend our own professional assistance in dealing with the cause and effect syndrome.

"And these are just a few of the activities we are engaged in."

Dr. George also cited the Society's own insurance scheme, representations made on behalf of the various sections, "and direct services to doctors who, through no fault of their own, suddenly find themselves confronted with problems which require outside help."

He said, "The Society's obligation under charter is to work toward improving the health and welfare of Nova Scotians as well as providing direct and indirect services to member physicians. I am proud to say that we have been honoring that charter.

"Some of our members and, I'm sure, the public don't realize that this can be and has been a 24 hour a day, seven day a week job. There are no magic buttons to push. The Society staff and your officers and committee chairmen are on the go all the time."

What does the future hold for the Society?

"More of the same. We have to keep alert in retaining our professional autonomy simply because we are professionals. At the same time, we have a duty to our patients, the people of Nova Scotia. We exercised that duty when we opposed the chiropractic bill. We exercised it in matters of the environment, in ambulance service improvements, in bursary assistance to medical students, and in a host of other ways.

"We will continue to exercise that duty to the public and to our member professionals. Putting it simply, when a thing needs doing, we'll do it and we'll do it in the best interests of all concerned." □

PATIENT'S RIGHTS TO ETHICAL AND DIGNIFIED CARE IN A HOSPITAL WITHIN THE PROVINCE OF NOVA SCOTIA

In affirmation of the basic principles of honesty, integrity and compassion upon which the delivery of health care in Nova Scotia is founded, the sponsoring organizations of this document declare that their members will support the following thirteen principles to the best of their ability at all times in the best interest of good patient care. The patient should have the right to:

1. Considerate and respectful care.
2. Privacy while receiving any aspect of personal care, so that patient's dignity is always respected.
3. Confidentiality of communications, records, case discussions, consultations, examinations and treatment.
4. Know the identity of the physician responsible for providing or co-ordinating his or her care.
5. Have an explanation of one's illness, the planned investigation, treatment, and reasons for changes in either of these points, if they should occur.
6. An opportunity to refuse any investigation or treatment after he/she has received a full explanation, including any alternate forms of investigation or treatment, provided he/she is of rational mind.
7. Complete treatment as indicated by the diagnosis, and to have anticipated complications of such treatment explained.
8. Continuing care and assessment, with necessary changes, while in hospital, and a planned program for discharge with their future care, as may be deemed necessary.
9. Have his or her investigation and care performed in an expeditious manner.
10. An explanation of hospital policies and procedures as they apply to the conduct of the patients.
11. Be informed where the investigation or treatment is of an experimental nature and be permitted to agree to or to refuse to participate with such investigative procedures or treatment, if he or she so desires.
12. An explanation when their care involves activities of an educational nature by students in the health professions.
13. Where the patient is a minor or not in a rational state of mind the patient's guardian or immediate family shall assume the rights to information and decisions respecting the patient's medical care.

Sponsoring organizations are: The Medical Society of Nova Scotia, the Registered Nurses Association of Nova Scotia and the Nova Scotia Hospital Association. □

The Effectiveness and Efficiency of Screening in Medical Care

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Screening has been defined as a medical investigation which does not arise from a patient's request for advice concerning specific complaints. So considered it comprises investigation of those patients who have not sought medical assistance, those who have sought assistance only for a screening test or periodic health examination, and those who have sought assistance for a condition unrelated to the screening procedure.[1] The term "mass screening" is used when a large number of people are being screened, regardless of whether they are examined at one point in time or serially over a longer period of time.[2]

It has been stated that most abnormal screening results represent healthy individuals with unusual analyses.[3] As the normal range is usually accepted to lie between the upper and lower 2.5% of the population distribution, by definition 5% of people will be "abnormal". If such 95% limits are assumed, and twenty tests are done, the problem is compounded as the laws of chance alone predict that the average patient will have at least one abnormal value detected. While this is more fully described in the reference indicated, the implications are evident in relation to the findings of many multiphasic screening programmes. If the prevalence of such abnormalities in a community be 5%, quite apart from not being a cause for alarm, this merely verifies the truth of the underlying concept of human variability. This assumes, of course, that the distribution of values in the population has first been adequately determined — which unfortunately is usually not the case either.

The Screening Hypothesis

Each proposal for screening consists of the hypothesis that earlier diagnosis followed by earlier therapy alters the natural history of the disease, either in the individual concerned or the community at large and sometimes at both levels. While such an assumption has been valid for certain infectious diseases it may be less tenable for many of the chronic non-infectious diseases that are the objects of more recent screening activities. To explain why this is so, it is necessary to explore the different concepts of etiology, prevention and intervention available to us.

Epidemiology began when Hippocrates pointed out that in order to control disease we must understand its causes. Koch greatly contributed to our success against many diseases assumed to have one major single cause. However, while diphtheria, tetanus, syphilis and tuberculosis, to mention a few, have declined remarkably in response to appropriate prevention and therapy we have been left with a legacy of enthusiasm which demands equivalent success in chronic non-communicable diseases once identifiable risk factors have been recognized.

A number of barriers may yet remain. For example, the risk factor may not be modifiable for preventive purposes. This was overcome in the case of phenylketonuria, once assumed to be solely due to a genetic defect, for which discovery of a modifiable environmental factor in the diet (phenyl alanine) has since allowed preventive action to be taken and with great success.[4] On the other hand, while the association between cigarette smoking and excess mortality was first made forty years ago, it is only recently that we have any reason to believe that antismoking campaigns have been at all successful in this country, and this still must be considered speculative.[5]

Less straightforward again is the situation in relation to coronary heart disease. While some would argue that recognition of multiple etiology enormously increases the number of points at which preventive action might be taken, this may prove to be more of a disadvantage than appears at first sight. While serum cholesterol, diastolic blood pressure, relative weight, smoking, physical activity and water softness have all been implicated, little information is yet available on the nature of interaction between these factors, each one of which, in isolation, may make a relatively modest contribution. Indeed, multifactorial diseases may require multifactorial prevention trials, particularly if the factors concerned are synergistic (total combined effect greater than the additive effect). Intervention on a wide spectrum of characteristics may be required for optimum preventive control. With the exception of hypertension, however, the effectiveness of such intervention in coronary heart disease remains to be demonstrated.[6]

Effectiveness and Efficiency of Screening Procedures

Those who have read Cochrane's minor classic "Effectiveness and Efficiency", will recollect the crematorium worker who was so fascinated by the gap between input and output that he (Cochrane) considered advising him to join the National Health Service in order to improve his job satisfaction! This champion of the randomised controlled trial has brought to us a greater awareness of the concepts of effectiveness, which he defines as the ability of a particular medical action to alter the natural history of a disease for the better, and efficiency which involves strategies of management designed to facilitate the application of medical actions.[7]

Prescriptive screening is usually understood to imply a direct contribution to the health of individuals in contrast with those screening programmes which have as their object the protection of the public health. This distinction is artificial as it

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is quite evident that these two aims are interconnected. All prescriptive screening by definition should be effective as it implies results in terms of care, if not always for the individual concerned at least for the community with whom he lives. These is a constant danger in screening that we may become so involved in the procedure that we may forget the programme of which it is a part. A screening programme will not only be ineffective but even damaging unless it is part of a system for disease control. Identification is almost meaningless unless there are significant results in terms of care.[8] The only major exception to this lies in the context of research which will not be further discussed.

TABLE I

SCHEME FOR EVALUATION OF PRESCRIPTIVE SCREENING PROCEDURES

(Adapted from Nuffield Provincial Hospitals Trust)

I- Definition and Review

A) DEFINITION OF THE PROBLEM
   1. What abnormality of medical significance is to be predicted or detected?
   2. What prevention or therapy is to be offered?
   3. Which group(s) is to be screened?
   4. At what stage(s) is detection aimed?
   5. What investigation and tests are proposed?

B) REVIEW OF POSITION BEFORE SCREENING
   1. Evidence concerning the prevalence, natural history and medical significance of the abnormality, with conclusions on the adequacy of the evidence.
   2. Evidence concerning the effectiveness of previous methods of preventing the disease.
   3. Evidence concerning the effectiveness of previous methods of treating the disease.

C) REVIEW OF EVIDENCE CONCERNING THE SCREENING PROCEDURE
   1. Evidence concerning the effectiveness of the proposed diagnostic method(s).
      a) Applicability to group whose investigation is proposed;
      b) Error rates, positive and negative;
      c) Comparison with traditional diagnostic methods;
      d) Availability of resources;
      e) Applicability;
      f) Cost;
      g) Conclusions on state of evidence on diagnostic method.
   2. Evidence concerning the effectiveness of the proposed treatment.
      a) Applicability to group proposed;
      b) Comparison of effectiveness with treatment following conventional diagnosis;
      c) Availability of resources;
      d) Acceptability;
      e) Cost;
      f) Conclusions on state of evidence on treatment.

Evaluation of Screening Procedures

Certainly screening programmes are nothing new, but their institution and perpetuation should be subject to the most rigorous evaluation. Perhaps the most adequate scheme for the evaluation of prescriptive screening procedures is that of the Nuffield Provincial Hospitals Trust which is summarised in Tables 1 and 2.[9] It is readily evident from this that the decision to undertake a screening programme should not be taken lightly.

Possibly the best general overview on the validation of screening procedures has been presented by Holland and Cochrane who list simplicity, acceptibility, accuracy, cost, repeatability, sensitivity and specificity as the essential requirements for screening procedures.[10] The first five criteria are reasonably self-explanatory. Sensitivity refers to the proportion of positives correctly identified as such, and specificity refers to the proportion of negatives correctly identified as such. The relative importance of these criteria differ from one screening situation to another.

When applying these criteria to a range of commonly conducted procedures these investigators found acceptable evidence for screening dislocation of the hip and phenylketonuria in neonates, hearing and vision in children, and rhesus factors and bacteruria in pregnant women. However, they were not able to find sufficient evidence to justify routine screening for

TABLE II

SCHEME FOR EVALUATION OF PRESCRIPTIVE SCREENING PROCEDURES

(Adapted from Nuffield Provincial Hospitals Trust)

II- Conclusions and Proposals

A) CONCLUSIONS CONCERNING THE STATE OF EVIDENCE ON THE PROBLEM AS A WHOLE
   1. Synthesis of evidence concerning natural history of disease and the effects of the screening procedure as a whole, diagnosis and treatment being considered together.
   2. Listing of medical gains and losses and comparison with similar balance sheets for alternative approaches to the problem.
   3. Listing of financial costs and gains and comparison with alternative approaches.

B) PROPOSALS FOR ACQUISITION OF FURTHER EVIDENCE

   Is further evidence necessary, and if so, what? What are the logistics of the proposals and their relationship to available resources?

C) PROPOSALS FOR INTITIAL APPLICATIONS

   What application is justified? For what design, scale and duration should it be planned? How should it be supervised and what resources should be committed? Is the proposal mainly as a service or a research basis and if the latter, what information, or technical or operational developments, should be pursued?

carcinoma of the bronchus, carcinoma of the breast, carcinoma of the cervix and bronchitis. They further concluded that there existed tests from which there is possibly some benefit, at considerable cost, for relatively few people. These included tuberculosis, arterial blood pressure, blood-sugar level, iron deficiency anemia in non-pregnant women, and intra-ocular pressure.[10]

A test to be worthwhile must be reproducable and a valid indication of the condition screened for (ie: adequate sensitivity and specificity). This is relatively straight-forward when we are dealing with a bimodal distribution as in phenylketonuria where the abnormal state is determined by a single gene. However, we are more often faced with a unimodal distribution which does not indicate any clear distinction between normal and disease states. For example the prognostic value of elevated blood pressure taken in isolation is still debatable. This is also the type of distribution found in intraocular pressure, hemoglobin, urea and glucose. For those interested in exploring the technicalities involved a good recent review by Wilson is recommended.[11]

It is important that any screening procedure once adopted should be subjected to periodic re-evaluation in terms of additional evidence concerning that procedure as well as factors relating to the success or failure of the programme. Chest radiography in screening for tuberculosis is a case in point here whose very success has contributed to the decline in the prevalence of active disease with consequent escalation of the cost of case finding. Schultz and Lambird in 1965 found that for a total cost of $241,000 only one case of active tuberculosis was discovered in a mass screening of 57,000 schoolchildren.[12] While this is clearly not the priority it once was, caution is essential in extrapolating from findings elsewhere. Local differences in disease prevalence and trends should always be taken into account.

And then there are those screening procedures which some people wish had never been embarked apon, at least not without adequate evidence. A case in point is cervical screening which is generally assumed by those who do it to be well substantiated. The total direct cost of this programme in Manitoba for 1968 was estimated by Gellman at $1,200,000.[13] On a per capita estimate, this implies an expenditure of $25,000,000 for the country as a whole in that year. Six years later, with inflation and the effects of medicare, the estimate would undoubtedly be higher still. This might be acceptable if the procedure were of proven effectiveness, however, the following extract from an excellent review of the evidence by E. G. Knox provides ample support for a healthy scepticism. While this statement was also made in 1968, the state of knowledge concerning this procedure remains essentially the same today.

"A controlled trial has not been carried out. There is no large scale application reported which shows an unequivocal decline in mortality from carcinoma of the cervix which must be attributed to the screening procedure. Reductions in the reported incidence of clinical carcinoma have been reported following such campaigns but it is not clear to what extent this might be due to excision of carcinoma in situ when discovered or how much to other factors such a natural decrease of incidence or perhaps the excision of early invasive carcinoma."[14]

In the absence of adequate answers to these criticisms it will remain impossible to determine to what extent the apparent ineffectiveness of cervical screening programmes is due to fundamental ineffectiveness or alternatively to gross inefficiency in delivering the intended service or a combination of these two possibilities.

More encouraging is the reported use of the randomised controlled trial in the evaluation of screening for breast cancer conducted by the Health Insurance Plan of Greater New York.[15] This approach should be essential in the evaluation of any screening procedure, and should certainly precede its institution on a wider scale. Equally well it should be realised that there are screening procedures of proven validity which may be underutilised. For example what proportion of women are screened for bacteruria in pregnancy by physicians who would consider cervical screening a routine and worthwhile procedure?

Laboratory screening procedures have been critically surveyed by Korvin and Pearce who point out two unwarranted assumptions frequently made without being explicity stated.[16] Firstly, that the discovery of a disease will lead to an improvement in the patient's management. Secondly, that treatment of a disease prior to the development of symptoms gives better results than treatment begun on clinical presentation. These authors point out that the diagnosis of disease is not synonymous with benefit to the patient and that early diagnosis does not necessarily facilitate care or improve prospects for control. They recommend that to evaluate screening one must evaluate the usefulness of the data collected. This has been put more bluntly by Gryfe who states, "if you cannot anticipate how you will deal with an 'abnormal' lab value before seeing it, don't order it in the first place!"[17]

While there are probably as many unquestioned answers in screening as there are unanswered questions, recent reviews by Sackett and colleagues have at least attempted to answer the following questions about the periodic health examination (or screening test). Will it detect diseases likely to have an important impact on health? Will the treatment of "risk factors" have a major impact apon the subsequent development of disease? What are the prospects that the health behaviour of participants in periodic health examination can be altered? Does the examination really alter outcomes? Are traditional methods of evaluating the effectiveness of early detection programmes adequate (eg: 5 year survival rate)? Have we considered the entire range of possible effects of early diagnosis and long therapy?[18]

The Dilemma

One might add to this selection the question of how, if we discover that some time honoured procedure is essentially ineffective, do we cease and desist gracefully? There is a dilemma here as to whether the decision to devalue a procedure should be made through the media or educational process, the medical college, the professional association, or

alternatively be left solely to the conscience of the individual physician working as he does under the influence of social, political, professional and other market pressures.

If a doctor seeks to practice preventive medicine through the use of screening procedures he finds himself in a role reversal. Instead of the patient seeking the doctor, the doctor seeks the patient. This he may do directly or indirectly through his organisations, volunteer bodies, or the media. The ethical implication is that when the patient seeks the doctor, the doctor does the best he can, and is not responsible for defects in medical knowledge. If however, the doctor initiates a screening procedure, he should have conclusive evidence that this will benefit an acceptable proportion of those screened and produce no unwarranted anxiety or side effects.

Conclusion

While smallpox, rabies, and cholera are particularly interesting because they demonstrate that only partial understanding of factors influencing disease may lead to highly effective preventive measures, this may not always be the case. Modern day epidemics of chronic non-communicable diseases so far appear to be much more refractory and decisions to organise screening programmes have usually been taken on the basis of inadequate information. This approach runs the very real danger of providing health services which, however well organised they may become, could eventually be shown to be basically ineffective. Screening procedures of proven effectiveness are few in number. □

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NOTICE

The **Reproductive Care Programme** offers to the medical profession of Nova Scotia a free consultation service via toll free telephone communications.

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D. W. Cudmore, M.D.

Psychiatric Sequelae in Kidney Donors

PREDICTION AND MANAGEMENT — A CASE STUDY*

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The zeal with which tissue transplantation has become an accepted method of treatment has focused interest on the psychiatric sequelae that follow this procedure in both donors and recipients. Hyman Muslin[1], using the term "Emotional Transplant", described the process whereby the transplanted kidney finally becomes integrated with the individual's self representations. W. A. Cramond et al[2] documented the criteria used in donor selection and highlighted the psycho-social problems arising in connection with the work of the renal unit. In another paper, Cramond[3] identified the ambivalent dependency that may develop between the recipient and the donor. He indicated that awareness of this interaction will help to establish better criteria for future donor selection. Cramond et al[4] were amongst the first to suggest psychological screening of potential donors in a renal homo transplantation program. In their screening they included psychological assessments and psychiatric interviews. The psychiatric evaluation helps to discover this dynamic relationship between the donor and the recipient and in particular any unconscious motives of a negative kind. On the basis of these tests and interviews, they were able to recommend or reject a potential donor even in the absence of clear-cut psychiatric disorder.

Carl Pollack[5] has pointed out that it is very difficult to draw up "rules and define criteria" for refusal on grounds of psychological unsuitability. In his experience, the psychiatrist has often been called upon to assess the donor who has been identified within the family situation and their work has been to help the family work through the turmoil.

This paper is divided into three parts. *Part I* deals with a description of a young girl who was seen in psychiatric consultation as a potential donor. It decribes the main factors that were taken into consideration in predicting the possible psychiatric sequelae following transplantation in the donor. The management recommended to prevent this possible psychological reaction is outlined. *Part II* deals with the reasons and the theories that make such predictions possible. In *Part III* areas for research are suggested, not only in the field of the psychological aspects of tissue transplantation, but for the field of psychiatry as a whole.

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*This paper was read at the World Congress of Psychiatry held in Mexico City, December 1971.

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PART I

The Donor

M. M., a single 17-year-old girl, was seen in pre-operative psychiatric consultation. She had been investigated along with her parents for an initial medical work-up, and she seemed to be the "best tissue choice" for her 14-year-old brother who was to be the recipient. A "family discussion" had finally led her to "donate her kidney". She was seen to be a simple, rather unsophisticated young girl of average intelligence. She was essentially unassuming, compliant, shy, and self-conscious. She had always been "reserved" and by accounts "well behaved". There was no coercion from the family or "the team" as far as could be determined.

The early history indicated strong elements of sibling rivalry with subsequent repression, denial, and reaction formation as major defense patterns. She indicated that her brother "had gotten away with many things because he had been so ill". At one time there were constant conflicts between herself and her brother, usually over the kinds of things that he would be allowed to do whereas she was not. She had felt during her early years that he was "favored", but later she herself began to recognize "that he was a very sick boy". She was well informed of the limitations of the transplant procedure and recognized in her own way the course his illness might take. She was quietly proud of the fact that she could "do this for him".

There was no evidence of a thinking disorder, a depressive condition, or sociopathy. She did not have any neurotic symptoms. On the basis of this significant background and other details which need not be discussed, the following recommendations seemed reasonable:

(1) There is, at present, no psychiatric contraindication to her being a donor.

(2) The fact that she has defended her sibling rivalry through reaction formation would indicate that the emotional bond between herself and her brother may become stronger.

(3) In the face of "rejection" of the kidney, several possibilities exist. The unconscious hostility will come to surface, repression may fail, guilt and depression are most likely.

(4) This patient has favorable family atmosphere to support her during a crisis.

(5) The emotional condition of the patient, post-operatively, will depend on "the status" of the brother. It will be of importance to explain the same to her in simple terms.

Following the surgery this patient had, what was described by another psychiatrist, "a severe grief reaction". She was observed to be "extremely worried over her brother's condition". He noted that she used "denial and repression". However, when she talked her eyes were "filled with tears". The consultation had resulted because "she cannot void urine and she has to be catheterized, and no urological reason can be found for her problem."

She was seen again a week later for follow-up, and at this time she "flatly refused" a transfer to the psychiatric ward. She was described as being "hostile and uncommunicative". It was recommended that she be treated by a fairly intensive "nursing regime" as far as possible with "the same person".

The events that had led to the above episode had so far not been clarified. Subsequently, I saw her in the Outpatient Clinic for follow-up, and the story behind the psychological dysfunction became painfully and abundantly clear. Here I shall quote directly from my notes to the surgeon.

"I saw a different girl than was described in the previous paragraph. She seemed to be quite bright and cheerful; and though essentially shy and passive, she became more spontaneous as the interview proceeded. Then I invited her to talk to me about the events that had occurred following the surgery. She indicated that in the first week she was in fact 'doing quite well'. Then there were several incidents that had occurred, which are psychologically of great significance in the development of her symptoms including the urinary retention, which could be explained on psychological grounds. About the second week she had heard 'nurses' mentioning that her brother had developed 'an infection'. This had led to worries of 'all kinds' based on what 'the doctors had said'. She indicated that she had heard nurses and others 'talking about rejection of the kidney'. However, at this time she was not sure whether they were referring to her brother's condition. About this time she remembers feeling 'extremely depressed. I wondered why my brother would be rejecting my kidney and what would happen to him. I was afraid that something terrible was going to happen.' She felt extremely 'worried, mixed up, and for a while so awfully depressed that I didn't know what I was saying.' She continued to visit her brother after the first week and waited in 'dread' wondering what the outcome would be. It is, apparently, during this time that she said she developed the retention and had to be catheterized.

She dated her improvement to the time when 'the doctor was able to come and talk to me and tell me about my brother and when they informed me that he was all right and that he was going to progress and when I saw him improving myself, I guess that helped me a lot and I began to feel well again.'"

This patient's perceptiveness of the potential danger her brother was undergoing was not a delusion. It was real. There was "a great fear that he was rejecting the kidney" and it is quite possible that she may have heard what she has so vividly described. Through non-verbal communication, many prevailing affects were communicated to her and she believed the worst.

PART II

(A) The Psychodynamic Principles Behind the Predictions

The term personality has been used in different ways by different authors. In their introduction on personality, Freedman and Kaplan[6], state that the most widely accepted definition refers to the individual's characteristic behaviour with his environment. They indicate that the theoretical models of personality organization "facilitate the understanding, prediction, and eventual therapeutic control of the human behaviour". Similarly the psychodynamic theory explains the various classical personality disorders on the basis of a constellation of certain ego defense operations that are more or less regularly set into action when there is exposure to stressful situations. The phenomena of fixation, return of the repressed, and regression explain the neurotic crystallization under such conditions.

Prediction No. 1 is fairly straightforward. As indicated, there was no suggestion of depression, a thought disturbance, or a history of antisocial behaviour. She was of average intelligence and her past history did not point to a neurotic adjustment. In our opinion, there was no psychiatric contraindication to her being a donor.

The aspect of sibling rivalry was perhaps the most crucial factor that gave us an opportunity to recognize her defense patterns and the dynamic relationship between herself and her brother. One can postulate that at an unconscious level she hated her brother and perhaps had considerable hostility towards her parents for "favoring him". However, again in dynamic terms this was defended by reaction formation, through the prohibitions of the external significant persons who would cease to love her unless she acquired their 'over-protective' attitude herself. It is through these defenses then that she resolves her anger and hostility to her brother, and at the same time gains acceptance within the family.

In her early years when her brother was eight years old and found to have "kidney disease", she could not have fully grasped the implications of his illness save that he was "favoured"; but as she grew older and existentially experienced the visits the family made to the doctor on his behalf, the despair and turmoil of her parents, the feelings of hostility and sibling rivalry must have caused considerable guilt leading to repression and the defense of reaction formation became entrenched more firmly.

It is the understanding of this dynamic relationship that leads us to "predict" that the emotional bond between the

donor and her brother may become stronger. Other writers have reported similar emotional closeness between the donor and the recipient, a fear of closeness, and in a recent paper Schowalter[7] describes "the creation of surgical siblings".

Kurt Wolff[8] has shown in his work with geriatric patients that when facing aging problems, these patients show an accentuation of life-long personality defenses. In our experience this is reasonably characteristic of younger persons as well. In our donor these features are clearly observed. The prediction is both clinically sound and in keeping with dynamic theory.

If and when "stress" were to occur post-operatively by way of the brother developing "infection" or "rejection", the defense of reaction formation may undergo a profound change because of the symbolic psychological implications of these complications to the donor. As in this patient, "I could not understand why my brother would reject my kidney." It is almost as though her unconscious hostility has determined this complication. Under the experience of this crisis, reaction formation as a defense is threatened, but the symbolic implication is unacceptable because of the underlying emotional affect that has undergone repression. However, guilt and depression are most likely to ensue and would be in keeping with the premorbid pattern; namely, that of the super ego having guided her all her life. In dynamic terms, through the process of identification with her brother, the unconscious hostility would still remain defended. However, this defense of identification would considerably influence the clinical picture with a "catastrophical reaction" as elaborated by Kurt Wolff.[8]

The patient's age, her rural background, the time the assessment was done (24 hours before surgery), and her spontaneity as the interview proceeded did not suggest a schizoid break to be likely.

The patient's post-operative emotional condition was predicted to depend on her brother's post-operative "status" on the basis of the explanations that have been elaborated earlier. It was with the full recognition of these postulates that it was suggested that the patient be informed of her brother's condition in simple terms.

(B) Post-Operative Reaction

The question may be asked if one might have predicted the urinary retention. Somatization as a defense did not come through to us during our evaluation. We do not feel that this kind of specific prediction is possible at this stage. However, retrospectively it demonstrated the identification with her brother through symptoms suggestive of kidney pathology. It expresses, on the one hand, her dread of his "rejection", and her unconscious hostility, on the other. It also symbolically expresses her altruistic sacrifice which may be expressed as "look what I have gone through for you". It also draws some attention to herself. John P. Kemph[9] has observed that the experiences of loss are felt by donors to a much greater extent. He also states that the recipient, unlike the donor, is under constant medical surveillance. In his opinion the donor requires more psychiatric attention than the recipient. In another paper[10], he explains the post-operative mourning in donors. In this patient the impending "rejection" makes the sacrifice of a vital organ futile, hence the depression is so profound and accompanied by "uncommunicativeness and hostility". Her "flat refusal" to be transferred to a psychiatric ward may be seen at an ego level to represent her need to be in close proximity to her brother and await information about the improvement in his condition, which by her own account finally produced a remission in her depression.

It may be speculated that her hostility and anger were particularly directed towards the Renal Unit staff for not communicating to her what actually was transpiring in her brother's condition. She hoped that they would let her know, as she herself has verbalized: 'I don't think it was entirely their fault, because all I had to do was to ask them a few questions. But I guess I was too afraid to ask.' This anger was all the more acute because according to her 'I felt that since I was a donor and was giving the kidney to my brother, that in a sense I was entitled to know how my brother was doing.'

There were several levels of transactions involved in this patient's psychiatric decompensation which cannot be elaborated here. We have focused on those that have a bearing on the present study. The suggested psychiatric management following her depression would seem to indicate that a concerned nurse involved in intensive care on a one to one basis may figure prominently in the management of such decompensations.

PART III

Avenues for Further Research

We have been engaged in screening both donors and recipients from a psychological point of view, primarily through psychiatric interviews. A clear understanding of the dynamic relationship between the donor and the recipient is sought. The coping mechanisms of the ego and its defenses are particularly important. We are involved in predicting possible psychiatric sequelae in both donors and recipients, based on psychodynamic and personality theories. We also recommend measures that may be prophylactic in preventing this predicted outcome in the face of "stress" encountered by the recipient and/or the donor.

The psychiatrist can be a significant member of a transplant team. His special skill, knowledge, and intuitiveness should enable him to make some predictions regarding psychiatric sequelae based on dynamic theories of personality and defense mechanisms employed to alleviate stresses.

These predictions test psychodynamic principles. They can be used to help donor/recipient prepare for surgery. They help to clarify preventive measures to avert post-

surgical psychological reactions. When such predictions do not occur, other individual, social, and familial factors that help the patient should be identified. □

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(4) Judy MacKenzie, R.N., P.H.N., Charge Nurse in Kidney Transplant Clinic, Victoria General Hospital, Halifax, N.S.

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Physician Self-Assessment

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The following questions have been submitted by the Division of Continuing Medical Education, Dalhousie University, and are reprinted from The American College of Physicians **Medical Knowledge Self-Assessment Test No. 1** with the permission of Dr. E. C. Rosenow, Executive Vice-President.

It is our hope that stimulated by these small samplings of self-assessment presented you will wish to purchase a full programme.

DIRECTIONS: Each of the questions or incomplete statements below is followed by five suggested answers or completions. Select the ONE that is BEST in each case.

6. A 25-year-old man has copious hemoptysis. There is no history of recent respiratory infection, chest pain, or chronic cough.

   With respect to this clinical picture, which of the following statements would apply?

   (a) If bronchoscopy is normal, bronchography should be performed
   (b) If other findings and the clinical setting indicate a diagnosis of pulmonary infarction, anticoagulation may be contraindicated because of hemoptysis
   (c) Idiopathic pulmonary hemosiderosis can probably be excluded if the red blood cells are normochromic
   (d) If other findings confirm a diagnosis of mitral stenosis, anticoagulation is indicated because of the recognized high incidence of pulmonary thromboembolic problems in patients with mitral valvular disease
   (e) None of the above

(Please turn to page 154 for answers) □

Secretory Otitis Media

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Several terms have been used for this disorder in an efffort to describe either the condition or its etiology. However in spite of the advances made in the field of Otology the problem of recurrent middle ear effusion still remains unsolved.

Two thousand, three hundred and ninety two myringotomies were performed in the Province of Nova Scotia during the year 1973. Of these one thousand, two hundred and forty six utilized ventilation tubes. This short article is to discuss the problem for the family physician who usually first sees and treats the patient and sometimes sees the patient in follow-up after surgery.

Adam Politzer first described a condition he called Otitis Media Catarrhalis in 1869. He recognized the secretory and the adhesive form of the condition. The therapy he advocated consisted of air insufflation and paracentesis of the middle ear. The principle of equalisation of pressure on both sides of the tympanic membrane by ventilation and drainage remain basic in the management of the middle ear effusion. Beverly Armstrong in 1954 introduced us to the most practical surgical adjunct; the indwelling polyethylene tube for ventilation of the middle ear.

Senturia described the middle ear effusions as serous, mucopurulent and purulent. The purulent variety will not be discussed. Idiopathic blue drum is included and briefly discussed.

Serous Fluid: The pale yellow coloured fluid with a low viscosity and free of bacteria.

Mucoid Fluid: The cloudy, whitish or dirty grey translucent sterile fluid having a rubbery consistency and described as "glue" ear.

Mucopurulent Fluid: Not much different from the mucoid variety but microscopically showing viable bacteria.

Idiopathic hemotympanum: The bluish appearing tympanic membrane with chronic refractory secretory otitis or cholesterol granuloma.

Equalisation of air pressure in the middle ear in the normal state is accomplished through a patent Eustachian tube. This tube is about 17 to 18 mm. in length and horizontal at birth, growing to a length of 35 to 36 mm. in the adult, becoming angled at its bony and cartilaginous junction. The medial two thirds is the cartilaginous portion and the lateral one third is the shorter bony portion. The junction or the isthmus of the two segments is very narrow. Two muscles, the Tensor and the Levator Palati control the opening of the fibro-cartilaginous part of the tube. It is however possible that only the tensor muscle plays a major role in opening the tube. The mucosa of the lumen is covered with pseudostratified ciliated columnar epithelium continuous with the nasopharynx. Goblet cells are present in the surface mucosa.

The middle ear is a closed space connected with the Eustachian tube at its medial end. The ciliated cells extend into the middle ear from the Eustachian tube and evacuates any foreign material in the middle ear towards the nasopharynx.

Normally the Eustachian tube is closed and opens only with swallowing or yawning to equalise the middle ear pressure. When there is an obstruction in the tube it gets locked and will not open without an increasing effort. Failure of pressure equalisation results in absorption of the gases in the closed rigid cavity which cannot collapse. Since nature does not tolerate a vacuum, there is transudation of fluid and often rupture of blood vessels with blood in the middle ear. This fluid is usually sterile and results from pure mechanical obstruction or barotrauma. If the cause is inflammatory secondary to an infection, then there is bacterial contamination resulting in a purulent otitis media and possible rupture of the tympanic membrane.

CAUSES OF MIDDLE EAR EFFUSIONS

These can be either mechanical or Inflammatory.

Adenoid Hypertrophy

This may cause either a direct obstruction of the Eustachian tube opening or of the lymphatics draining the middle ear and Eustachian tube. The former is rarely seen while the latter is probably of greater importance. Chronic adenoiditis with enlarged adenoids provides a focus of infection adjacent to the Eustachian tube opening. In one controlled study there was a 40% recurrence rate of middle ear fluid when adenoids were not removed. However only 3 percent had a recurrence when an adenoidectomy was performed.

Cleft Palate

Cleft palate definitely increases the incidence of middle ear effusion. The incidence reported is as high as 80 percent in infants, 60 percent in children and about 40 percent in adolescents. Atelectatic ear and purulent otitis is more common in adults with cleft palate. The cause of the recurrence of the fluid in the middle ear is believed to be secondary to muscular dysfunction of the tensor palati and probably the levator.

Tumors

Nasopharyngeal tumor results in obstruction of the tubal orifice and also lymphatic obstruction. A unilateral serous effusion in an adult should caution one to search for a nasopharyngeal carcinoma.

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Barotrauma

Sudden change of pressure especially on rapid descent in an airplane or into deep water, locks the Eustachian tube owing to occlusion by suction. This is due to the increased extratympanic pressure. The latter is a common problem seen during summer in scuba divers. This sport in my view should not be taken lightly and thorough instructions should be given on the methods of equalisation of pressure and also an ear, nose and throat examination to rule out the possibility of an Eustachian dysfunction. This topic will be discussed more thoroughly in another article.

Nasal Obstruction

Hypertrophy of the nasal turbinates or a nasal septal deformity may in itself not produce a recurrent effusion. However if present in association with chronic infection these may act as contributing factors.

Improper Control of Inflammatory Disease

The middle ear effusion is usually sterile in secretory otitis media. Antibiotics are not usually required for the treatment of this condition. Bacterial growth may be found in the mucopurulent form of fluid and inadequate antibiotic therapy may result in a lingering low grade infection in the middle ear.

Allergy

Dust and food allergy definitely plays a part in the recurrent effusion in the middle ear. There is generalised mucosal reaction with increased mucus production.

Iatrogenic Factors

These include inadequate antibiotic coverage resulting in a low grade lingering exudate. Radiation therapy to the head results in a serous type of effusion probably due to disturbed lymphatic drainage of the nasopharynx. Adenoidectomy may cause permanent scarring of the torus resulting in disturbed Eustachian function.

Clinically the condition is more common in children. The history is usually one of recurrent colds, ear aches and repeated antibiotic therapy. The majority of the children seen are first diagnosed at the school screening test. The parents are either not aware of a hearing loss or get the impression that the child is becoming obstinate and "does not want to hear". Some parents observe that the child asks them to repeat very often and that it wants the television turned on louder. Teachers usually complain that the child is not paying attention in the class.

The adults usually present with a clear cut history of hearing loss, plugged feeling in the ear or in milder cases, a sensation of popping or cracking is noted.

PHYSICAL EXAMINATION

A good history and a complete ears, nose and throat examination is essential, as the etiological factors are present in this area. These factors are mentioned above and should be looked for.

The tympanic membrane changes are very suggestive of either fluid in the middle ear or Eustachian tube dysfunction. The loss of translucency and the amber or yellow colour of the tympanic membrane is highly suggestive of an effusion. A very typical but often ignored sign is the chalky appearance of the handle of the malleus. The handle also appears shortened due to retraction. There may be a deep pocket in the pars flaccida with prominence of the short process of the malleus. Fluid levels or bubbles as described in books are seen only when positive pressure is applied in serous effusion. The blue or purple drum is seen in cases of hemotympanum secondary to trauma or fracture of temporal bone, leukemic deposits or in vascular tumors. The classical blue drum is seen in "idiopathic hemotympanum".

Tuning forks are still the most reliable, easily available and less time consuming when used in a proper and routine manner. A conductive loss can be easily diagnosed with a negative Rinne test with a 512 c.p.s. fork. The Weber test is lateralised to the ear with greater conductive loss in bilateral involvement. In cases with a mild conductive loss the bone conduction is prolonged compared to the examiners; presuming that the latter's hearing is normal.

Audiogram for pure tone and speech is useful in diagnosis of difficult cases and also for a record of progress. This usually shows a flat type of conductive loss or a conductive pattern in the low frequencies.

Tympanometry a is very simple test which is extremely helpful in diagnosing the middle ear or Eustachian tube malfunction. In smaller children or the ones more difficult to test this test can easily be performed and gives the information regarding mobility of the drum, function of the tube and the condition of the middle ear ossicles.

MANAGEMENT

The Management includes medical and surgical therapy.

MEDICAL

Serous otitis when secondary to upper respiratory infection is probably best treated by oral decongestants with the possible shrinking effect on the mucosa of Eustachian tube, nasal sinuses and the nose. Following this politzerisation and auto inflation should be done to "unlock" the tube. Valsalva's manoeuvre is the most commonly used. However this is not physiological and the others like Toynbee's or Frenzels' method must be advocated. In the former the patient is asked to hold the nose and swallow while the mouth is closed and in the latter the patient swallows with the nose pinched and mouth open. This last method is found to be the most effective in my experience.

Antibiotics are useful in the mucopurulent form of the disease. Oral decongestants should be added to help clear the passage and hasten early clearance. Politzerisation should be done once the condition subsides so that any retraction of the tympanic membrane can be corrected. Inadequate antibiotic coverage and failure to follow the patient invariably results in the recurrence of the disease or a resultant "glue" ear where

the consistency of the fluid becomes thick. Once this occurs then surgical management is required.

Allergy work-up is necessary in those patients who have findings of allergic rhinitis or sinusitis or those who have a strong personal or family history of allergy. Food allergy is difficult to test but should be included as it is quite commonly responsible for recurrent otitis.

SURGICAL

The overall management includes proper diagnosis of the cause and its treatment. Hypertrophic adenoids should be removed. Tonsillectomy is not always needed, unless there are clear cut indications for it. Adenotonsillectomy in a known allergic patient may exacerbate the allergic state. Children with cleft palate need special caution and a total adenoidectomy is contraindicated. However in some cases lateral lymphoid tissue can be removed without touching the midline mass.

In adults a unilateral serous otitis is the first sign of a nasopharyngeal carcinoma and this should always be kept in mind.

Evacuation of the fluid from the middle ear is carried out by either aspiration of thin fluid or a myringotomy. These procedures should be done under magnification. When a microscope is not available a headlight and x6 eye loop gives satisfactory magnification.

General anesthesia is required in children and some adults. Local anesthesia in the form of 0.5cc of one or two percent Xylocaine infiltrated under the skin of the posterior bony canal wall is excellent for the majority of the adult patients.

A sterile technique without the use of routine skin preparation is found to be quite satisfactory.

Myringotomy with evacuation of fluid may not be enough in cases where fluid is thick or where recurrence has occurred. Only in cases where diagnostic myringotomy is done and no fluid found is a tube not inserted. Insertion of a ventilation tube helps in preventing early recurrence. Various forms and sizes of tubes are available. A Polyethylene tube is most commonly used at the Children's Hospital in Halifax, with satisfactory results. The tube is inserted for ventilation and not for drainage.

The site of the myringotomy incision varies for a given case. Postero-superior myringotomy and one at the umbo should be avoided as there is danger of injury to the ossicles in the former and to the promontory in the latter. An incision should be made in the direction of the radial middle layer. Anterior superior myringotomies with insertion of tube seems to produce a better result in the long run and the tube stays in longer. When there is thick mucus a "beer can" principle may be used by doing an anterior and posterior myringotomy thereby allowing air to enter from one incision and facilitating removal of the fluid from the other.

Complications and follow-up

The complications include ossicular injury or injury to the promontory.

Drainage of purulent material following a myringotomy should be appropriately treated with local antibiotic drops and if needed, systemic antibiotics. If discharge persists then the tube must be removed.

The tube is left in place usually from three to six months. Sometimes as in cases of cleft palate they are left in till spontaneously extruded. If fluid recurs then a fresh myringotomy with tube is needed. The parents must be advised to keep the ears dry. This becomes a problem in summer months when children go swimming. Ordinary plugs do not prevent water from going in the ear. Custom made ear plugs are needed and prescribed if the child is allowed in the water.

Follow-up at regular intervals is essential in the total management. The tubes occasionally extrude and fluid recurs with hearing loss. Sometimes the tubes are plugged with inspissated secretion. These need not be replaced unless there is reformation of fluid.

Granulations or cholesteatoma may develop around the margins of the incision. The latter can usually be avoided by taking care not to invert the edges of the incision while inserting the tube. Granulations should be treated with a combination of an antibiotic with cortisone drops. If there is no improvement then the tube should be removed.

In very refractory cases two tubes may be inserted, one anterior and the other posterior or the tube clipped to the handle of the malleus. Occasionally a longer tube has been inserted through a tympanotomy incision after thorough evacuation of fluid from the middle ear.

SUMMARY

The causes, diagnosis and management of secretory otitis media have been briefly discussed with a view to help the family physician in the recognition and treatment of these cases. □

COMING MEETING

"The Traffic Injury Research Foundation of Canada (TIRF) is pleased to announce that for the first time the American Association for Automotive Medicine will meet outside United States at the Holiday Inn (Downtown) Toronto on September 12 through 14, 1974.

A wide range of subjects will be considered including restraint considerations, injury scales, injury investigations, accident investigation, and optical hazards relating to motorcycles and snowmobiles.

Information concerning attendance may be obtained by writing Dr. A. F. W. Peart, Traffic Injury Research Foundation of Canada, 74 Stanley Avenue, Ottawa, Ontario, Canada, K1M 1P4."

Antenatal Detection of Genetic Disorders

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An Antenatal Genetic Clinic is currently being established at the Grace Maternity Hospital. THE primary purpose of the clinic is to offer prenatal diagnosis for couples with a significant risk of having a child with severe genetic disease. Patients would be assessed by a team including an obstetrician and a geneticist on a referral basis. A biochemist neonatologist or other specialized resource person will join the team as appropriate.

Ideally, both parents would attend the clinic prior to 16 weeks gestation in order to determine whether amniocentesis is appropriate. The optimal time to obtain amniotic fluid, both with respect to obstetrical and tissue considerations is 16 weeks gestation. The patient would then return to the care of her attending physician. Results of chromosome analysis are usually available in 14-21 days and a somewhat longer time period is required for biochemical determinations.

The following paper is presented as a guide and source of background information for physicians who may wish to take advantage of this new facility.

The antenatal detection of genetic disorders has become an area of increasing importance during the past few years. There is no doubt that genetically determined disease is now an important cause for hospital admission, particularly to a pediatric hospital. About 7% of these admissions are for single gene defects, 0.4% for chromosome anomalies, another 18.5% for congenital malformation, 3.8% for polygenic diseases, and 6.7% are classified as "unknown" but probably genetic in origin to some degree.. The acceptance of transabdominal amniocentesis as a safe technique, advances in tissue culture technique, micromethods for biochemical assays and improvement in the methods for chromosomal analysis have all contributed to the rapid advances in this field.

The rapid advances in antenatal diagnosis reflect several steps in scientific advancement. In 1966, Steele and Breg[2] successfully cultured amniotic fluid cells. Successful cultures then opened the way to cytogenetic and biochemical studies of the fetus, and in 1968, the first diagnosis of Down's syndrome *in utero* was reported by Valenti.[3] In the same year, Nadler[4] was the first to diagnose an inborn error of metabolism (galactosemia) in a fetus by demonstrating the absence of normal activity of galactose-1 phosphate uridyl transferase in cultured amniotic fluid cells.

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INDICATIONS FOR AMNIOCENTESIS

The following recommendations are based on the report of a joint committee of the Canadian Genetics Society, the Society of Obstetricians and Gynecologists of Canada, and the Canadian Pediatric Society.

1. Maternal Age

The risk of Down's syndrome (Trisomy 21) increases from about 1:2000 live births at a maternal age of twenty to about 1:300 at thirty-five and 1:100 at age forty. Above a maternal age of forty-five, the risk is about 1:40. It is recommended that amniocentesis should be offered to all mothers aged over forty, irrespective of the number or outcome of previous pregnancies, unless there are definite medical or obstetric contra-indications. It is recommended that amniocentesis should neither be offered nor recommended to mothers aged under thirty-five if age is the only consideration. In our present state of knowledge, there is an area between ages thirty-five and thirty-nine where maternal anxiety tends to be high. In these cases, amniocentesis should be discussed with the parents and each case should be treated individually.

2. Parental Chromosome Abnormality

Amniocentesis is recommended where either parent is carrying a chromosome abnormality, irrespective of whether this is a balanced chromosome rearrangement or mosaicism. When mosaicism is confined to somatic tissues, there is no increase in risk to the subsequent children. However, since it is impossible to rule out gonadal mosaicism, amniocentesis should be offered in all cases.

3. Previous Trisomy

Where a previous pregnancy has terminated in a conceptus with trisomy, subsequent pregnancies should be monitored by amniocentesis, irrespective of whether the trisomic conceptus was a live birth, stillbirth, or spontaneous abortion. At present there is evidence that where a previous pregnancy terminated in a Down's syndrome live birth, there is an increased risk of recurrence in subsequent pregnancies. This risk is probably of the order of 1-2%. There are at present few data on the recurrence risks when a previous conceptus was trisomic for a chromosome other than 21. Until more data become available, subsequent pregnancies should be monitored by amniocentesis.

4. Biochemical Disease

Amniocentesis is recommended for autosomal or X-linked recessive conditions only when the condition can be detected *in utero* and has a high probability of resulting in severe disease, congenital malformation, or severe mental retardation. In general, in the case of an autosomal recessive condition, if there is evidence that both parents are, or have a very high probability of being heterozygotes, the risk of

affected children approximates 25%. In the case of an X-linked recessive, if there is evidence that the mother has a high risk of being a heterozygote, 50% of male children are likely to be affected.

The following disorders have been diagnosed *in utero* using cultured cells.[5]

Acid phosphatase deficiency (lysosomal acid phosphatase deficiency)
Fabry's disease (diffuse angiokeratoma)
Generalized gangliosidosis (GM_1 gangliosidosis type 1)
Tay-Sachs disease (GM_2 gangliosidosis type 1)
Gaucher's disease
Pompe's disease (glycogen storage disease type 2)
Lesch-Nyhan syndrome (hypoxanthine-guanine phosphoribosyl transferase deficiency)
Krabbe's disease (globoid cell leucodystrophy or galactosyl ceramide lipidosis)
Matachromatic leucodystrophy
Hunter's syndrome (mucopolysaccharidosis type 2)
Niemann-Pick disease (classical type A only)
Proprionicacidaemia

Other Conditions Potentially Diagnosable in Utero

Acatalasaemia
Adrenogenital syndrome
Ceramide lactoside lipidosis
Chediak-Higashi syndrome
Citrullinaemia
Congenital erythropoietic porphyria
Glycogen storage disease type 1
Glycogen storage disease type 5
I-cell disease
Hyperlysinaemia
San filippo syndrome (mucopolysaccharidoiss type 3)
Morquio's syndrome (mucopolysaccharidosis type 4)
Scheie's syndrome (mucopolysaccharidosis type 5)
Maroteaux-Lamy syndrome (mucopolysaccharidosis type 6)
Pyruvate decarboxylase deficiency
Wolman's disease

5. X-Linked Conditions in Which the Disease is Not Detectable in Utero

In the case of an X-linked condition, leading to severe disease, congenital malformation or retardation, in which it is at present not possible to determine whether the fetus is affected, it is considered that amniocentesis may be justified in order to determine the sex of the fetus. Under these circumstances, when the mother is known to be a heterozygote, male fetuses have a 50% chance of being affected and could be aborted should the parents so elect. In the case of certain severe diseases such as Duchenne muscular dystrophy, there may be instances in which, due to lack of certainty that the mother herself is heterozygous, the statistical risk to her male children is lower. Such cases need to be evaluated individually and amniocentesis offered if the request is felt to be reasonable by the genetic/obstetric team.

6. Open Neural Tube Defects (Anencephaly, Meningomyelocele)

Recent evidence strongly suggests that the level of alpha-fetoprotein in the amniotic fluid between 14 and 20 weeks gestation is markedly elevated in the presence of anencephaly and meningomyelocele *in utero*. Estimation of alpha-fetoprotein levels in amniotic fluid plus ultrasonography will likely become a standard diagnostic approach in this area in the near future. Since there is a significant risk of recurrence of a similar defect in a subsequent pregnancy (5%), we recommend that amniocentesis be offered to patients who have a history of a child with a neural tube defect in a previous pregnancy.

7. Anxiety

There may be cases in which the family and/or obstetric history, in conjunction with severe maternal anxiety, may justify amniocentesis. These instances must be carefully evaluated on an individual basis.

POTENTIAL PROBLEMS RELATED TO THE PROCEDURE

The risks of transabdominal amniocentesis early in pregnancy may be divided into those affecting the fetus and those affecting the mother. Major maternal risks include bleeding, infection and blood group sensitization. All three are rare complications, but because of possibility of sensitization, Bowman recommends all unimmunized Rh negative women subjected to amniocentesis should be given one prophylactic dose of Rh immune globulin.[6] The fetal risks include abortion, direct fetal injury and induced malformation. At the present time, the most important obstetrical risk seems to be that of spontaneous abortion. Current figures for the risk of spontaneous abortion following genetic amniocentesis approximates 1%.

We are currently participating in a study sponsored by the Medical Research Council of Canada in order to evaluate the potential hazards of this procedure. Information obtained as part of the survey includes a detailed family and obstetrical history as well as a follow-up regarding the labor and delivery and examination of the new born.

It is recognized that the procedure itself, as well as the waiting period required to obtain test results, may be a source of parental anxiety. Every attempt is made to insure that couples are fully aware of the possible hazards and limitations of the test. A copy of the Informed Consent and Release statement was published in a previous issue of the Nova Scotia Medical Bulletin.[7] The probability of misinterpretation of test results is considered to be very small. However, it is important that patients are aware that abnormalities of development may occur for many reasons, only one of which is being checked by the amniocentesis.

Current Canadian legislation governing abortions does not allow for termination due to fetal abnormality, genetic or otherwise. However, the emotional disturbance for parents with the knowledge of an affected offspring is usually sufficient for consideration of termination.

COMMENTS

The future for intra-uterine detection of genetic disorders is extremely bright. Many potentially fruitful approaches are possible which may increase the number of disorders detectable. Future studies may involve direct skin biopsies and blood sampling from the fetus.[8] Direct visualization of the fetus has been accomplished by using a fine endoscope.[9] This method, termed fetoscopy, would provide an optimal approach for detection of common congenital malformations. At present, this approach has been applied prior to therapeutic abortions and the risks of the procedure remain unknown. For the present, this must be regarded as a strictly experimental procedure.

For couples who are carriers of genetic disorders, amniocentesis has completely altered the prospects of having normal children. Couples who would not otherwise take the risk of having a second affected child can now be reassured in subsequent pregnancies. We feel the medical profession is obliged to make the public aware of the availability of antenatal genetic diagnosis so all will benefit, not only the few that are sufficiently educated, informed and motivated to seek assistance in situations of significant risk.

SUMMARY OF CURRENT CLINIC PROCEDURE FOR PRENATAL DIAGNOSIS

1. Referral from attending physician when pregnancy is confirmed or prior to 16 weeks gestation.
2. Assessment of appropriateness of prenatal testing: this may involve chromosomal or biochemical analysis of affected family members, etc., as well as counselling of both parents. The patient's Rh blood group would also be determined if this information is not already available.
3. If amniocentesis is appropriate, placental localization by ultrasound is carried out prior to the amniotic tap. Both procedures are usually done on an outpatient basis. Hospitalization is not required, but we recommend that out-of-town patients do not travel until the following day.
4. Test results are forwarded to the patient and her physician in 2-3 weeks for chromosomal results (a somewhat longer time is usually required for biochemical analyses).
5. If an abnormal fetus is detected, pregnancy termination would be offered immediately. If the pregnancy is continued, a follow-up report on the baby is requested at the time of delivery.
6. It should be emphasized that the clinic functions primarily in a diagnostic role and responsibility for the routine prenatal care, as well as delivery and follow-up, would remain with the attending physician. However, we feel that at the present time, all genetic amniocentesis should be arranged by contacting the Antenatal Genetic Clinic at the Grace Maternity Hospital, 422-6501.

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Rh Haemolytic Disease of the Newborn

A FOLLOW-UP STUDY

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The purpose of this study was to follow up children who had been born with Rh haemolytic disease, and whose cases had been managed by the Rh Committee (Grace Maternity Hospital) during the antenatal period. The study was mainly concerned with the evaluation of the hearing of the children. Also assessed were general physical growth and development, co-ordination, and school progress. In the children over four years of age, vision was also tested.

Materials

The study included all Rh positive chidlren over one year of age who were Coombs positive at birth. The mothers, (Rh negative) had been referred to the Rh Committee for management during that pregnancy. The children were delivered in, and still reside in the Halifax-Dartmouth area. Twenty-one children ranging in age from one year three months to ten years two months, were contacted and included in the study.

The severity of Rh disease varied. Four children had had intrauterine transfusions. Using the Rh baby classification: one baby was mildly affected, not requiring exchange transfusions; sixteen babies were moderately affected with a cord haemoglobin greater than 10 gm% and required a delayed exchange transfusion for hyperbilirubinemia; four babies were severely affected with a cord haemoglobin of 10 gm% or less and required an immediate exchange.

Methods

Hospital records were searched for information regarding the prenatal care of the mother, the birth process (gestational age, weight, haemoglobin, bilirubin, presence of asphyxia neonatorum) and the neonatal progress (highest total and indirect bilirubin, lowest blood glucose, number of exchange and direct transfusions and drugs administered).

Due to the wide range in ages of the children, they were divided into two age groups for audiological assessment. Audiometric testing of the nine youngsters, four years old and under, was performed by an audiologist using either behavioral observation audiometry or "play" audiometry. The audiometric screening utilized either narrow band or puretone auditory stimuli 250 through 4,000 c.p.s. issued at 20 dB, H.L. (re ISO for puretone testing re 15 dB, S.P.L. for sound field testing).

The 12 children over four years of age were assessed by the Verbal Auditory Screening for Children test (VASC) or puretone audiometry. The VASC test was conducted by presenting phonetically balanced words varying in frequency from 250 to 6,000 c.p.s. through ear phones at intensities decreasing from 51 dB to 15 dB. In the puretone audiometry, puretones of specific frequencies (500 through 6,000 c.p.s.) were presented through earphones at an intensity of 20 dB.

In addition, this group of 12 older children were screened for visual acuity and evidence of strabismus.

Children under six years of age were assessed by means of the Denver Developmental Screening Test.[1] This tests development in gross motor, fine motor, language and personal-social areas. The co-ordination of children over six years of age was evaluated by observing the gait, heel-toe walk and hopping. Other tests used were the "finger-nose" test, "knee-heel" test and rapidly alternating movements.

School progress was evaluated by recording grades completed and failed, and also by difficult or easy subjects as reported by both the mother and child. The Wide Range Achievement Test[2] (W.R.A.T.) was administered to all children over six years of age, and is used as a method of measuring the basic school subjects of reading, writing, spelling, and arithmetic.

General behavioral chacteristics of all children were assessed by observation and by interview with the mother. The children's weight and height were plotted on the Boston Anthropometric Chart[3] to obtain their growth percentile, and important developmental milestones were plotted on a Denver Development Screening Chart.

Results

All of the children four years of age and under passed the audiometric screening. This would indicate adequate hearing sensitivity for normal development of speech and language at this time. All of the children over four years of age assessed by means of the "Verbal Auditory Screening for Children "test, passed, and can therefore be considered to be able to hear and understand speech offered at the level of a soft whisper. Of the four older children tested by means of a puretone audiogram, there were two failures. One child (No. 15) could not hear the tone of 500 c.p.s. presented at 20 dB. to his right ear, but otherwise his hearing was normal. The other child (No. 13) showed a bilateral high frequency sensori-neural hearing loss of approximately 60 dB, characteristic of deafness due to hyperbilirubinemia. Of the twelve older children whose vision was tested, four were found to have strabismus. The visual acuity in all cases was normal.

The childhood milestones were normal in all but two of the twenty-one children. One of these children (fourteen) is thought to be retarded, with an IQ of approximately sixty, as estimated by his paediatrician. Now, at the age of four years three months, he shows a Denver Development level of two and one half years of age. The child who was found to have the

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high frequency hearing loss was naturally slow in his language development. It was also found that he was delayed in gross motor development (sitting alone, walking) and fine motor development (using spoons, tying shoes). This some child now at the age of seven years seven months, has difficulty tying his shoes, climbing stairs and catching balls. He showed past pointing and was poor at rapid alternating movements.

All of the children over six years of age had a normal standard score (100 = 15) on the Wide Range Achievement Test. They also exhibited satisfactory school progress.

With regards to general behavioral characteristics, it was found that for three of the twenty-one children (No. 1, No. 13, No. 14) tranquilizers had been prescribed for hyperactivity.

TABLE OF CONCLUSIONS

CHILD	No. 1	No. 13	No. 14	No. 15	No. 19	No. 20
Abnormality	1. Hyperactivity	1. Hyperactivity 2. High Frequency Hearing Loss 3. Strabismus 4. Uncoordination	1. Hyperactivity 2. Moderately Retarded 3. Strabismus	1. Hearing Loss at 500 C.P.S.	1. Strabismus 2. Lisp	1. Strabismus
Age on June 1, 1973	3 yrs. 4 mos.	7 yrs. 7 mos.	4 yrs. 3 mos.	10 yrs. 1 mo.	7 yrs. 11 mos.	7 yrs. 0 mos.
#IUT/#Exchange Trans./#Direct Transfusions	3/10/0	0/5/2	0/4/2	0/3/0	0/2/0	0/1/0
Gestational Age	32/wks.	34/wks.	34 wks.	36 wks.	37 wks.	34 wks.
Birth Weight	2845 Kg.	2480 Kg.	2345 Kg.	2890 Kg.	3090 Kg.	1955 Kg.
Highest Bilirubin Total/Indirect	26.7/23.9	28.5/27.4	22.0/20.2	23.2/21.1	17.6/15.9	21.6/19.9
Time Bilirubin Over 20mgm.% Total/Indirect	19hrs/12hrs.	18hrs/14hrs.	6hrs/1hr.	2hrs/1hr.	0/0	12hr/0hr.
Birth Hg (gm%) Lowest Hg (gm%)	12.5gm% 8.7gm%	9.0gm% 7.7gm%	5.0gm% 5.0gm%	17.0gm% 12.0gm%	14.0gm% 12.5gm%	15.3gm% 11.3gm%
Lowest Blood Glucose (mgm%)	34 mgm%	not done	10 mgm%	not done	not done	60 mgm%
Asphyxia Neonatorum	Moderate	Severe	Severe	No	No	No
Neonatal Drugs	1. Ampicillin 40mgm.q6h x 3 days 2. Polymyxin B .8mgm.q6h x 5 days	1. Phenobarbital 8mgm.q4hx2days (Im) 2. Kanamycin 18mgm.q12h x 1.15mgm.q6h	1. Chloramphenicol 58mgm. IM/day x 10 days 2. Polymyxin B 1.15mgm.q6h x 9 days 3. Kanamycin 17mgm.q12h x 9 days	No	No	1. Chloromycetin 25mgm.q12h x 4 days
Neonatal Diseases	1. Rh disease 2. Prematurity 3. Underweight 4. Asphyxia 5. R.D.S. 6. Hypoglycemia	1. Rh disease 2. Prematurity 3. Underweight 4. Asphyxia 5. R.D.S. 6. Evidence of Kernicterus (Tremors, Twitching, High pitched cry, Rigid Limbs, Arching of Back, Irritable.)	1. Rh disease 2. Prematurity 3. Underweight 4. Asphyxia 5. R.D.S. 6. Hypoglycemia 7. Systemic Bacterial Infection	1. Rh disease 2. Prematurity	1. Rh disease	1. Rh disease 2. Prematurity 3. Underweight

Two of these children (No. 1, No. 13) are still taking this medication.

Of the twenty-one children included in this study, sixteen were male. The height and weight of all the children were within normal limits.

Conclusion

Of the twenty-one children studied, fifteen were found to be completely normal in the areas of hearing, growth, development, and behavioral characteristics.

Of the six remaining children:

a) No. 1 was found to be hyperactive and/or have a behavioral problem.

b) No. 13 was found to have a high frequency loss of approximately 60 dB, strabismus, decreased fine and gross motor co-ordination for his age, and hyperactivity. This child was the only baby exhibiting signs of kernicterus in the neonatal period.

c) No. 14 was thought to be moderately retarded, was one to two years behind in development, and had a severe strabismus. The retardation was thought, by a neurologist, to be due to the hypoglycemia and anoxia in the neonatal period.

d) No. 15 could not hear a tone of 500 c.p.s. presented at 20 dB.

e) No. 19 was found to have strabismus and a lateral lisp.

f) No. 20 was found to have strabismus.

Three of the twenty-one children were found to be hyperactive by their parents and paediatricians. Tranquilizers had been prescribed. All three of these children had indirect bilirubin levels greater than 20 mgm%. Odel, in his study in 1970, found that approximately one half of the children having sequelae due to hyperbilirubinemia, demonstrated hyperkinesis, poor attention span, and more aggressive behavior.[4]

25% (four of the twelve children tested) were found to have strabismus, as compared with 1-3% of the normal population. The indirect bilirubin levels in all of the four children had risen above 15 mgm%, but in only two cases did it rise to greater than 20 mgs%. This high percentage (25%) may be the result of the small population tested, and merits more investigation, before one can say that strabismum is a sequella of hyperbilirubinemia. Nevertheless, children who had moderately severe Rh disease are a high risk population and should definitely have their vision checked by an ophthalmologist at three years of age.

The one child with the high frequency hearing loss was fortunately diagnosed by the age of six months. He is leading a relatively normal life and is doing well in a public school.

The hearing loss that may result from hyperbilirubinemia is often not obvious, and therefore not picked up. The child may respond to noise and therefore be thought to be hearing. If this is a high frequency tone deafness, as may occur as a sequella of Rh hemolytic disease, the patient may be missing some or most of the consonants which are responsible for making speech intelligible. He may be slow to talk and to follow directions. His intelligence may be grossly underestimated and he may be labelled as slow or retarded. To prevent this catastrophe all high risk children should have an audiological assessment at two years, and again at four years of age, when a more reliable puretone audiogram can be obtained. This high risk group should include all children who had a neonatal indirect bilirubin blood level of greater than 20 mgm%.

This study indicates that the majority of children who had Rh haemolytic disease are developing normally. This would suggest that the practices of intrauterine transfusions, early induction of labor when indicated, and exchange transfusions are effective in preventing long-term sequelae due to hyperbilirubinemia of severe Rh heomolytic disease. With the use of Rh Immune Globulin to prevent sensitization of Rh negative women (within 72 hrs of delivery, abortion or ectopic pregnancy in Rh negative women who don't show antibodies), Rh haemolytic disease, and its serious sequelae, will be eradicated completely. □

Every great discovery I ever made, I gambled that the truth was there, and then I acted on it in faith until I could prove its existence.

Arthur H. Compton, physicist.

Salmon Fishing as a Hobby

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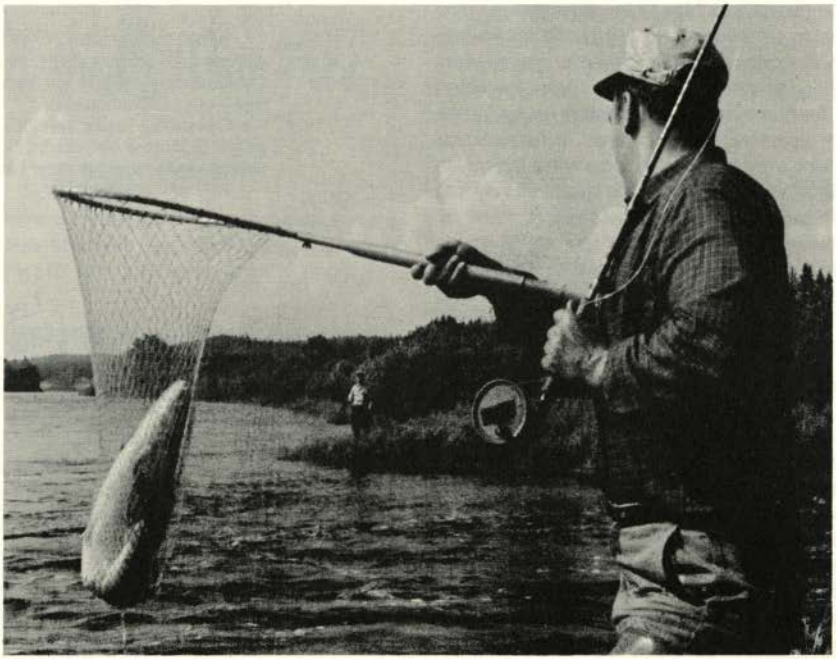

The following article is intended to be an exercise in occupational therapy. Fishing for the Atlantic salmon takes one into the fresh air and provides a fair amount of healthful exercise.

If there are salmon in the river I will endeavor to explain how one may end the day with more than exercise and appetite.

Let us assume that the water in the river is at it's optimum height and a fair number of salmon are in the pools. The method of fishing will depend to some extent on the time of year and the water temperature. A general rule is that early in the season and with cold water the wet fly will be more successful. Later on in the summer as the water becomes warmer the dry or floating fly will account for more fish, although there are exceptions to both rules. Also the rougher the surface of the water and the faster the current the more likely the wet fly is to be successful. When the water is cold the fish are usually found in deeper and slower water than in the heat of the summer, when to obtain the maximum amount of oxygen they tend to be in shallow water where it first enters the pool. They have favorite "lies" and fish will be found day after day in the same spots. Favorite locations are just in front of or behind stones, or along the edges of partly buried logs or ledges of rock.

The wet fly is presented to the fish by casting out and across the pool at approximately a forty-five degree angle. The fly is allowed to swing in front of the fish with the angler endeavoring to prevent any drag on the fly due to the current forming a bag, or modified U, in the line. This lets the fly behave in a way which would be more natural for something alive and also leaves it in view longer and gives the salmon a better chance to take the fly well inside the mouth. Salmon are most likely to take a fly the first time it passes them in a satisfactory manner so that a short step should be taken between casts to cover new water and to afford an opportunity for any following angler to try his luck.

A salmon taking a wet fly may come with a fast rush but especially in cold water he usually comes up behind the fly and is visible as he follows it along the top, only taking it in his mouth as he descends. If the angler strikes too soon in these circumstances all he accomplishes is to pull the fly away from the salmon or touch him lightly on the lip which will so alarm the fish that he will be seen no more that day. Except when fishing in water with absolutely no current there will be enough resistance from the force of the current on the line to force the point of any reasonably sharp hook into the fish's mouth. After the

angler feels the fish, raising the rod to the vertical will pull the hook in over the barb.

The dry fly is most successful at water temperatures between sixty-five and seventy degrees and in pools with a smooth or slightly rippled surface. It must be cast in such a way that there will be no drag of the current on the line near the fly. A dry fly which is being drawn over the surface of the water will catch no fish. A dry fly also must pass almost directly over a fish as they will only swim a few inches to either side to take a floating fly. This means that if the exact position in the pool usually occupied by salmon is known, or if the fish can actually be seen, it is an immense advantage. Otherwise in a large pool it takes a very long time to be sure of covering all the water, and even then, the fly may not be cast to float in the few inches of current which represents the "taking area" of that particular fish. Salmon taking a dry fly are apt to come with a faster rush and to take the fly on the way up and to eject it as they turn away so the angler should strike almost the first instant he sees the fish break water as it takes an appreciable time to pick the slack line from the water and the strike to reach the fly. If this is not done, it nearly always gives the fish time to eject the fly from his mouth, or results in the hook just catching a shallow fold of skin on the outside of the lip.

The selection of the fly is not the deep dark secret it is thought to be by many anglers. Wet flies are made in a great multitude of patterns and they will all take salmon on occasion. What is of most importance is the size of a wet fly and once the right size is correctly decided upon the pattern is of only secondary importance. The fly should not be tied to be too heavy as one with only a small amount of feathers or hair which will transmit light seems to be more successful. My own preference is for a dark pattern on a bright day and a bright one on a dark day or early in the season. Others will dispute this and I have known many successful anglers who reverse this order. The lower and clearer the water the smaller the size the wet fly should be.

A dry fly should be tied with stiff hackles which will enable it to float high on the water. Pattern is of very little importance and even size does not seem to be so important as in a wet fly. It is possible however that in low and very clear water a smaller size may be more effective. What is of more importance than the size or pattern of the fly is the diameter of the leader. While it is true that in high or dirty water this is immaterial, when the river becomes clear and the water warm, salmon will reject a fly fished on a heavy leader while the same fish will readily take the fly fished on a four or six pound test leader.

□

Physician Self-Assessment – ANSWER

Question No.	Correct Answer
6	C

DEFENSIVE DRIVING

Now that we have all broken the filthy tobacco habit and are insinuating our new found purity upon our more weakly constituted patients, let us turn to another area of preventive medicine.

What I have in mind is highway speed limits. It is an irrefutable fact that highway accidents decrease in direct ratio to reduction in speed. This was proven most forcibly during the most recent oil crisis in the U.S.A. Highway accidents across the continental U.S. decreased 25 to 35%. This only confirmed what all of us knew but few governments wish to acknowledge. One would think that the authorities would take this golden opportunity to post lower speed limits on all our highways. Our roads are fairly good but for the most part are not fit for 60-65 mph speeds. The speed limits should be 45-55 depending upon the type of highway and the degree of residential build-up. We would cut the accident rate by at least a quarter and save many lives and much suffering.

Now, about preventive medicine. If every physician in the province voluntarily reduced his speed on the highway to just 10 mph below the posted limit of 60 to 65, this could slow up a lot of traffic. In most areas, 50-55 is as fast as is "reasonable and prudent" anyway.

There are an ever increasing number of drivers on the highways and that means an increasing number under the influence of alcohol, drugs or stupidity. The percentage of drivers in the latter category is definitely not decreasing.

In all honesty can any of us say that we must travel an extra 10 mph faster in order to get to the golf club or the cottage 5 minutes sooner? We all do it and we can all stop doing it. We think of ourselves as mature, responsible people and I dare say most of us are. But we are being downright childish in racing over the highways (like everyone else) in our Super-Duper Eights with 4-Barrel Carburation and 460 cubes. Lets have a go at 55 mph instead of 65 where its allowed, and cut to 50 where a 60 is posted.

The other item that is fascinating is the seat belt. This too has proven itself as a great life-saver and yet it is not used universally, though present on most cars for the past few years. There are even buzzers and warning signals to goad the forgetful driver into snapping the belt around his body. And yet there are actually people who work out methods to frustrate these devices so that they can drive unprotected by the safety belts. If this is not tantamount to a death wish then I wish one or our learned psychiatrists would explain it to me. Or does it take some of the thrill out of driving? Or is it perhaps too uncomfortable for our more portly colleagues? If the latter, then it should serve as a stimulant to weight reduction.

And so, dear readers, here are two more steps on the road to salvation. Let us all drive leisurely along at a comfortable 50, snuggled into our seats by our shoulder-seat belts and breathing the clean tobacco free air. At the same time as we are increasing our enjoyment of motoring, we are adding many years to our incumbency as fathers or mothers and as useful members of society.

□

M. E. Burnstein, M.D.

"It costs $125,000 to $200,000 a year to keep a paralyzed accident victim in hospital."

Dr. John States,
Past President of the American
Association of Automotive Medicine

"Hospitals in Australia are reporting a drop of 24% in bed occupancy since the introduction of mandatory seat belt wearing legislation."

Charles Pulley,
President of the American Safety
Belt Council
during a recent National Safety
Belt Council Usage Conference held
in Washington, D.C.

THE GOLFER'S PSALM

The Pro is my shepherd
He maketh me to drive straight down
green fairways
He leadeth me across still water hazards
He restoreth my approach shots
He leadeth me in the paths of accuracy
for my games' sake
Yea, though I slip through the roughs
in the shadow of sandtraps
I will fear no bogies, for his advice is
with me
His putter and irons, they comfort me
He prepareth a strategy for me in the
presence of my opponents
And anointeth my head with confidence
The cup will not be runneth over
Surely birdies and eagles shall follow me
all the rounds of my life
And I will score in the low eighties forever. □

NSMB 1974; 53: 156-7

Personal Interest Notes

Dalhousie University Medical School held its spring convocation exercises on June 12th 1974 at which time degrees were presented to 85 graduates from the fourth year class and 91 graduates from the fifth year class.

Out of the 85 students from the fourth year class, 45 are from Nova Scotia, 23 from New Brunswick, two from Newfoundland and five from Prince Edward Island. There are four other Canadians of which one is from Alberta and three from Ontario. There are also six others of which five are from the United States and one from Hong Kong.

Of the 91 graduates from the fifth year class, 37 are from Nova Scotia, 27 from New Brunswick, 16 from Newfoundland and two from Prince Edward Island. There are eight other Canadians, five from Quebec, two from British Columbia and one from Ontario. There is one graduate from the United States.

From the fifth year graduating class 70 are going into General Practice, seven into the Armed Forces and 14 into postgraduate training

This year two Dr. C. B. Stewart Gold Medals for excellence were presented to a candidate in each of the two graduating classes of physicians. **Dr. Douglas Charles Macmichael** of Halifax received the medal for the five year course and **Dr. Terrance Brennan,** of Bathurst, N.B., received the medal for the four year course.

Two Halifax doctors, **Dr. F. Murray Fraser,** noted for his work in family medicine and **Dr. Clyde S. Marshall,** recognized for his contribution to mental health care were presented with Honorary Degrees during the convocation.

Dr. F. Murray Fraser shown receiving his Honorary Degree from Dr. Henry D. Hicks, President.

Dr. Clyde S. Marshall being congratulated by Dalhousie President Dr. Henry D. Hicks after receiving his Honorary Degree.

Dr. D. F. MacDonald, Yarmouth, has been awarded a Senior Membership in The Canadian Medical Association.

Dr. MacDonald received the presentation at the annual meeting in Toronto.

Senior Membership is awarded on a restricted basis to physicians who have attained the age of 65 years, who have been long term members of the Association and have served the medical profession and their patients in an outstanding manner during their career.

Dr. L. C. Steeves, Halifax was recently presented with an Honorary Doctor of Science degree from Memorial University, St. John's, Newfoundland, for his work and responsibility for the development of educational programs for practicing physicians from 1957 to 1966 when he transferred his responsibility to Memorial's Faculty of Medicine.

Dr. and Mrs. Roy Moreash, Berwick, were guests of honor at the district Lions Club annual awards night dinner where the well known physician received a plaque marking his long service to the community. Dr. Moreash who has practised medicine in Berwick since 1934, will be residing in Rockingham, Halifax.

Dr. G. R. Langley shown above making presentation to Dr. R. C. Dickson.

Dr. Robert Clarke Dickson was honored recently by Specialists in Internal Medicine at a dinner and dance to mark his retirement. Dr. Dickson who has been Head of the Department of Medicine at Dalhousie University since 1956, retired from that position on June 30th, 1974.

Highlight of the evening was the announcement of the foundation of a Robert Clark Dickson Lectureship in Internal Medicine financed by gifts from physicians who have trained under Dr. Dickson.

Under Dr. Dickson's leadership the Department of Medicine has grown to the prominence it holds today. Physicians who took their training in Dr. Dickson's department work at hospitals and medical schools throughout the world.

In addition to his work at Dalhousie Dr. Dickson is an officer of the British Empire and the Queen's Honorary Physician in Canada. He also holds numerous other distinctions.

The gathering to honour Dr. Dickson was held in the MacInnis Room of the Dalhousie Student Union Building where Dr. & Mrs. Dickson were led into the dinner by a Piper playing "Highland Laddie", the regimental march of Dr. Dickson's regiment, the 48th Highlanders of Canada.

The appointment of **Dr. George Ross Langley** as Head of the Department of Medicine, Dalhousie University Faculty of Medicine effective on July 1st., 1974, has been announced by Dr. Henry D. Hicks, president of the University.

Dr. Langley is a native of Port Hawkesbury, Nova Scotia and graduated from Dalhousie Medical School in 1957.

In 1960 he was the recipient of Dr. Arthur Haatz Fellowship from the University of Toronto, which was spent as a Research Fellow in Haematology at the University of Melbourne, Australia. In 1961 he was awarded a Medical Research Council Fellowship and was a research assistant at the University of Rochester School of Medicine, Rochester, New York.

He held a John and Mary R. Markle Scholarship in Academic Medicine from 1963 to 1968.

In 1963 Dr. Langley was appointed Lecturer in Medicine at Dalhousie, subsequently named Assistant and Associate Professor, and in 1968, was made full Professor of Medicine.

In 1969, Dr. Langley was appointed Chief of Service, Dalhousie Clinical Teaching Unit, Camp Hill Hospital, a position he held until his new appointment. □

Correspondence

To the Editor:

In their article on *Trends in Hospital Utilization in Nova Scotia* of April 1974, Drs. Gordon, Weldon and MacLean present some interesting statistics and also some observations in the discussions which are no doubt intended to provoke, since they offer no explanation of their findings. In fact, on review it would appear that it asks more questions than it answers.

> "An interesting observation and one of considerable importance for planning purposes, is the fact that the Victoria General Hospital and Halifax Infirmary appear to be switching their roles regarding service to their home region, especially for surgical procedures."

With particular reference to the switching of the role vis a vis the Victoria General Hospital and the Halifax Infirmary, in regard to treating 3B population, the following thoughts come to mind.

Item 1:
What effect does the fact that most true emergencies are directed to the Victoria General, which has the facilities to deal with them, have on the admission rate?

Item 2:
What is the per centage of emergency versus elective surgery admissions at the two hospitals, and further, what per centage of the emergency surgical work is the result of trauma at the Victoria General and the Infirmary?

Item 3:
What effect has the increased teaching load at the Halifax Infirmary had on its capacity to admit from the 3B area?

Item 4:
What is the effect of the Obstetric Unit at the Halifax Infirmary on the statistics as presented, since newborns have been excluded?

Item 5:
Have the beds available for admission purposes at the two hospitals over this period been constant?

I would agree wholeheartedly that it is an interesting observation, but on its own is of doubtful importance. It is the underlying factors which have produced the changes resulting in the statistics given, which are important and it is to these that the hospital insurance commission and legislators should pay heed that we may all benefit from an efficient health care delivery system.

Yours faithfully,

Macadam Duncan, M.B., Ch.B., C.C.F.P.

Authors' Comment:
Dr. Duncan is correct. The article was indeed intended to ask more questions than it answered.

To the Editor:

I was interested to read *A Working Vacation in Jamaica* (N.S. Medical Bulletin, June, 1974, Vol. 53 No. 3, pages 113-114), but was a little taken aback on reading the penultimate sentence. The Canadian government and The Canadian Medical Association have long seen "the need to assist under-developed countries" and both organizations have enviable records in this endeavour.

One only has to read the publications of C.I.D.A., C.U.S.O., and C.E.S.O. to name but a few of many organizations, to see how much expertise and assistance, including financial on a large scale, is provided to the developing countries by Canada.

For five years, The C.M.A. has been providing assistance to the Caribbean countries in all branches of health delivery. Physicians, dentists, nurses, laboratory and radiology technicians, hospital architects, administrators, dietitians, epidemiologists, etc., have been sent to the Caribbean for varying periods of time. Economy return fare is provided by The C.M.A. and C.I.D.A. and the volunteer is given board and lodging by the host health organizations. Dr. Russ Manuel, mentioned in the opening paragraph of the article, has had transportation costs to the University of the West Indies paid by The C.M.A. Caribbean Medical Programme on three occasions during the past three years.

There is still a great need among the developing countries for assistance in the provision and teaching of basic health care and The C.M.A. is accepted by those countries as doing an excellent job along these lines; this sentiment was expressed publicly at the meeting last week of the Caribbean Health Ministers.

Perhaps Mr. Doherty's article and this letter may stimulate some Nova Scotia physicians to donate their time and skills to The C.M.A. programme which has now expanded its parish to include Anglophone Africa. I would be more than pleased to provide information on the programmes, current vacancies, etc., and would hope that the number of assignments undertaken by the Nova Scotia doctors would move into double figures!

Yours sincerely,

J. S. Bennett, M.B., F.R.C.S.(C), F.A.C.O.G.,
Administrator,
International Health Programmes,
The Canadian Medical Association.

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WHAT IS YOUR DIAGNOSIS? — ANSWER

Stress fracture of the proximal shaft of the tibia. This condition is relatively common in active children at this age. Symptoms may follow undue physical exertion, and often no single episode of trauma is remembered. A fracture line is not always visualized, but the location and rapid evolution towards healing is characteristic of the condition. Differential diagnosis in the early stages includes neoplasm and local inflammatory lesions with periosteal reaction; single radiographs obtained during the healing phase could be mistaken for osteoid-osteoma.

ADVERTISERS' INDEX