

NEWS LETTER

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OF

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THE SCOTTISH SOCIETY OF ANAESTHETISTS

(Founded 20th February 1914)

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“The objects of the Society will be to further the study of the science and practice of anaesthetics and the proper teaching thereof, and to conserve and advance the interests of anaesthetists.”

“Ordinary membership will be restricted to members of the medical profession practising the specialty of anaesthetics.”

— Extracts from the Constitution.

Subscriptions

£1.00 per annum

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President's Newsletter

The resignations of Dr. MacRae as Secretary and Dr. Grubb as Treasurer of the Society cannot be passed without comment. They have worked indefatigably in performing these duties for four years. To say that they will be sorely missed is an understatement, but does not imply that their successors Dr. Arthur and Dr. Miller are not already emulating their achievements. The retirement of Dr. Davidson as Editor of the Newsletter which has, through his efforts, gone from strength to strength is also a deeply felt loss, but the Society have been fortunate in having Dr. Steel to replace him. Dr. Davidson has also resigned as the Scottish Society representative on the S.C.H.M.S. following his election as an area representative. His much valued services on this Committee will be undertaken by his successor, Dr. Arthur.

As reported by Dr. Davidson at the A.G.M. the proportion of merit awards to anaesthetists in Scotland is 18.8% which compares with an average of over 30% for all consultants. Although there has been some improvement in recent years Council continue to press through our representative on the S.C.H.M.S. for an increased distribution. A new Committee is being formed in Scotland from existing C merit award holders which will make recommendations for awards and it is hoped that anaesthetists will be represented on this committee with the opportunity to improve the situation. Liaison between existing C merit award anaesthetists and S.C.H.M.S. anaesthetic representatives would be helpful.

Other matters brought to the notice of Council and discussed have been proceedings of the working party on forensic pathology services, the proposed institution of operating department assistants and inadequate anaesthetic accommodation in hospitals. There has been no development of these concerns worthy of report.

The phasing out of private beds in National Health Hospitals and the plans outlined in the Government's Consultative document of 11th August (reported in full in the B.M.J. of 23rd August) if implemented could mean the end of private medical practice in this country. The profession appears united in its condemnation of these proposals and even those not in favour of private practice doubt the value of complete

Government monopoly of medical services. The mere fact that an alternative exists guarantees freedom of choice to patient and doctor, though many may never opt to use it. It is hoped that our representatives may persuade the Minister of Health and Social Services to modify her proposals and that extreme counter persuasive methods, so popular with trade unionists and so hateful to the general public and to the medical profession in particular, will not be required. These may be personally biased views, but at least our support and sympathy are proffered to those engaged in the unenviable task of negotiating on our behalf. It is hoped that by the time the Newsletter is circulated the dispute will have been amicably settled to the satisfaction of patient, profession and Government. Of concern also to the profession is the dispute relating to extra duty remuneration for junior hospital staff. Understanding of the situation is difficult for those not closely connected with negotiations, but it is hoped that these problems will soon be resolved, and that the hard work and inconvenient hours of emergency duty will be appropriately recompensed.

In contrast to the foregoing it is a congenial duty to report an item of hitherto unsuspected and pleasant news. Dr. Frank Holmes, last year's President, has published a book entitled "Following the Roe". A copy of his book has not yet been obtained, but judging from reviews in two monthly magazines it is an enthralling story about roe deer and "certainly one of the best books on this subject ever written in the English language". Dr. Holmes is to be congratulated and to quote again "as a first literary attempt on a non-medical subject it is hoped that it will not be his last".

Programme for 1976

REGISTRAR'S PRIZE: Entries to be submitted to the Secretary by 28th February, 1976.

ANNUAL GENERAL MEETING: The Post House, Aviemore, 30th April – 2nd May, 1976.

SCIENTIFIC MEETING: This will be replaced by the Scientific Meeting of the Faculty of Anaesthetists to be held in Edinburgh in May, 1976.

REGISTRARS' MEETING: Royal Infirmary, Glasgow, October, 1976.

Registrars' Meeting

Registrars' Meeting: Edinburgh, 17th October, 1975. The annual meeting was held in the Royal Infirmary, Edinburgh and was well attended by over forty junior anaesthetists from all parts of the country. In the morning session, the registrars were able to choose between two programmes of clinical demonstrations. One group saw anaesthesia for Caesarean section, apparatus for neonatal respiratory care, the technique of blind nasal intubation and the measurement of cardiac output using transthoracic impedance. The demonstrations in the other group included the measurement of liver blood flow by dye uptake, the use of the ventilating bronchoscope and the local anaesthetic techniques of intercostal nerve block and inter-scalene brachial plexus block.

In the afternoon several short papers were read

on a wide range of topics. Papers on the use of indocyanine green for the measurement of liver blood flow, gastric emptying, post-operative oxygen therapy and non-invasive cardiac output measurement were given by Drs. D. Wright, W.S. Nimmo, G.B. Drummond and D.G. Littlewood respectively. The use of the fiberoptic bronchoscope for a case of difficult intubation was described by Dr. A.G. Norbury and finally Dr. J.A. Wildsmith gave a paper on the respiratory effects of sodium nitroprusside.

Dr. Drummond, who organised the meeting, and the other members of staff of the anaesthetic department are to be congratulated on an interesting and varied programme. We are also grateful to the Lothian Health Board for providing an excellent lunch.

Annual General Meeting — Aviemore

25th – 27th APRIL, 1975

Although the Society was founded in 1914, two wartime interludes when no meetings were held, resolved that 1975 was our fiftieth annual general meeting. Once again the meeting was held at the Post House, Aviemore. A turn out of over 150 members and guests at the dinner would indicate continuing enthusiasm for our A.G.M.

Your Council are continuing their search for utopia in the shape of alternative situations for our A.G.M., which have adequate accommodation within easy reach of all the main centres and provide suitable diversions for the evening and for the ladies and children not involved in the meeting during the day. It also appears that a Golf Course

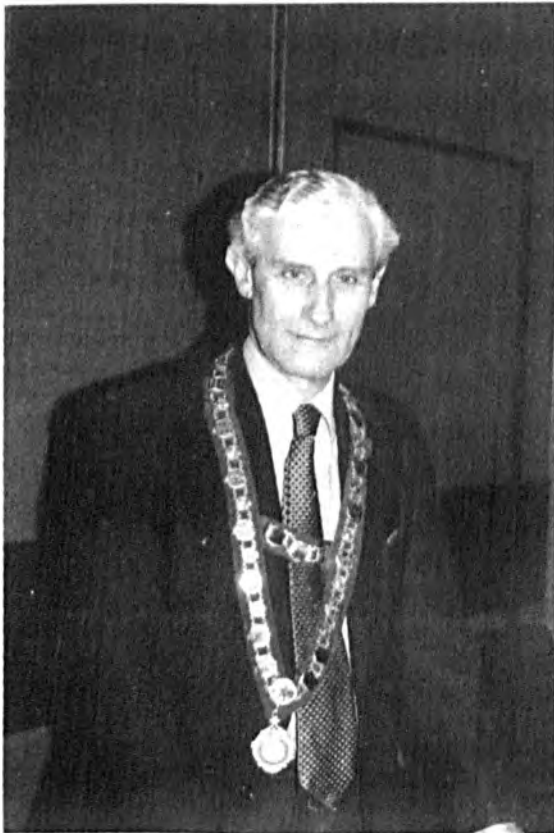
in the vicinity is desirable.

For the past four years our members have besported themselves by courtesy of the Boat of Garten Golf and Tennis Club to whom the Society is greatly indebted, and this year as in our first year at Aviemore, Alec Reid won the major prize and Betty Bradford the ladies prize. Such was the generosity of our colleagues in the trade exhibition and other companies that all those sportsmen and women who failed to achieve greatness on the golf course swept themselves into the prize list on the ice, where this year Donald Campbell organised

the curling as a locum for Dr. Jimmy Kyles who could not be with us.

Sir Donald Douglas was our guest speaker and his address is reported in the Newsletter as is that of our President Dr. Henry Fairlie.

Changes in your Secretary and Treasurer together with the necessity to book early made your Council decide to return again to Aviemore for 1976, so once again the Society extends a cordial invitation to all members to attend the A.G.M.



Dr. FRANK HOLMES



Dr. HENRY FAIRLIE

Presidents, Past and Present, at the A.G.M.

CARDIOVASCULAR REACTIONS FOLLOWING THE APPLICATION OF ACRYLIC CEMENT TO BONE AND JOINT SURFACES IN ORTHOPAEDIC SURGERY

Clinical reports on the cardiovascular complications following the utilisation of acrylic cement in surgery usually refer to the operation of hip arthroplasty. Patients presenting for this type of surgery are usually elderly with osteoarthritis, rheumatoid arthritis or traumatic problems. Total hip replacement involves the substitution of a polyethylene or metal cup prosthesis for the acetabular cartilage and a metal prosthesis for the head of the femur. The femoral prosthesis has a rounded articulating head, short neck, and stem about six inches in length. During the operation, the exposed joint is disarticulated and the head and neck of the femur and the acetabular cartilage are removed. The acetabular bone surface is roughened, cement applied and the cup prosthesis inserted. The femoral medullary cavity is reamed and a suction catheter introduced followed by acrylic cement and the stem of the prosthesis. The catheter is removed before impaction of the femoral components, and when the prosthesis has been firmly fixed, the joint is articulated, a drain inserted and the wound closed. The duration of surgery varies from 90 minutes to two hours and the average blood loss is about one litre. The Thompson arthroplasty is a procedure involving the insertion of only a femoral prosthesis in patients with a fracture of the neck of the femur and the undamaged acetabular cartilage is not removed.

Total replacement of the hip joint was performed first by Wiles in 1938 (Wiles, 1958). The method depended on mechanical fixation of the prosthesis which was not completely satisfactory. Haboush (1953) first described fixation with acrylic cement, a technique which was used subsequently by Charnley, McKee, Watson-Farrar and Ring and gained general acceptance.

In 1970, cardiovascular disturbances and occasionally cardiac arrest, which occurred immediately after application of cement, were reported. Consequently, the Department of Health and Social Security appointed a Working Party to

examine the causes including possible toxic, septic, carcinogenic or allergic effects. The Working Party was composed of orthopaedic and other appropriate specialists including two anaesthetists, Dr. P.V. Cole of St. Bartholomews Hospital and Dr. J.F. Nunn of the Clinical Research Centre, Middlesex. Investigations were undertaken during the period 1971-73 and in December 1973, a final comprehensive report was submitted which was published by the D.H.S.S. in 1974 and circulated to hospitals (W.P.A.C.O.S. 1974).

Acrylic cement is prepared from a combination of liquid and powder. The liquid contains monomeric methyl methacrylate, a small quantity of *n-n* dimethylparatoluidine and a trace of hydroquinone. The powder contains polymethylmethacrylate and a small quantity of benzoyl peroxide. When the liquid and powder are mixed, a reaction between the dimethylparatoluidine and benzoyl peroxide initiates polymerisation of the monomer and the compound becomes doughy then hardens during a period of approximately ten minutes. The reaction is exothermic and high temperatures may be produced. The monomer is chemically similar to chloroform. It is highly volatile with a characteristic smell and is fat soluble.

The reactions which followed application of cement varied from minor changes in blood pressure and heart rate to cardiac arrest. The incidence of cardiac arrest attributable to cement was 2 in 3,700 cases (Charnley, 1970), 2 in 1,000 (Cadle et al, 1972), 1 in 500 (Cole, 1973) and 2 in 2,012 (Coventry et al, 1974). In 80%-90% of patients, transient decreases in arterial pressure of 10-70 mm Hg and increases in heart rate of 10-20 beats/min were observed 20-120 secs after the application of cement and lasting 2-5 minutes. Of less common occurrence were bradycardia, hypertension or biphasic changes in arterial pressure. These reactions occurred most frequently following insertion of the femoral rather than acetabular prosthesis.

In animals, the injection of the liquid component intravenously induced the same reactions as occurred clinically. Injection separately of all the constituents (liquid and powder) showed that the monomer alone was active (Homsy, 1969; Peebles et al, 1972; Ellis and Mulvein, 1974). In both laboratory and clinical studies, the use of C¹⁴ labelled monomer revealed that the maximum blood concentrations of monomer coincided with the time at which cardiovascular changes occurred (Homsy, 1969; Phillips et al, 1973). These included a decrease in arterial pressure and an increase in heart rate and cardiac output associated with peripheral vasodilatation, but no change in central venous pressure (Peebles et al, 1972). This is regarded as the typical reaction to the monomer. Arterial gas values usually remained within normal limits (Phillips et al, 1971; Herndon et al, 1974) but occasional hypoxaemia has been attributed to increased absorption of monomer from excessively vascular bone surfaces (Park et al, 1973) or to fat embolism (described later). The presence of abnormal E.C.G. complexes was uncommon but ventricular extrasystoles following the application of cement and coinciding with hypotension and tachycardia were recorded in four of a series of twenty patients (Thomas et al, 1971).

It has been suggested that monomer may have direct toxic effects on the myocardium and this is supported by cytotoxic reactions in tissue cultures (Hulliger, 1962) and hyperaemic pulmonary reactions in dogs (Homsy et al, 1969) following exposure to monomer. However, these investigations did not simulate the clinical situation (W.P.A.C.O.S., 1974; McLaughlin et al, 1973). In addition, Homsy (1972) injected dogs intravenously with monomer to the point of respiratory arrest and observed that the heart was still beating. There was no histological evidence of toxic myocardial damage. In the clinical situation, autopsy evidence of a myocardial toxic effect has not been reported (Coventry, 1973) and the major mechanism underlying cardiovascular collapse is thought to be a reduction in systemic vascular resistance. Thus, patients most likely to respond adversely to monomer include those with coronary artery disease where hypotension or tachycardia may further decrease coronary circulation, valvular stenosis or pericarditis, heart block, myxoedema and certain types of cardiomyopathy together

with the elderly and those receiving digitalis or blocking drugs (Peebles et al, 1972). Failure to replace blood loss may exaggerate the C.V.S. effects of the monomer, as may halothane or hypotensive techniques of anaesthesia (Cadle et al, 1972). Fearn et al (1973) observed that increases or decreases in blood pressure, caused by altering the inspired concentration of halothane, tended to be augmented during the application of cement and advised the use of neuroleptanalgesia.

The mechanisms underlying the cardiovascular reactions to acrylic cement are still not fully understood. Vasodilatation is an invariable feature and the possibility of histamine release was investigated, with negative results (Peebles et al, 1972). A hypersensitivity reaction has been reported (Pegham and Medhurst, 1971) of a surgeon who developed a skin rash as a result of the penetration of monomer through his rubber gloves. No other instances of hypersensitivity or allergy associated with cement arthroplasty have been documented.

Most investigations of the mechanism of action of monomer have centred on its absorption, distribution and elimination. Exposed bone surfaces are extremely vascular and entry of the volatile monomer into the circulation is rapid. Cardiovascular disturbances following cement applications usually occur within 90 seconds. The area and vascularity of bony surfaces are greater in the femoral site than in the acetabulum and consequently cardiovascular reactions were more frequent after femoral than after acetabular application (Phillips et al, 1971). It has been thought that high pressures in the femoral medullary cavity following impaction of the prosthesis would hasten further the absorption of monomer. Pressures of 1900 mm Hg have been recorded yet the level of pressure bore no relation to the frequency or extent of changes in arterial pressure which followed (Phillips et al, 1973).

The volume of monomer absorbed has not been measured but McLaughlin et al (1973) estimated that 0.5% of the monomer applied entered the circulation and Homsy et al (1969) from clinical and laboratory investigations found a peak concentration in the inferior vena cava of 1.0 mgm% within 3 minutes and traces in aortic blood within 1 minute of application. In order to reduce the amount of monomer absorbed, Charnley (1970) recommended delaying application until

the cement was becoming cool and firm, although several workers failed to demonstrate any advantages from this technique (Thomas et al, 1971; Wrighton et al, 1971). However, delaying is thought to be important (Homsy, 1969; Cohen and Ith, 1971; Brittain and Ryan, 1972) and inexperienced surgeons have tended to apply cement early with a correspondingly greater frequency and intensity of arterial pressure and heart rate changes.

The fate of absorbed monomer is not entirely elucidated but it is known that the substance is cleared entirely from the circulation in 20 minutes. (Homsy et al, 1969; McLaughlin et al, 1973). As the substance is highly volatile, a pulmonary portal of excretion is likely and this has been confirmed by the detection of monomer in expired gas (Homsy, 1969).

Although there is good evidence for the association of cardiovascular reactions with the release of monomer, other hypotheses have been advanced to explain the mechanism of the adverse reactions. Histamine release, hypersensitivity or allergy and pulmonary hyperaemia are rarely, if ever, implicated. Neurogenic stimuli from surgery or from high temperatures and pressures generated by the application of cement have been discounted when it was shown that during spinal or epidural block changes in heart rate and blood pressure were observed with the usual frequency and intensity (Peebles et al, 1972; Cohen and Smith, 1971). Air embolism as a sequel to high bone cavity pressures was reported by Hyland and Robins (1970). The patient developed air embolism following impaction of the femoral components and the authors noted that the medullary cavity was osteoporotic, unusually large, and had not been vented. Ngai et al (1974) heard characteristic mill wheel sounds on three occasions following femoral impaction and noted that the bone cavity had not been vented. However, these reports are unusual and no air embolism was detected in a series of patients who exhibited relatively frequent cardiovascular reactions occurring during hip replacement (Herndon et al, 1974).

The hypothesis that fat embolism and not monomer was related to the cardiovascular disturbances was not so easily disproved. Fat and marrow debris are embolised probably by the high bone cavity pressure (Pelling and Butterworth,

1973; Modig et al, 1973; Park et al, 1973) and it was thought that the sudden enforced entry into the circulation would hasten the usual slow onset of the signs and symptoms of fat embolism and that lesser degrees of embolism (and not monomer) would cause hypotension and tachycardia. Greater amounts would cause the development of the typical syndrome as described by Ross (1970). It was suggested that under anaesthesia the typical signs of fat embolism would be modified to produce hypotension, tachycardia, hypoxaemia, decreased pulmonary compliance, delayed recovery from anaesthesia and altered states of consciousness, all of which have been observed in patients undergoing cement arthroplasty (Charnley et al, 1971; Gresham et al, 1971; Sevitt, 1972). The theory did not explain why hypotension and tachycardia followed the acetabular application of cement when fat embolism was unlikely or why hypotension and tachycardia followed the intravenous injection of monomer in dogs when no fat was embolised. In addition, it did not explain why hypotension and tachycardia bore no relation to femoral impaction, the degree of intramedullary pressure or the quantity of fat probably embolised by this procedure. Evidence indicated rather that monomer entered the circulation following application of acetabular and femoral cement causing cardiovascular changes and that fat was embolised following impaction of femoral components causing cardiovascular and respiratory changes.

This concept is supported by more recent findings. Herndon et al (1974) cannulated the appropriate femoral vein in patients undergoing total hip replacement, placed ultra sound probes in the vein and over the praecordium, and inserted pressure recorders through drill holes in the femoral shaft. From venous blood samples and from the ultra sound probes (using the Doppler principle), the presence of fat droplets was detected. These emboli always followed femoral impaction of cement and prosthesis. Typical changes in heart rate and arterial pressure were recorded following the application of cement and these could not be related in incidence or magnitude to the quantity of fat embolised. In addition, cardiovascular changes occurred also after acetabular application when virtually no fat entered the circulation. The suspected association

between intramedullary femoral pressures and fat embolism was confirmed. Thus increased intramedullary pressures increased the quantity of fat embolised and decreased pressures were associated with decreased embolism. Similar results were reported also by Kallos et al (1974) and Tronzo et al (1974).

It is not clear if the fat embolism following impaction of the femoral components is clinically significant. In total hip replacement surgery, Kallos (1975) observed hypoxaemia following impaction and this was related to high bone cavity pressures and embolisation of fat. In five patients, a mean decrease of arterial oxygen tension of 40 mm Hg was observed and on several occasions concomitant profound hypotension required resuscitative measures and the administration of 100% oxygen. Similar episodes have been reported, also in total hip replacement surgery, by Modig et al (1973); Part et al (1973) and Coventry et al (1975). However, the latter found no signs of fat embolism after surgery using clinical, radiological and serum enzyme examinations. Herndon et al (1974) found that even when intramedullary femoral pressures and fat embolism were maximal, there were little or no changes in arterial oxygen tension and postoperatively no evidence of fat embolism. Herndon et al agreed with the earlier findings and conclusions of W.P.A.C.O.S. that fat embolism was rarely of significance in total hip replacement surgery.

It is possible that other factors are responsible for the episodes of hypoxaemia which have been observed on some occasions. For example, patients suffering from rheumatoid arthritis which is associated with an increase of bone marrow fat were known to be particularly at risk from fat embolism following femoral seating (Harris, 1971).

Other factors undoubtedly increased the incidence of significant fat embolism observed in patients undergoing Thompson arthroplasty (W.P.A.C.O.S., 1974). These elderly unfit patients presented as emergencies and having suffered a recent fracture were particularly liable to develop this complication. However, clinical and statistical investigations have shown that impaction of the femoral components was the major precipitating factor (Gresham et al, 1971; Sevitt, 1972). It is probably correct to conclude that patients undergoing Thompson arthroplasty have a susceptibility and predisposition to the develop-

ment of fat embolism which may be initiated or augmented by impaction of the femoral components.

The severity of fat embolism is determined by the quantity of fat and the degree of pressure in the bone cavity, and is modified by suction venting. The importance of aspiration was not always appreciated in the early days of hip arthroplasty and the current routine use of this procedure has substantially reduced though not eliminated the incidence. There is still concern and Herndon et al (1974) and Kallos (1975) have investigated alternative methods of venting. They found that the usual practice of inserting a suction catheter proximally alongside the prosthesis stem and cement reduced the extent of fat embolism but as the catheter had to be withdrawn before impaction of the prosthesis and before the cement hardened, high cavity pressures were still generated and the extent of fat embolism was still appreciable. By venting also through drill holes at the level of the tip of the prosthesis (recommended by Glen in 1970), intramedullary pressures were reduced to zero or near zero and the amount of embolism was reduced considerably. However, Kallos noted that surgeons did not favour drill holes in the mid shaft of the femur because of the danger of subsequent fracture, haemorrhage or sepsis at this site, and he suggested that drilling near the femoral condyle would not have these disadvantages.

The following recommendations are made to minimise the incidence of adverse cardiovascular reactions occurring during the operation of hip arthroplasty. They are based mainly on the work of W.P.A.C.O.S. (1974) together with minor additions and alterations abstracted from more recent publications:

1. Thorough preoperative examination to identify those patients at risk.
2. Non surgical methods of treatment should be considered for those at risk. Other methods of surgery not requiring cement fixation may be advisable — Ring's arthroplasty for total hip replacement patients; Moore's prosthesis for patients suffering from a recent fracture of the neck of femur.
3. Patients should be monitored carefully during surgery with particular emphasis on the cardiovascular system.

4. Equipment for emergency resuscitation should be readily available.
5. Indications for the use of halothane and hypotensive drugs should be carefully considered and particular caution should be exercised if they are utilised.
6. Blood loss should be replaced promptly and the circulatory fluid volume should be well maintained.
7. The application of cement to the patient should be delayed for as long as practicable after mixing.
8. Proximal suction venting should be used during insertion of the femoral components and if indicated additional drill hole vents should be made in the shaft or near the condyle of the femur.
9. If venting fails or if increased fat embolism is suspected, 100% oxygen should be administered before, during and after impaction of femoral components.

There are enormous benefits to be derived from hip arthroplasty in terms of relief from pain and increased mobility. Provided that the risks of hip arthroplasty utilising cement are appreciated, the mortality and morbidity of the procedure should be no greater than for any other type of major procedure in patients of this age group, and in ensuring a successful outcome from surgery skilful anaesthesia and careful monitoring of the patient are of paramount importance.

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ANAESTHETICS AND SURGERY — THE EVOLUTION OF A THERAPEUTIC TEAM

My purpose in this talk is to trace the evolution of the partnership between Anaesthetist and Surgeon in my lifetime and, in doing so, to pay a tribute to the Anaesthetists with whom I have worked. I intend for the most part to rely on personal observations since other men's views, though pleasant to quote in support of one's own, tend to spoil the argument if they do not.

I begin with the scene in Dundee Royal Infirmary in August, 1934. The surgical staff consisted of 6 surgeons and 3 house-surgeons arranged in 3 teams, each with a Chief a sub-Chief and a house surgeon. Each team was responsible for 50 adult and 10 children's beds. There were no specialists. Abdominal, orthopaedic, traumatic, urological and plastic surgery were all considered to be within the competence of a well trained surgeon. The anaesthetic staff consisted of 5 part-time anaesthetists who were also engaged in general practice. The clinical load was heavy. Elective surgery was done daily including Saturdays and emergency surgery by each Unit two days a week and every third Saturday. Democracy had not yet reared its ugly head so the junior Unit had Wednesday and Saturday until death or retiral took a hand. So, the life of a Unit anaesthetist was a busy one. He had an operating list most mornings, his practice in the afternoon and evening, and often private patients in the nursing homes early in the morning or later in the day. The type of anaesthesia used varied from individual to individual. The most popular was open ether preceded either by chloroform or ethyl chloride. The former was preferred by the seniors, and was often used by them throughout especially in patients with chronic bronchitis in whom "ether pneumonia" was considered to be a serious risk. Endotracheal tubes were just coming in at this time. They were of gum elastic and usually connected to a Clover's inhaler or a Boyle's apparatus. They were distrusted by many surgeons because they believed they increased the risk of

chest infections. I think it would be true to say that within the limits of the techniques available the standard of anaesthesia in elective surgery was high though the surgeon was often faced with a tight abdominal wall at the end of the procedure.

A curious paradox of this period was that the assistant surgeon had to turn out for the emergencies while the anaesthetist did not. I think the explanation was that the young surgeon was making his way in the world and was keen to make contact with as many G.P.'s as possible. The anaesthetist had already arrived. The custom led to the unhappy situation that the most difficult anaesthetics, the unprepared surgical emergencies were never administered by the experts. Instead, it was left to the wretched house surgeon to cajole one of his fellow houseman, usually the duty house physician to give the anaesthetic while he scrubbed with his sub-chief. But often no one was available and the houseman had to give the anaesthetic himself, while a student or nurse acted as surgical assistant. The quality of the anaesthetic was as you may imagine atrocious. The poor assistant surgeon had to work under the most intolerable conditions with an anoxic straining patient and an apprehensive young man at the top end who was terrified to use too much anaesthetic for fear of apnoea. It is perhaps in this field that the most dramatic change as perceived by the surgeon has taken place. The induction vomit has largely been overcome by careful gastric aspiration, endo-tracheal anaesthesia has abolished anoxia, and relaxation is achieved by muscle relaxants, not deep anaesthesia. Thus, the need for break neck speed has disappeared and a much more deliberate technique is possible. I never fail to be amazed at the skill of my anaesthetic colleagues in neonatal emergencies. The passing of the years has deprived me of all of it except the tracheo-oesophageal fistulas but in this isolated sphere to see a modern anaesthetist deal with a 2000 gm. neonate who first has a gastrostomy,

then is turned over for a right thoracotomy, and a major intra-thoracic procedure lasting an hour and finish with a pink active baby the size and shape of a skinned rabbit is something to marvel at and applaud.

But to return to the past. As in so many spheres of human affairs everything was changed by the war. Anaesthetists and surgeons were torn from their cosy environment and unceremoniously distributed to deserts, jungles and mountains, there to cope often with primitive equipment with the most seriously injured and shocked casualties. We quickly learned that the operation was an incident, and often a minor one, in a continuing therapeutic process which began with the stretcher bearers, the Battalion M.O.'s, the ambulances continued with the pre-operative assessment and treatment and finished in the postoperative tent. Since it was manifestly impossible for the surgeon to be in two places at once, if often fell to the anaesthetist, his patient supervised by a general duty officer, to spend a great deal of time on pre-operative resuscitation and assessment correcting blood loss and estimating the nature and extent of the injuries. His activities extended to the post-operative tent where his skill at laryngoscopy for bronchial toilet was invaluable. It would be fair to say that the average anaesthetist entered the war as a purveyor of sleep but ended it as a skilled physician of trauma.

The second major change in the role of the anaesthetist of which I have personal experience was in the field of control of blood loss. After the war I returned to Edinburgh to work with Sir James Learmonth who was at that time carrying out a trial of the treatment of severe hypertension with thoracic lumbar sympathectomy. His anaesthetist was that remarkable and genial scientist Dr. John Gillies who, with Harold Griffiths, was using high spinal anaesthesia to allow us to operate in an almost bloodless field. It was and is a mystery to me why patients with extremely low blood pressures neither developed renal tubular necrosis nor reactionary haemorrhage. I take it that the extreme vasodilatation allowed good tissue perfusion at very low blood pressures and that platelet aggregation at severed vessels was enhanced for the same reason. We measured the cardiac output in a few cases and found that it was not notably diminished.

The third major change of the role of the

anaesthetist followed the evolution of cardiac surgery. The development of this speciality completed the transition of the anaesthetist from analgesist to clinical physiologist which had begun during the war. It is difficult to recall now the excitement of the early days of this speciality in the fifties and sixties. It was the spectacular success of mitral valvotomy, started in America by Bailey and Harkins and in England by Brock and Holmes Sellors, which gave the great impetus to the speciality. Hypothermia, the brain child of Bigelow in Toronto was developed in Britain by Cooper and Sellick so that the circulation could be arrested for ten minutes or so to allow the closure of an atrial septal defect or the incision of a narrowed pulmonary valve. But, it was in the evolution of cardio-pulmonary bypass that the most remarkable human experiment in cardio-pulmonary dynamics took place. As usual it is difficult to give absolute credit to one individual for the final elaboration of the method but in America, John Gibson and John Kirklin and in Britain, Dennis Melrose must be given a major share. One might also with justice add the names of Lillehei and Drew. The intra-operative and post-operative care of these patients required the most thorough training in cardio-respiratory physiology and the use of the most sophisticated monitoring equipment. From my own viewpoint this was the finest joint endeavour between anaesthetist and surgeon and I should like to pay my personal tribute to Ian Lawson and Sandy Forrest who were our anaesthetic colleagues. It would be true to say that the administration of the analgesic gases had by now become a rather minor incident in the management of a patient made critically ill by a major surgical injury. One can recollect long night vigils in the recovery room in which failure or success was determined by decisions made jointly between anaesthetist and surgeon, decisions based on accurate biophysical and biochemical data not on guesswork. This was the joint therapeutic team in action at its best. Our experience in this work heavily influenced the design of the Ninewells Theatre Suite of which the Department of Anaesthesia is an integral part with its clinical charge of 22 beds, its research laboratories and its offices and seminar rooms.

And so in the short span of my surgical life, of 40 years to be precise, I have seen the care of surgical patients change from a purely surgical

endeavour to a closely integrated enterprise in which surgeon and anaesthetist each contributes his own particular skill and knowledge to the infinitely greater benefit of the patient.

I now come to the second part of my talk. Your secretary has asked me to say something of the future of surgery. It would be a brave man who would attempt this task with any confidence since advances in bacteriology and pathology may change the face of surgery in an unpredictable way. One has only to think of the absence of tuberculosis in surgical wards due to the discovery of streptomycin. Chemotherapy for malignant disease, already well established in choriocarcinoma and the lymphomas might radically alter the pattern of surgery. But during my service with the Joint Committee for Higher Surgical Training, we had to do some thinking about the future and we were forced to the view that some new specialities were likely to emerge over the next ten years or so.

The first is Traumatology — the oldest branch of surgery but the one in greatest disarray at the moment. The problem is that injury respects no anatomical frontiers. No one is better aware than yourselves that the victim of a road traffic accident may have cerebral, thoracic, abdominal and limb injuries, all requiring attention. In addition, the condition of shock from which he is suffering requires the help of a skilled resuscitation team.

What is the present position? He will be taken to the nearest hospital with a casualty department where he will be seen by a Casualty Officer who may be an S.H.O., a general practitioner or most entertaining of all, a University Lecturer earning a bit on the side by doing casualty sessions. At this stage, bleeding will be controlled, and a good airway established. An attempt will be made to assess his injuries. Then comes the problem of referral and disposal — general surgery, neurosurgery, orthopaedics, respiratory care? Wherever he goes he will be seen by a group of specialists each concerned with his special facet of the problem. The injury considered to be life threatening will be dealt with first, the others by stages according to their urgency. It is an unhappy and haphazard arrangement, often with transfer from one unit to another. The only continuity of care in the whole story is that of the anaesthetist. The argument put forward for this multi-

disciplinary approach to trauma is that of the special skills and there is no doubt that with present training programmes a general surgeon is illfitted to deal with a fractured femur or an orthopaedic surgeon with a ruptured spleen. But the skills of traumatic surgery are not complex; they are in general the control of bleeding and the repair of damaged tissues. During the last war many surgeons achieved great skill in exactly this field and if the speciality were established in civil practice they would do so again. The advantages of a clear and defined responsibility for all aspects of trauma are sufficiently obvious. A single opinion for the Casualty Officer to seek, a single area for admissions, but most important of all, a single team highly experienced in the management of shock, respiratory insufficiency, unconsciousness, cranial, visceral and limb injuries. It is a matter for debate as to whether, once the acute surgery has been undertaken, continuing responsibility should be in the hands of the traumatologists. There are arguments either way. The care of paraplegics is a very special problem best dealt with in paraplegic centres. The rehabilitation of limb injuries might also be best dealt with in special rehabilitation centres and the same might be said for post-traumatic brain damage. These arrangements are obviously capable of different solutions in different centres. But what is unequivocal is the unhappy state of accident services at the moment because of the lack of a clearly defined responsibility for the management of all aspects of acute injury and the lack of a defined ward area to which all seriously injured people should be admitted. I believe that the speciality of traumatic surgery will gradually overcome the prejudices of the general, orthopaedic and neuro surgeon, that a proper training programme will be organised and that every major hospital of the future will have its accident unit and department of traumatology.

The second speciality which is appearing on the horizon is that of clinical oncology or, to put it less pompously, the treatment of cancer, not only by surgery but by chemotherapy and radiotherapy. The natural history of malignant disease, its greatest variability in growth invasiveness, in its capacity to obstruct hollow tubes or cause space occupying lesions, its variable response to surgery, chemotherapy and so on makes it sensible that certain individuals should concentrate their energies on solving some of the problems. The

training of such an individual would have to be complex and prolonged. He would require a good insight into pathology, radiotherapy, chemotherapy and surgery and now a knowledge of immunology seems to be becoming mandatory. You may feel that this is a pretty tall order for any one individual. But one knows of individuals who have already achieved training of this type, notably the late Stamford Cade of the Westminster Hospital. He was an international figure in cancer therapy who could speak to radiotherapists in their own language and was an outstanding cancer surgeon as well. The present arrangement whereby patients with malignant disease are seen primarily by surgeons who carry out such surgery as they see fit and later call in radiotherapists, is far from ideal. Indeed, a case could be made out that cancer is not primarily a surgical problem at all but a systemic disease with local manifestations such as obstruction and ulceration which are amenable to surgical treatment. I would not wish to labour the likelihood of this speciality becoming established on any other than an occasional basis with special centres for the treatment of malignant disease staffed by dedicated individuals who have undergone the tough training required. But the remarkable results obtained in testicular tumours by Smithers and his group at the Marsden Hospital in London, make me feel that the development is desirable.

Finally, we come to the matter of surgical, or for that matter, anaesthetic, logistics, the art of deploying specialists and their skills to the best advantage. What does the future hold? If we look back at the past and extrapolate to the future, one thing stands out clearly. The period of apprenticeship is getting longer and longer. In the 19th century, a young man setting out on a specialist career, could expect to be on the consultant staff of his hospital in his late 20's or early 30's. William Harvey was a physician to St. Bartholomew's at the age of 28 and Gordon Taylor on the staff of the Middlesex at 29. At the inception of the Health Service it was visualised that the usual age for consultant appointment was 32. The average age in medicine and surgery today is 37 and many senior registrars have to wait longer than this. It is manifestly absurd to suppose that a young man of 18 requires a further 18 years of training to become a specialist in his own right. How have we got into this ridiculous situation? I am afraid that

the answer is that we are training too many specialists for the available vacancies and indeed for the available workload. There are a number of reasons for this but the principal ones appear to be two in number. First, the penalties of the early stages of specialisation are much less severe than they were before the inception of the Health Service. Before 1948, you either had to have private means or to be able to scrape together a bare living by tutoring and assisting, if you were aiming at a career in a speciality. This feeling of insecurity without any guarantee of a specialist appointment at the end of it, deterred all but the most determined candidates. In contrast a young man aiming at a specialist career now is guaranteed a modest but increasing and secure income during his training. The second reason, I am afraid, is that we consultants are delighted to have enthusiastic young men take over much of the tedious repetitive clinical work and much of the night work. So we have competed for helpers without having regard to their future. It is true that over the past few years the number of senior registrar appointments has been strictly limited but there is still little bar to the number of S.H.O. and registrar jobs. The problem of over-recruitment has been shifted to the left as it were. The government is naturally delighted to have a lavish supply of recruits to staff the hospital service since they know that however unfavourable the salary structure may be, there will be for the foreseeable future, at all events, no staff shortage. The only solution to the problem which I can see is to limit rather rigidly entry to training programmes at registrar level. This is a matter for actuarial skill — not for the B.M.A. or the Colleges. I know that a proposal of this type would be unpopular with consultants and junior staff alike. But have we any other choice? What could be worse than the agony of mind of a highly skilled senior registrar of 36 with a rapidly growing family and heavy financial commitments failing over and over again to achieve a consultant post and finally having to emigrate.

Mr President, it has been a great honour to be your guest speaker at this delightful meeting in the heart of our lovely country. I have tried to trace the evolution of a close professional bond between our two specialities. But, if I may say so, the bond goes far beyond our technical skills. Memories of disasters and triumphs shared bind us together,

with ties of loyalty and affection which transcends those between any other colleagues. Yours is a

great and growing speciality. I salute you and wish you well.

LIVER FUNCTION DURING ANAESTHESIA AND INDUCED HYPOTENSION

Induced hypotension and its effects have been a topic of perennial interest to research workers in this centre. Although cardiac output has been shown to be little affected by modern techniques, it cannot be assumed that certain regions of the body do not suffer a reduction in blood flow that could be harmful. This paper describes the development of a simple method to assess liver function in anaesthetised patients, and some of the results using this method.

Indocyanine green (ICG), a dye that is commonly used for cardiac output measurement, is used. It has the advantages that the blood concentration can be measured continuously and non-invasively, using an earpiece densitometer, that it is distributed only within the intravascular space of the body, and that it is rapidly and exclusively taken up by the liver. Thus, after the dye has become distributed within the intravascular space following an intravenous dose, the blood concentration decays in a simple exponential fashion. Figure 1 shows a typical experimental trace of the earpiece densitometer output against time (running from right to left). The rate of reduction in the blood concentration is determined by the liver activity, and may be expressed as the half-life of the ICG in the blood. As this value is the time that the concentration takes to decrease from any given value to half this initial value, the expression is independent of the absolute blood concentration, and thus it is not necessary to calibrate the densitometer in terms of absolute blood concentrations.

In an initial study, this method of using ICG uptake as an index of liver activity was used before and after cyclopropane administration. Cyclopropane anaesthesia has been shown to be associated with a reduction in hepatic blood flow, using the more invasive but more informative technique of constant rate ICG infusion, which necessitates catheterisation of a hepatic vein.¹

Eight patients about to undergo peripheral surgery were given an intravenous dose of ICG

whilst fasting prior to anaesthesia, and the reduction in blood concentration followed with the densitometer. Anaesthesia was then induced with a sleep dose of thiopentone, and anaesthesia was maintained by a nitrous oxide/relaxant/artificial ventilation technique. ICG uptake was measured again, and repeated after the administration of cyclopropane in oxygen. Although the induction of anaesthesia with nitrous oxide/relaxant anaesthesia was not associated with a significant change in the ICG half-life, cyclopropane caused a statistically significant increase from a mean of 3.85 minutes to a mean of 5.61 minutes. After demonstrating that effects such as those of cyclopropane could be detected by this method, ICG clearance was studied in patients about to undergo major gynaecological surgery for whom a hypotensive technique of anaesthesia is usually employed. The first ICG measurement was carried out, as before, in the fasting awake patient, and the second then performed during stable anaesthesia with the patient spontaneously breathing nitrous oxide, oxygen, and ½% halothane.

In four patients, hypotension was then induced by a lumbar epidural block via a previously introduced catheter, using 20 ml 2% lignocaine. In seven patients a slow infusion of 0.005% sodium nitroprusside was used. A similar degree of hypotension was achieved in each group of patients, measured by means of a sphygmomanometer. The results are shown in figure 2. No statistical significance could be attributed to any of the changes in ICG clearance whereas the circulatory effects were highly significant.

It is likely that the changes in ICG half-life associated with cyclopropane administration are caused by alterations in hepatic blood flow, as this effect has been demonstrated by other workers.¹ However, it cannot be inferred from the results of this study that a change in the metabolic capacity of the liver has not occurred as well. Nevertheless, it is clear that the effects of induced hypotension are more likely to cause alterations in hepatic

blood flow than in hepatic metabolic activity.

In conclusion, the analysis of the decay in blood concentration of ICG after a single intravenous bolus dose is a useful, sensitive, simple, and relatively non-invasive index of hepatic function, and induced hypotension with either lumbar epidural block or nitroprusside infusion has no

detectable effect on liver blood flow.

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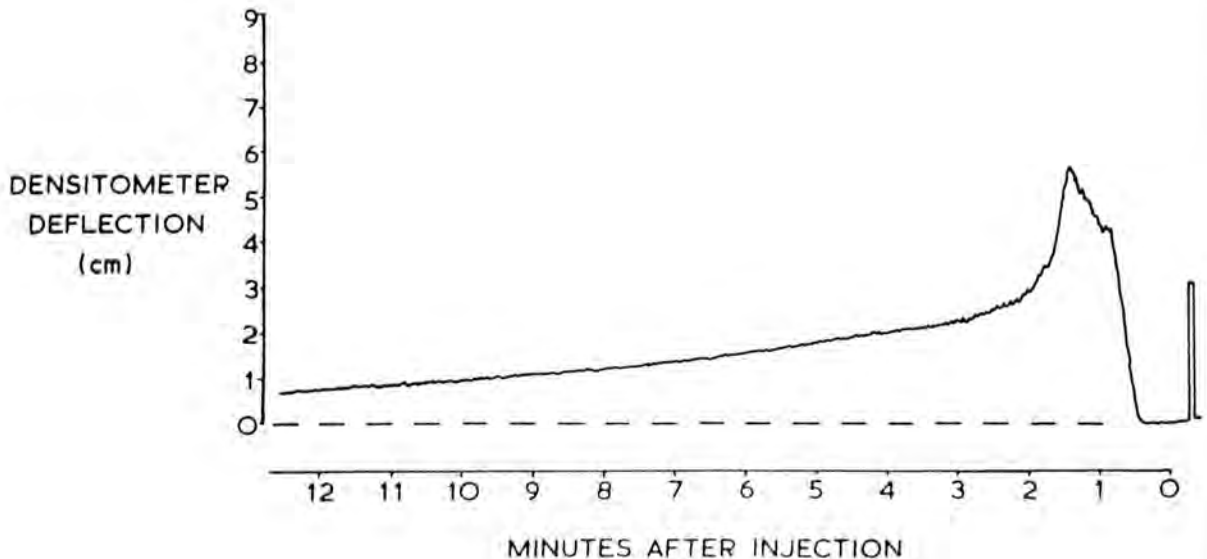


Fig. 1

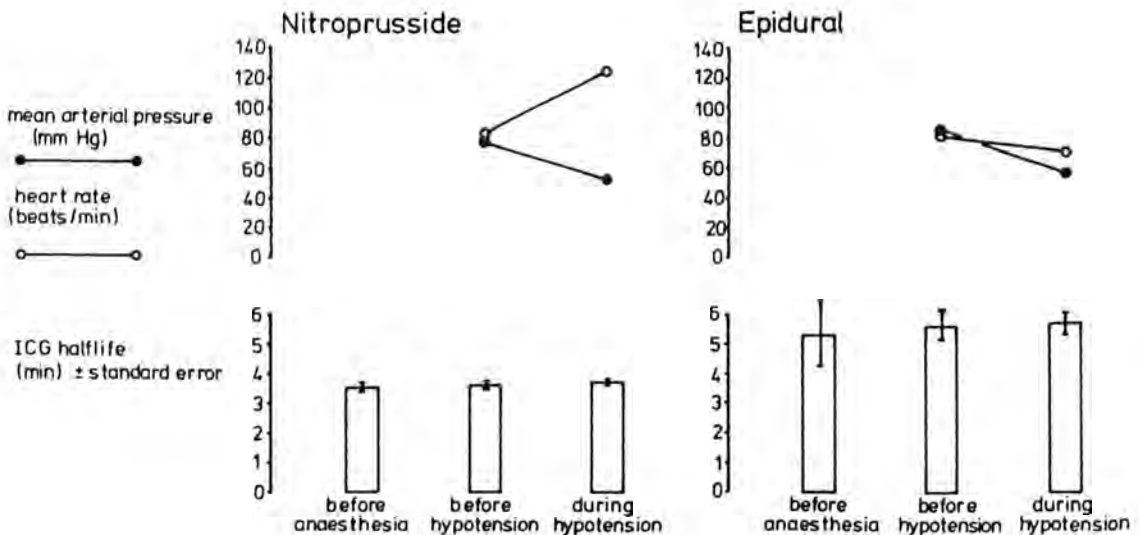


Fig. 2

BASIC SCIENCES AND ANAESTHESIA

HIGH ATMOSPHERIC PRESSURE: IMPLICATIONS FOR ANAESTHESIA AND DEEP DIVING

Dr. M. J. HALSEY

The basic sciences applied to anaesthesia have been concerned traditionally with the physics of gases and liquids, clinical measurement and clinical chemistry. However, in the research area there has also been increased activity in attempting to unravel the mechanisms of anaesthesia. This has involved anaesthetists and research workers from many diverse disciplines including pharmacology, physical chemistry and physiology. A specific understanding as to how anaesthetics act may lead to the development of safer and more flexible agents without undesirable side-effects. Eventually it may be possible for unconsciousness, muscular relaxation and analgesia to be induced and varied independently.

One of the "tools" that has been used in such research by several multidisciplinary groups of workers is high atmosphere pressure. The phenomenon of "pressure reversal of anaesthesia", as it has become known, has now been demonstrated in many different species. For example, a mouse can be anaesthetised with 1.5 atmospheres of nitrous oxide in a pressure chamber; if helium is added to the chamber until the total pressure is 50 atmospheres (equivalent to a depth of 1,500 ft in sea water) the mouse wakes up, in spite of the fact that the partial pressures of nitrous oxide and oxygen are essentially unaltered. This surprising effect is not due to some peculiarity of helium, because similar results have been obtained with aquatic animals, such as newts and tadpoles, where the pressure also can be applied directly by compression of the surrounding water.

This pressure antagonism of anaesthesia can be explained qualitatively by assuming that anaesthetics interact with the critical molecular site (or sites) of action for general anaesthesia and the resulting expansion can be counteracted by

increasing the ambient pressure. From a quantitative analysis of the results it is possible to define the compressibility properties of the site of action. The volume changes can also be related to the "phase changes" of lipids which are likely to influence the function of membrane-bound proteins.

Such molecular events associated with a simple expansion of the site of action may, in turn, affect the critical cellular processes for synaptic transmission such as neurotransmitter release and action, sodium potassium and calcium fluxes. The disruption of synaptic transmission in varying degrees throughout the nervous system together with the many associated feedback and controller systems will produce general anaesthesia with diverse side effects, dependent on the agent used.

These studies on the molecular mechanisms of anaesthesia have both long-term implications for clinical anaesthesia and a surprising immediate practical application in deep diving technology. The antagonism between pressure and anaesthesia is a mutual effect and it has been discovered that anaesthetics can ameliorate some of the adverse effects of high pressure encountered in dives below 1,000 feet of sea water. Routine working dives in the sea have yet to be extended beyond the 600 foot limit. There have been a series of successful experimental dives in American, British and French pressure chambers in the region of 1,000–2,000 feet using helium and oxygen. However, there are problems with "the high pressure nervous syndrome", which has been characterised clinically by tremor, dysmetria, fasciculation, myoclonus and microsleep. Some very recent experimental dives have deliberately added nitrogen to the breathing mixture as an anaesthetic additive, and have demonstrated that

many of these problems can be overcome. Furthermore, animal experiments have indicated that by adding sub-anaesthetic partial pressures of nitrous oxide the highest tolerated pressures can be at least doubled. The technique of anaesthetic additives may prove to be a major advance in deep diving technology.



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THE EFFECT OF TEMPERATURE CHANGES ON ANAESTHETIC POTENCY

Dr. VALERIE F LOOK

For several years workers interested in the biological implications of high hydrostatic pressures have demonstrated the use of such pressures as a means of exploring the mode of action of gaseous anaesthetic agents. Little has been done to make use of the thermodynamic equivalent — changes in temperature — as an exploratory tool. With the publication of a comprehensive review of the literature regarding changes in anaesthetic solubility with temperature (Allott et al 1973) it has become possible to examine more closely the results of the few published experiments in which gaseous anaesthetic agents have been used over a range of temperatures.

From results given for equipotent partial pressures at different temperatures it is possible to evaluate the change in partial pressure required only to offset the change in solubility of the agent. The "excess" change in partial pressure over and above this can be regarded as the solubility independent change of anaesthetic potency and may include the effect of the temperature change alone on the experimental subject. The experiments considered here are: the MAC values for dogs determined at different temperatures by Regan and Eger (1967); equipotent anaesthetic levels for goldfish reported by Cherkin and Catchpool (1964); the ED50 values for the luminous bacteria *Photobacterium Phosphoreum*

published by Flook et al (1974). Only in the latter experiments was the effect of temperature change itself on the experimental subject fully accounted for within the results.

The comparisons between change of equipotent partial pressure and change of solubility have been made on the assumption that the effective site of action of the anaesthetic agent is a lipid phase. The result of such a comparison with the ED50 values for luminous bacteria over a temperature range 5° — 35°C show that, within experimental error, there is no solubility independent change of potency for chloroform, methoxyflurane and halothane. The comparison for the results for dogs (27° — 37°C) and goldfish (10° — 30°C) experiments suggest small differences between equipotent doses and solubility changes for halothane, diethyl ether and methoxyflurane in dogs and these three agents and also chloroform in goldfish but these may not be statistically significant.

One of the more interesting models recently proposed for the mode of action of anaesthetic agents is the "free volume" model of Stern and Frisch (1973). This model proposes that the presence of an effective amount of anaesthetic agent at the appropriate site of action causes an increase in free volume greater than a certain threshold level. Equipotent partial pressures of anaesthetic agent must give rise to equal free

volume changes. The thermodynamic equation describing these relationships is

$$\ln\left(\frac{P_1}{P_2}\right) = \frac{\Delta H}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right) + \frac{\alpha(T_2 - T_1)}{\gamma_1 S_2 P_2}$$

Subscripts 1 and 2 refer to temperatures T_1 and T_2 . P is partial pressure of agent, R the universal gas constant, ΔH the enthalpy of solution, S the Bunsen solubility, α the compressibility of the solvent and γ the free volume change/unit concentration of solute.

This equation expresses mathematically the factors already considered. The first term on the right hand side describes the effect of changes in solubility on equipotent partial pressures. The numerator of the second term expresses the effect of temperature change alone on the site of action of anaesthetic action. The denominator of this second term describes the effect of the agent on the site of action.

In experiments in which the effect of changing solubility fully accounts for the change in equipotent partial pressures the second term on the right hand side is zero. This is the case in the luminous bacteria experiments. In the dog and

goldfish experiments this term may not be zero and can be used to provide information about the site of action. If all the anaesthetic agents act at the same site in an experimental subject (e.g. dogs) then the numerator of this second term is the same for all agents, $S_2 P_2$ can be calculated for each agent. This allows an estimate of magnitude of γ , the effect of solute on the free volume at the site of action. For both dogs and goldfish the values of γ rank in the same order, halothane, chloroform, methoxyflurane and diethyl ether the largest. Thus the site of action of the anaesthetics should have a molecular configuration in which the ranking of the free volume changes caused by those agents corresponds to the estimates made from these experiments.

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INTERACTION OF ENZYMES WITH GENERAL ANAESTHETICS

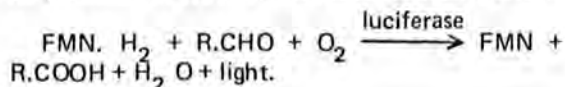
Dr. GILLIAN D. ADEY

Since Meyer (1899) and Overton (1901) demonstrated the correlation between the potency of anaesthetics and their solubility in olive oil, most theories explaining the mechanism of action of anaesthetics have postulated interactions of anaesthetics with lipids. Although Moore and Roaf (1905) suggested that anaesthetics form loose unstable complexes with proteins, it was not until the 1960's that anaesthetic-protein interactions received critical attention.

Inert gases and hydrocarbon anaesthetics bind to a variety of proteins and recent nuclear magnetic resonance studies (Barker *et al.*, 1975) have clearly shown that anaesthetics in low

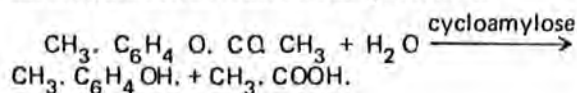
concentrations bind to specific areas on the haemoglobin molecule. It is likely that these areas are hydrophobic since anaesthetics have a high lipid solubility and it therefore seems reasonable to postulate similar areas exist in enzyme molecules. Thus, if the active centre of an enzyme is very hydrophobic, anaesthetics in clinical concentrations may selectively bind to this area and so alter the enzyme function. Such interactions may help to explain the mechanism of action of anaesthetics and also their toxic effects. We have, therefore, undertaken to investigate the effects of anaesthetics on the *in vitro* function of enzymes thought to have hydrophobic active centres.

The light output of luminous bacteria may be inhibited up to 50% by clinical concentrations of anaesthetics (White and Dundas, 1970). Luciferase, the enzyme responsible for catalysing the light-producing reaction may be purified, and in the presence of appropriate substrates light may be produced *in vitro* by the reaction shown below.



The velocity of the reaction is decreased by 50% in the presence of clinical concentrations of anaesthetics and the lower the concentration of aldehyde the greater is the inhibition exerted by a given partial pressure of anaesthetic. Such kinetic analysis demonstrates that the anaesthetic is acting as a competitive inhibitor of the enzyme at the aldehyde binding site. It is known that the aldehyde binding site on the luciferase molecule is very hydrophobic so it is therefore important to determine whether anaesthetics act as competitive inhibitors of the action of other enzymes with hydrophobic active centres.

A suitable system for exploratory examination is provided by the group of cyclic oligosaccharides known as cycloamyloses or "Schardinger Dextrins". They catalyse the hydrolysis of a number of esters, and this reaction has been advocated as a model for the study of enzymic mechanisms. Cycloamylose molecules are similar in shape to a doughnut, the substrate binding to the hydrophobic hole in the centre. The size of the central cavity depends on the number of monosaccharide units in the cycloamylose molecule. Cycloamyloses catalyse the hydrolysis of tolyl acetate, the overall reaction being as follows:



Anaesthetics in low concentration were shown to inhibit catalysis of this reaction by cycloheptamylose by as much as 53%. However, no inhibition could be demonstrated when the smaller cyclohexamylose was used as catalyst presumably because the anaesthetic molecule was too large to fit into the central cavity of the smaller oligosaccharide. By quantifying the experiments it will be possible to determine the relative importance of hydrophobic and steric factors in the binding of anaesthetics to cycloamyloses.

The exact molecular structure of several enzymes has now been elucidated and many of them (e.g. α -chymotrypsin) are available in a highly purified, membrane-free form. Therefore, by using these enzymes, in particular those with hydrophobic active centres, and determining which are inhibited by anaesthetics in clinical concentrations it should be possible to draw some conclusions about the factors that are important in determining the binding of anaesthetics to enzyme molecules. Further, it should be possible to predict from the enzyme structure whether its function will be altered in the presence of anaesthetic agents.

We thank The Wellcome Trust for supporting this work.

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BETA-ADRENOCEPTOR BLOCKADE AND THYROTOXICOSIS

Dr. P. D. BEWSHER

β -blocking drugs have been found to be particularly useful in the management of patients with

angina and hypertensive heart disease, probably by blocking the stimulation of β_1 receptors. The

reason why these drugs should also be effective in hyperthyroidism — a totally different type of syndrome — is the fact that the effects of increased circulating levels of thyroid hormones are closely related to apparently increased adrenergic activity. The precise nature of this relationship is not known but it now seems unlikely that elevated levels of thyroid hormones increase the sensitivity of tissues to catecholamines, as previously thought.

In addition to the sympathetic mediated action it appears that thyroid hormones have direct effects on many tissues and it is perhaps these direct effects that are responsible for the inability of β -blockers to wholly control the disease process in hyperthyroidism.

The first attempts to control hyperthyroidism through the autonomic nervous system were surgical. In the latter part of the last century, cervical ganglia and sympathetic trunks were being removed in preference to the thyroid gland. In the 1920's, adrenalectomy and adrenal denervation were carried out. In the 1940's, high spinal anaesthesia was recommended during surgery for thyrotoxicosis, and had been used in the treatment of thyroid crisis.

In 1954, reserpine was the first drug used to reduce sympathetic activity in thyrotoxicosis and was used to prepare patients for surgery. In 1962 guanethidine was found to be effective whereas methyl-dopa was not. With the introduction of propranolol, β -blockade was shown to modify many of the clinical features of thyrotoxicosis without some of the side-effects associated with earlier autonomic blocking drugs. The β -blockers most frequently used in thyrotoxicosis are propranolol (of which we have most experience), oxprenolol and practolol.

The clinical features of hyperthyroidism which are most consistently improved by propranolol are heart rate, systolic blood pressure, cardiac output, finger tremor, certain eye signs, sweating, myopathy, nitrogen balance and subjective features such as palpitations, heat intolerance, tiredness, irritability and effort dyspnoea.

Two important features of hyperthyroidism not generally affected by β -blockade need to be mentioned. The oxygen consumption and basal metabolic rate are not reduced by these drugs, and the patients remain metabolically thyrotoxic. In addition, β -blockade does not affect thyroid

hormone synthesis and release and the patients remain biochemically thyrotoxic.

The two important side-effects of propranolol therapy are the precipitation of cardiac failure and bronchospasm.

Some of the indications for the use of propranolol in hyperthyroidism are as follows:—

1. During confirmatory tests. Since β -blockers do not affect iodine kinetics in the thyroid gland, it is possible to produce a symptomatic improvement in patients with suspected hyperthyroidism while confirmatory tests are being carried out.

2. During radioactive iodine therapy. Propranolol can be started before the treatment is given and continued until the patient is biochemically euthyroid.

3. Long-term care. Used in two series of patients, but not recommended because of the continuing elevation of oxygen consumption.

4. Adjuvant to partial thyroidectomy. Patients may undergo operation within a few days of starting propranolol treatment if a satisfactory response is obtained. The drug is continued for seven days after operation.

5. Thyroid crisis. Though rare now, this condition is an urgent indication for β -blockade along with other recognised supportive measures.

Practolol, a cardioselective β -blocking drug with a lower tendency to induce cardiac failure and bronchospasm, is theoretically unsuitable for the management of thyrotoxicosis. We have tested this hypothesis by a double-blind cross-over study in 21 thyrotoxic patients, comparing four weeks' treatment with practolol and four weeks with propranolol. The drugs were equally effective in lowering the scores on the Wayne Diagnostic Index and the Taylor Anxiety Scale and in prolonging the ankle reflex time. Pulse rate, blood pressure and finger tremor were improved more by propranolol than practolol and propranolol caused a significant reduction in the serum level of tri-iodothyronine. Practolol was more effective than propranolol in lowering the serum glycerol levels and in improving the eye signs, whereas neither drug affected the frequency of bowel motions and the serum levels of thyroxine, cholesterol, triglyceride and calcium.

The study demonstrates that practolol is effective in relieving the symptoms of thyrotoxicosis, with less risk of side effects than propranolol. Although, with the recently described

serious adverse reactions to practolol, its use in future will be limited, the findings suggest that

newer cardioselective β -blocking drugs may be of value in thyrotoxicosis.

B-ADRENERGIC BLOCKADE AND PARTIAL THYROIDECTOMY FOR THYROTOXICOSIS

Dr. I. SMITH

The treatment of thyrotoxicosis is in a state of flux. Long term antithyroid drug therapy (Astwood) is labour intensive and remission for the individual cannot be foretold. It does not influence the fundamental nature of the disease, and recurrence with thyro-cardiac damage in later life, is a distinct risk. Radio-iodine therapy is inexpensive and easy to administer but since it acts by interference with the replicative mechanism of the thyroid follicular cell, the end result is predictably hypothyroidism in all patients if followed for sufficient time.

Thyroidectomy also has its complications notably hypothyroidism in 25%. Over 70% of patients return to normal, which is in contrast to post-radiation hypothyroidism whose incidence progresses relentlessly. Further advantage to the surgeon has derived from preparation for surgery with Beta-adrenergic blockade. Propranolol rapidly controls the toxic symptoms but hormone synthesis and laboratory indices are not affected, so that treatment of the toxic state can start while investigations proceed. Assessment of the patient prior to operation must be gauged solely on clinical grounds.

In the last 5 years, over 180 patients have been prepared for surgery using propranolol, initially with carbimazole and iodine. The next step was to simplify treatment by omitting first carbimazole and then iodine, and for the last two years the majority of patients have been prepared for thyroidectomy with propranolol alone. The dose is 40 mg orally 6 hourly.

There are economic advantages in the saving of patients' time and hospital resources. The number of outpatient attendances has fallen from 9 to 3 and the mean duration of treatment was reduced

from 314 days to 25 days. With increasing experience the whole thyrotoxic illness can now be over in 10 days — 5 days preparation with propranolol and 4 or 5 days in hospital for partial thyroidectomy. Patient behaviour is no different from that after traditional methods of preparation. For the surgeon the gland is firm and pliable, easily dissected and less friable. Blood loss is minimal — as low as 20 ml.

Various anaesthetic techniques have been employed satisfactorily and patients were carefully monitored. With propranolol pulse rate is about 10 beats/minute slower than with carbimazole. Pulse rate throughout operation is extremely stable under propranolol, and blood pressure changes are minimal. No dysrhythmias were seen during intubation or cuff inflation even after the surgeon had injected adrenaline into the neck, compared with the usual incidence of 20 — 25%.

Propranolol causes a fall in cardiac output due mainly to a fall in heart rate.

Under anaesthesia, cardiac output of propranolol pretreated patients is high, at 5 — 5½ litres/minute per 70 Kg. compared to carbimazole pretreated patients whose cardiac output is within the normal range of 2.5 — 4 litres/minute per 70 Kg. Clinically, we have seen no signs of cardiac failure during anaesthesia. The cardiovascular system, therefore, is hyperdynamic but stable under propranolol, with excellent protection against dysrhythmias.

Precautions

Asthma and cardiac failure are standard contraindications to beta blockade. Pre-operative *clinical* assessment is essential to ensure that the toxic manifestations are blocked, that pulse rate has

fallen to normal, and that the patient has not developed cardiac failure. 40 mg. of propranolol *must* be given orally at 6 a.m. on the morning of operation, repeated if the operation is delayed, and resumed as soon as possible post-operatively. If atropine is not used in the premedication to

prevent vagal dominance it may be required intra-operatively. Finally, we found that propranolol was ineffective in one patient on amitriptyline — just as the pharmacology books say!

PROBLEMS OF FLUIDIC TECHNOLOGY AND VENTILATOR DESIGN

Dr. H.J. MANSON and Dr. D.G. ROSS

Fluidics is a branch of engineering which uses fluid (in ventilators, gas) flow phenomena to transmit power and process information (Foster and Parker, 1970). Many workers, but not all, would restrict the term "fluidic" to devices without and "pneumatic" to devices with, moving parts. This has led to confusion e.g. the Celog respirator, often described as "fluidic" is in part a pneumatic logic respirator (de la Bastaie, 1970).

Our design policy has been to use moving parts only at the interface between control and patient gas.

Advantages of fluidics in ventilator design include:-

- (1) Reliability due to lack of moving parts and the use of an already essential gas power source. The gas supply must be filtered, and the system enclosed.
- (2) Speed of operation is superior to mechanical and pneumatic systems.
- (3) Development cost is low if "building blocks" of individual fluidic devices are used.

Some of the disadvantages are:-

- (1) Speed of operation cannot compete with electronic systems.
- (2) High cost of complex designs and integrated circuits.
- (3) Gas consumption is high with discrete components.
- (4) Limited power handling.
- (5) Circuit design problems e.g. lack of diode and capacitor analogues; non-linear impedance in connecting lines.

The scattered literature on the subject, large amount of unpublished research, as yet unstandardised symbols and the tendency for manufacturers' data to be incomplete also hamper progress.

Pure Fluid Respirators

Several designs have been used:

- (1) Planar designs e.g. the American Army Respirator (Mushin et al, 1969). These ventilators are noisy, have a high gas consumption and low peak flows: they are now more or less restricted to "respiratory assist" devices.
- (2) Annular bistable design (Bushman and Askill, 1971).
- (3) We made preliminary experiments with a three dimensional Coanda effect ventilator. The driving gas attached to a "spike" to form a jet. It had the following characteristics:
Supply pressure 60 p.s.i.g.
Gas consumption 30-40 L/min.
Inspiratory pressure up to 40 cm. H₂O.

These figures could probably be improved but stable control of the jet was difficult and the jet entrained room air (as would designs 1 and 2 above).

Hybrid Designs

These use moving parts to control patient gas flow. The "Airox R" (Fchter, 1970) employs a "step up" pneumatic valve to control primary flow

in an ejector, which is satisfactory for a pressure cycled device.

"Bag in Bottle" designs have been used but require four moving parts and have led to high gas consumptions.

We have tried a minute volume divider using two diaphragms to control patient gas flow from a 12 L discharging compliance. The waveform obtained was not very satisfactory. We also learned that Servo PEEP mechanisms "chatter" due to lung time constants. Most importantly moist patient gas if used as a signal causes fluidic devices to malfunction, unless interfaced by filters (which

reduce sensitivity), moving part (diaphragm) interfacing devices or by bleeding gas into the patient circuit (which alters the parameters being measured).

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REPORT OF THE STANDING COMMITTEE SCOTLAND OF THE FACULTY OF ANAESTHETISTS

The Scottish Standing Committee of the Faculty of Anaesthetists has held three meetings during the year under the Chairmanship of Professor J. D. Robertson. One of the items which has taken up some time is the National Medical Consultative Committee (N.M.C.C.). Under the reorganised Health Service, committees continue to proliferate. The N.M.C.C. is one of eight consultative committees set up to advise the Scottish Health Services Planning Council and it has itself spawned eleven Specialty Sub-committees, one of which is for anaesthesia. This sub-committee which is to hold its first meeting very soon is composed of the elected members of the Scottish Standing Committee, who were nominated by the Scottish Conference of Colleges and Faculties, together with members nominated by the N.M.C.C. who represent a wide range of anaesthetic interests in Scotland. They are Dr. Murray Lawson (Dundee), Dr. Booth (Inverness), Dr. Kier (Dumfries), Dr. Beaton (Stirling) and Dr. Murchison (Junior Staff, Glasgow). The exact function of this sub-committee and its relationship to established anaesthetic groups such as the Scottish Society of Anaesthetists and the Scottish Standing Committee will require to be defined at an early date.

Negotiations proceeded during the year with the Scottish Home and Health Department on the question of Regional Anaesthetic Assessors for the confidential enquiry into maternal deaths. After

further consideration, it was decided to recommend that there should be two assessors and not five as originally envisaged. The S.H.H.D. agreed and Dr. Donald Moir and Dr. Bruce Scott have now been appointed. After consultation with interested parties, a new report form has been drawn up and will come into use from October 1975.

The Course on Measurement which was held in Edinburgh in January was again successful but it has been decided that, should future meetings of this kind be held, they should be organised and run within Scotland from the facilities available here, provided adequate funding can be arranged.

A number of other topics have been discussed including the date of the Primary examination, General Practitioners in the Hospital Service and the recent election of members to the Board of Faculty. It was felt that, while Scottish anaesthetists had no wish to claim special privileges in representation, their special and different interests required that there should be some direct representation on the Board. This matter will assume great importance in 1977 when Professor Robertson retires from the Board and it will be kept under review.

We wish to put on record our appreciation of the services rendered to the Scottish Standing Committee and to Scottish anaesthesia by Professor A. C. Forrester who retired from membership of the S.S.C. on his retirement from

m) the Board of Faculty. We also wish Scottish
he anaesthetists to know of the help and personal
ng interest shown by the Dean, Professor J. G.
Robson and the Vice Dean Dr. Andrew Hunter,

one or other of whom has attended each of our
meetings and aided our deliberations.

A.H.B. Masson, *Honorary Secretary*

SCOTTISH COMMITTEE FOR HOSPITAL MEDICAL SERVICES

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Dr. I. A. Davidson reported to the Annual
General Meeting of the Society in April, that the
two major items of interest to the Society during
74/75 were, firstly the fees payable for anaes-
thetists in Local Authority Clinics and secondly
Distinction Awards.

Dental Fees

Although there appeared to be some early
progress on this point, more recent reports from
the C.C.H.M.S. would indicate that little success
has been achieved regarding higher fees for
consultant anaesthetists.

Distinction Awards

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Progress has been made on two points, firstly
re-organisation of the method of awarding C
awards along similar lines to those adopted in
England. There is now a Committee representing
all regions and specialities who will make
recommendations for C awards as well as the
specialty committees. Secondly there has been a
slow but none the less sure improvement in the
number of awards to anaesthetists. Any further
improvement is likely to be curtailed by the
present economic climate although the committee
will continue to recommend doctors for C awards.
These will be notional at present as there is no
money to award! Forms will be sent out again
during 1976 and it is clear that awards can only be
made if the form is filled in!

Increments

The economic situation has also affected the
new incremental scale so that those over the first
increment will not receive any further improve-
ment in salary meantime, whether there will be a
retrospective payment after the crisis remains in
doubt. There will be no retrospective payment for
those whose distinction awards were only partially
raised in the last review body report. It would
appear unlikely that the review body will report in
1976.

Junior Doctors Contract

Although at the last meeting of the S.C.H.M.S.
this appeared to have been amicably settled, at the
time of writing this report there is considerable
conflict both among Junior Doctors and between
them and the government. It is hoped that an
amicable settlement will be reached by the time of
publication.

Independent Practice

There appeared to be unanimous condemnation
of the "Consultative Document" and all it stands
for. Although private beds within N.H.S. hospitals
are a relatively insignificant matter in Scotland the
general feeling was that even their abolition should
be resisted, as it appeared to be the thin end of the
wedge.

Devolution

The white paper is to be published soon and
from press leaks so far it is almost certain that
Health & Social Services will be devolved. The
committee felt that in Scotland we in the Health
Service do very well when negotiating with our
colleagues South of the border. In cases such
as staffing we do relatively better. It was felt this
collaboration should continue and any financial
differences between Scotland and England that
might occur as a result of devolution, would only
spell disaster for Scotland.

Q.D.A.s

It would appear that most regions have come to
terms with the institution of the O.D.A.s, however
it was pointed out that the Lewin Report gave
permissive directions for the employment of
O.D.A.s and did not make this compulsory.

Anaesthetists continue to be well represented at
the S.C.H.M.S. and I am now the Society's
representative in place of Dr. Davidson who now
appears for the Lothians.

Douglas Arthur

CENTRAL COMMITTEE FOR HOSPITAL MEDICAL SERVICES

ANAESTHETIST SUB-COMMITTEE

This sub-committee usually meets three to four times and this is the third report, submitted to the Newsletter, about the issues which have been currently under consideration. Such is the turmoil, that our profession seems to have been in now for some years, I find that, as I said in my report last year, that our wide-ranging discussions seem to be swamped by the troubles of the times — e.g. the contract dispute, "the work to contract", the Review Body Reports and their relation to the financial state of the nation and most recently the junior doctors dispute with the Government.

However, some of the apparently less dramatic issues are important also and the Sub-Committee continues to press for their solution. Indeed, it has been complimented by the parent Committee on more than one occasion for its efforts in our interests.

Work of the Sub-Committee 1974—75

(i) *Part time training and Consultant Posts for Women Doctors*

After discussion at several meetings, recommendations were forwarded to the Faculty and the Joint Committee for Higher Training. The main points of these are that, post-graduate training for Senior Registrars should have as its object the return of the trainee to a career post, that the training criteria be more stringent and that there should be competitive interviews for these S.R. posts. Part-time consultant posts were not considered to be ideal where continuous care is considered to be essential. However, it was thought that one post shared between two consultants (i.e. a partnership) might be possible.

(ii) *Dental Anaesthetic Fees*

Progress with this problem continues to be slow and difficult due to a number of factors, not the least of these being problems with our dental colleagues and the financial state of the N.H.S. at present. All this tends to make attempted changes in the method of

remuneration difficult, but pressure is continuing and every possible method of approach to achieve a solution is being explored. A number of welcome letters have been received from interested anaesthetists on this subject as are, indeed, all communications from colleagues on any of today's problems in the specialty.

(iii) *Consultant Anaesthetists' Workload*

A much discussed and revised memorandum on this subject has been sent to the Association of Anaesthetists for circulation and copies have been sent to the C.C.H.M.S. and the H.J.S.C.

(iv) *Sessional Fees for Dental Anaesthetists*

Following a query from the S.C.H.M.S., the Sub-Committee resolved and the C.C.H.M.S. later accepted that;

- (a) Ideally, all general anaesthetics should be administered by a practitioner with general specialist training and expertise and efforts should be made by local authorities to ensure suitably trained specialists are employed where possible.
- (b) Where a specialist practitioner is so employed, he should be remunerated at specialist sessional rates.
- (c) The possession of a D.A., would qualify the holder to be graded as a specialist in this area of work.

The author of this report is at present the only anaesthetist from Scotland who is a member of this Sub-Committee but steps have been taken, with the approval of the C.C.H.M.S., to ensure that, should there not be a Scottish anaesthetist who qualifies to be on the Sub-Committee (by virtue of membership of the B.M.A. Council or the C.C.H.M.S.) then a Scottish anaesthetist could be co-opted from the S.C.H.M.S. to ensure that views from the North are heard.

The Chairman and Vice-Chairman of the Sub-Committee for 1975—76 are Dr. M.J. Coplans and Dr. E.B. Lewis respectively and any points which

colleagues wish to bring to the notice of the Sub-Committee can be sent either to me or directly to the Sub-Committee at B.M.A. House

in London.

Donald Beaton

Registrar's Prize

The Society awards annually a prize of £60 for the best original paper submitted by an anaesthetist in Scotland, holding the grade of Senior Registrar or under. A second prize of £30 or a third of £10 may be awarded for other papers of particular merit at the discretion of the assessors. It is not necessary that the Registrar be a member of the Society.

The conditions attaching to the award are as follows:—

1. The paper must be original, i.e., it should not have been read previously at any meeting or published in any journal. The winning of the prize is in no way a bar to the subsequent publication of the paper.

2. It is desirable that papers submitted show evidence of personal work, but papers consisting of surveys of the literature are eligible for consideration. The Council of the Society wishes to stress that intending competitors should not be discouraged through fear of their efforts being judged elementary. It is fully realised that junior anaesthetists in some peripheral hospitals may not have opportunities to deal with special types of

cases or to employ advanced anaesthetic techniques.

3. Papers for adjudication *must* reach the Secretary by the *end of February* at the latest.

4. The winner of the prize will be required to give a digest of the paper at the Annual General Meeting of the Society towards the end of April.

The Secretary places all entries in the hands of the Award Committee which consists of the President, Vice-President and Past President. The members of this Committee have expressed the desire to be able to adjudicate without knowing the name or hospital of the writer: it is requested therefore that the name, address, etc., of the entrant be submitted on a separate covering page. This will be retained by the Secretary, but otherwise the essay itself should give no indication as to its source: acknowledgment to colleagues, etc., should not be included.

Dr. G.B. Drummond of the Royal Infirmary, Edinburgh, won the Prize for 1975 for his paper "Liver Function during Anaesthesia and Induced Hypotension". An award was also given to Dr. E.L.I. Lloyd of the Royal Infirmary, Edinburgh for a paper entitled "Rewarming from Immersion Hypothermia".

Editorial

I should like to begin these notes with an appreciation of the work done for the Society by Dr. Iain Davidson who edited the Newsletter for the last four years. This was a period of expansion and innovation for the Newsletter and enhance-

ment of its primary function of keeping the members informed of the Society's activities. It is the new editor's hope that he will be able to maintain the high standard set by his predecessor. May I also express my thanks to all those who

contributed to this issue of the Newsletter.

The year, in following a now familiar trend, has been one of great change for medicine, but a plethora of reports had done little to lessen the problems confronting the profession and may even have added to them by encouraging medical emigration to North America. Indeed, one could be hard put to find much to enthuse over in a year in which the Owen Working Party failed to produce a Consultant Contract, the Government's "voluntary" incomes policy froze our salary increments and Mrs Castle produced her so called consultative document on private practice. In addition, more than a year of N.H.S. reorganisation seems only to have achieved a further lowering of morale in the hospital service and increased resentment for an Administration which has become vast, remote and at times, evasive. Now, in this period of economic restraint, having been told that the prospects for the financing of the Service are bleak and that rationing of resources is inevitable, we await another consultative document on priorities. One can only hope that, if standards are not to be allowed to fall any further, cutbacks in this already under financed Service will not be in areas directly concerned with patient care.

It would be wrong, however, to give the impression that the year was a complete catalogue of gloom. Of particular interest to anaesthetists must have been the statement of the President of the General Dental Council deprecating the

practice of operator-administered general dental anaesthesia and the proposal of the Merrison Committee to give the Faculty of Anaesthetists direct representation on the General Medical Council.

Finally, it is worth noting that just about the only thing not to have changed in these inflationary times is the Society's subscription, an achievement which surely calls for our gratitude to those who have managed the Society's affairs.

Dr. WALTER NORRIS

Editor of Newsletter 1967-70

Dr. Walter Norris, Consultant Anaesthetist at the Glasgow Royal Infirmary died on the 5th February, 1975, after a long period of ill health. It is unnecessary to list his well known and unparalleled contributions to the Specialty both locally and nationally in teaching, research and political representation. Suffice it to say that in this respect he is almost irreplaceable. More importantly perhaps, his colleagues and friends in the Scottish Society have lost a wise and true friend who will always be a sterling example of the pursuit of the highest ideals of medicine in general and anaesthesia in particular.

News from the Regions

Western Region

The events in the Western Region this year were overshadowed by the death of Dr. Walter Norris in February. Dr. Norris, who had been guide, philosopher and friend to so many of us all will be sadly missed not only in the Royal Infirmary, but also by his so many friends in the Medical and Nursing professions throughout the country. A tribute to Dr. Norris, a former Editor of this Newsletter appears in this issue.

Work continues on the new hospitals — Monklands Hospital, Coatbridge and Rutherglen Maternity Hospital nearing completion, while Phase I, Glasgow Royal Infirmary, has appeared above ground. Technical problems still prevent the new Western Infirmary block becoming fully operational, these we hope will be overcome in the near future.

Several new consultant appointments have been made during the last few months; Dr. Rhoda Shearer to Law Hospital, Dr. John Murray to a new consultant appointment in Falkirk while Dr. Laurie Smith succeeded Dr. Walker in Ayrshire. Dr. W. G. Anderson recently became a Consultant in Glasgow Royal Infirmary.

There are changes too, in the academic world. Professor R. A. Millar is to take up an appointment in Newfoundland in the New Year and Dr. Graham Smith and Dr. W. Fitch have been appointed Senior Lecturers at the Western Infirmary and the Royal Infirmary respectively. Dr. Alastair Spence continues as Editor of the British Journal of Anaesthesia and Dr. Donald Campbell has been appointed to the Council of the Association of Anaesthetists of Great Britain and Ireland.

This year has seen some slackening off in the Trans-Atlantic exodus, but becoming detectable is an interest in the "short sea crossings" to the Common Market countries.

The year's major sporting event, the Galley Trophy Golf Outing, was held in torrential rain. The winner was Dr. John P. Vance by several strokes. It is perhaps worth noting that despite the decidedly inclement weather, all the competitors completed the course.

Tayside Region

The Department in Dundee has now settled into their new quarters at Ninewells Hospital and all other specialties that were to move from D.R.I. have now done so. The development at D.R.I. has not progressed as quickly as was expected, but matters are now on the move.

We enjoyed having the Registrars' Meeting in the new environment and the large attendance of junior staff appeared to have a profitable day.

The new artificial ventilation unit should be completed in about twelve months' time. The increase in the number of beds available and the move from its present rather cramped quarters will be most welcome.

In Perth, Dr. Laurie has retired and we welcome Dr. Brown as consultant in his place.

Dr. Margaret Wood is leaving for a year's visit to Nashville, Tennessee, while Dr. A. Houghton should be returning from Montreal.

Grampian Region

We welcome Dr. W. N. Rollason, past president of our Society back among us after his sojourn in Edinburgh earlier this year. The department in Aberdeen was pleased to act as hosts this spring to the Dublin Anaesthetists' Travelling Club and to the Scientific Meeting of our Society.

Another visitor was Dr. Mohandespour from Iran who spent 6 months with us before moving to Reading. Dr. W. F. D. Hamilton, Senior Registrar has spent a sabbatical year at the University of Calgary, and we offer our congratulations to Dr. T. W. Ogg on his appointment as consultant in Cambridge. Dr. Ogg's appointment coincided with favourable F.F.A. results for three of our registrars, an excellent reason to have a departmental party for "Ken, Tom, Dick and Henry".

On a more general note, the shortage of recruits to our specialty in recent years which we ascribed to the oil boom and cost of housing in Aberdeen has been reversed, and we now have a surplus of local graduates interested in our specialty. Similarly the acute shortage of nurses which caused the closure of 146 beds in the Royal Infirmary last year, has eased a little and some of

the wards have reopened. However, the long term nursing shortage remains and it seems impossible to recruit the extra several hundred nurses required to open Phase II of the Royal Infirmary. The Health Board, therefore, appointed a Committee of Inquiry to advise them on the future provision of health care in the region. The proposals made by the Weir Committee are being discussed by the various advisory committees and the final decision of the Board will have long term effects on medical care throughout the area. The most controversial suggestions concern the possible closure of the Royal Aberdeen Childrens' Hospital and some peripheral hospitals in order to allow the new building to be opened. In Phase II there will be an Intensive Care Unit, four theatres, the Anaesthetics Department, Neurosurgery, Casualty and the University Departments of Medicine, Therapeutics, Obstetrics and Gynaecology. The University has also established this year an Institute of Environmental and Offshore Medicine, but at the date of writing none of us has been called to anaesthetise a patient on an oil rig!

Highland Region

No further progress appears to have been made in the Phase II hospital buildings, but considerable improvement has occurred in the staffing of the operating theatres. Recruitment has been better and the standard of recruits good. A training programme is being set up and appears to be appreciated by the participants. The theatre Users' Committee is well established under the chairmanship of Dr. Booth.

Dr. Howard Spenceley joined the staff in May from Edinburgh, his Consultant post being a newly established one, and the Registrar post was filled in November by Dr. Eileen Mills. We congratulate Dr. John Machin on passing the final F.F.A. examinations and on his recent appointment as Senior Registrar in Anaesthetics in Nottingham.

Editor:

We note the subtle name change of our representative from Inverness. We congratulate Dr. Sheelagh White (nee Wilson) on her marriage earlier this year.

South-East Region

The last year has been a mixed one for anaesthesia, as it has been for the profession as a whole. The new organisational structure is beginning to settle down but the uncertainties of

the political and financial climate remain disconcerting. Edinburgh has been lucky in that it has remained free from the major confrontations which have occurred in other parts of the Health Service. On the credit side Phase I of the new Royal Infirmary is now under way and consists of a large flat area sprouting an enormous crane.

Changes in personnel have taken place with regularity, particularly in the junior grades and the department now has a distinctly international flavour. Three of our senior registrars, Drs. Buchan, Butchers, and Lloyd have been appointed to new consultant posts in Edinburgh with sessions in the Royal Infirmary and other hospitals in the South District. These posts have been needed to cover extra commitments in paediatric cardiac surgery and intensive care, and to staff the new orthopaedic theatre at Princess Margaret Rose Hospital. Dr. Ashley Macdonald, having experienced another Edinburgh winter decided that Canada was more attractive and has returned there, this time for good. Dr. Henry Bauld is also in Canada on a year's appointment in Edmonton but is expected to return. Dr. Rae, having anaesthetised gynaecological patients in ward 34, R.I.E. for about a quarter of a century has decided that enough is enough and has started what we hope will be a long and pleasant retirement.

This year the Christmas party took the form of a buffet supper and dance in the Masonic Lodge, Hill Street. By special arrangement the services of a group, flushed with their success in the Edinburgh Festival Fringe, were obtained to provide music and entertainment. This was greatly appreciated and added much to what was a very enjoyable evening. It would be appropriate to record our thanks to those, who over the years, have ensured the success of these events by their hard organisational work and financial genius.

Difficulty was experienced in finding a suitable date for the Golf Outing, held this year at Baberton. After two changes the organisers were able to provide the worst weather of the summer and the rounds were played in torrential rain. This proved useful in separating the men from the boys and it must be recorded that the stamina and devotion to duty shown by the majority was quite remarkable. The prize was won by Dr. Masson and it is understood that the handicapping system is to be revised next year.

GLASGOW AND WEST OF SCOTLAND
SOCIETY OF ANAESTHETISTS

Curriculum 1975-76

1975

Thursday, 9th October

Golf Outing - Williamwood Golf Club, 2 p.m.

Saturday, 18th October

Combined meeting with Edinburgh and East of Scotland Society of Anaesthetists.

Professor David L. Bruce, Chicago: "Occupational Exposure to Anaesthetics", at 5 p.m. at the Royal College of Physicians and Surgeons of Glasgow. A Sherry-Reception and Dinner will be held in the College Hall after the meeting.

Tuesday, 2nd December

Dr. H.H. Pinkerton - "The Changing Face of Anaesthesia over 50 years".

1976

Wednesday, 14th January

Surgeon-Commander David H. Elliott, O.B.E., R.N. "Some Disorders of Respiration following Decompression".

Thursday, 12th February

Members' Night: Division of Anaesthesia, Victoria Infirmary.

Wednesday, 10th March

Dr. I.A. Levy: Presidential Address.

Tuesday, 20th April

Annual General Meeting.

Unless otherwise stated, meetings will be held at the Royal College of Physicians and Surgeons of Glasgow, 242 St. Vincent Street, at 8.15 p.m.

Tea will be available at 7.45 p.m.

Notice of each meeting will be sent to members.

EDINBURGH AND EAST OF SCOTLAND
SOCIETY OF ANAESTHETISTS

Syllabus 1975-76

1975

Saturday, 18th October

Combined Meeting with Glasgow and West of Scotland Society of Anaesthetists in the Royal College of Physicians and Surgeons of Glasgow, 242 St. Vincent Street, Glasgow, at 5 p.m.

"Occupational Exposure to Anaesthetics"
Professor Bruce, Chicago, U.S.A.

A Sherry Reception and Dinner will follow the meeting.

Tuesday, 18th November

Presidential Address.

Tuesday, 2nd December

"Spinal Anaesthesia" Dr. R. Bryce-Smith, Oxford.

1976

Tuesday, 6th January

Symposium on "Death Associated with Anaesthesia and/or Operation"

Mr. N. Milne, Procurator Fiscal.

Dr. R. Nagle, Police Surgeon.

Dr. A.H.B. Masson, Consultant Anaesthetist.

Sherry will be served at 7.45 p.m.

Tuesday, 10th February

Members' Night.

Tuesday, 2nd March

Visit to the British Oxygen Company in Glasgow.

Friday, 12th March

Annual Dinner

Tuesday, 20th April

Annual General Meeting. This meeting will start at 7.30 p.m.

Meetings will be held in the Royal College of Surgeons, Nicholson Street, Edinburgh, unless specified otherwise.

Tea at 7.45 p.m. for 8 p.m.

NORTH-EAST OF SCOTLAND SOCIETY OF ANAESTHETISTS

Syllabus 1975-76

1975

Thursday, 16th October – Stracathro
"The Physiological Operating Theatre" Dr. E. Gardner.

Thursday, 20th November – Aberdeen
"Mechanisms of Anaesthesia and the Credibility of MAC" Professor R.A. Millar.

1976

Thursday, 25th March – Stracathro
"Registrars' Papers".

Thursday, 15th April – Dundee
"Anaesthesia for the Respiratory Cripple"
Professor J.A. Thornton.

Thursday, 20th May – Stracathro
Annual General Meeting.
Presidential Address, Dr. J.W. U. Parry.

Meetings are held at 8 p.m. in Aberdeen Royal Infirmary, Ninewells Hospital, Dundee, or Stracathro Hospital, Brechin, unless otherwise notified.