South pacific underwater medicine society

Journal

C O N T E N T S

SPUMS Newsletter
January - March 1975

SUBSCRIPTIONS

Members pay $15 yearly. Associate membership for those neither medically qualified nor engaged in hyperbaric nor underwater related research is available for $10. The journal is sent up to four issues yearly to both full and associate members. Those resident outside the immediate Australasian area should write for the special terms available.

Treasurer: Mr J Pennyfather, C/- School of Underwater Medicine, HMAS Penguin, Balmoral, NSW.

Notes to Correspondents and Authors

Please type all correspondence and be certain to give your name and address even though they may not be for publication. Authors are requested to be considerate of the limited facilities for the redrawing of tables, graphs or illustrations and should provide same in a presentation suitable for photo-reproduction direct. Books, journals, notices of Symposia, etc will be given consideration for notice in this journal.

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Disclaimer

All opinions expressed are given in good faith and in all cases represent the views of the writer and are not necessarily representative of the policy of SPUMS.

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EDITORIAL

There is a long and fairly honourable tradition that an Editor is allowed free rein to put forward his own ideas subject to their being the same as those of his employers. You, fellow members of SPUMS, are in effect the ones to call the tune. However, you are gifted with diverse interests and differing opinions, possibly a natural consequence of the double qualification of being simultaneously Doctors and Divers, both highly individualistic occupations. It being impossible to satisfy everyone all the time, I have decided to accept the precedent set by my illustrious predecessor in this Editorial Chair and chart my own course. If even part of the commissioned articles eventuate you, the readers, should have few causes for complaint.

The Society has rapidly progressed from a newsletter to a Newsletter contact with its members and now aspires to deserve the name of Journal. Articles are solicited from members and non members, both medical and lay. The only conditions are that the information be accurate, not too complicated for typing for photo-production in the magazine (or it could be supplied typed to match these pages) and in some way relevant to Hyperbaric or Underwater problems.

It will be a lily-livered author indeed who cannot relate almost any subject in some degree to such a wide franchise! Correspondence to the Editor will receive consideration of publication and Books or Magazines will be reviewed if presented for such consideration.

(sic) ready for the day when they can be made available, under a seal of confidentiality such that legal processes cannot breach, to some central pool of information. So please start to keep YOUR notes NOW. In diving more than any other activity, the old homily tells it all:

> ‘It ain’t what you don’t know that hurts
> you most, it’s all them things you do
> know that ain’t so’.

Now read on, and safe diving.

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Experimental proof of the Laws of Reflection

There is at least one more convert now to a belief in the applicability of the laws of Reflection under aqueous conditions, and you will be pleased to hear that he has fully recovered and is back at work.

Our Experimenter had a fine new Nemrod compressed air speargun and was just itching to kill something nice and big with it. But nothing seemed willing to volunteer for this signal honour. It seemed rather a pity not to christen the bang-stick, so a rock was selected as the target. BANG! Spot on! Ooch!!! Yes, you couldn’t do it if you tried but he had hit that rock dead on at 90° and had the rare privilege of a front row seat to watch that spear-shaft retrace its path exactly. It was a pity he was still in-situ, as it were, for it returned to his arm. Luckily, not only did it deflect from a bone without causing a fracture but his buddy and the dive boat were nearby. A few stitches and he was ready to give his lecture on safe diving.

MORAL: Remember always that your actions may reflect on you adversely!!

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THE INSTITUTE OF DIVING MEDICINE
Dr RAF Cox

Introduction

The history of the medicine of diving is, in a sense, the history of the development of diving itself. While diving was concerned primarily with shallow water work, it was appropriate that the diving medical examinations should also be part of the local General Practitioner’s practice in his capacity as an Appointed Factory Doctor, who was authorised to sign the diver’s “Blue Book” and thereby license him within the confines of the Factories Act to pursue his occupation. As diving has extended outside the controls exercised by this Act, ie. beyond the three mile limit, and also at increasing depths, the physiological demands placed upon the modern diver have increased, and in turn have created a need for a developing specialisation in medicine to provide the necessary diagnostic and therapeutic skills.

In practice the natural development of the industry has localised the demands to those places which have acted as centres from which diving operations have been conducted.

The first of these focal points in the North Sea was at Great Yarmouth and, beginning in 1966, has created an increasing demand for medical examinations of this nature. Thus, for example, during this period about 900 diving medical examinations have been completed routinely, both during the diver's working life and in those cases where illness or injury has terminated his career.

The past two years have seen a dramatic increase in the pace of offshore exploration in the North Sea, stimulated by economic and political pressures and, with this, a demand for divers to reach the increasing depths at which drilling is now taking place and from which production will be maintained. As a consequence, many of the complications of diving - decompression sickness aseptic bone necrosis, acoustic and vestibular barotrauma, hypothermia, etc. - have assumed a much greater importance, thus creating greater demands on the expertise of those few medical practitioners trained and experienced in this field. To the present time such demands at Great Yarmouth have been incorporated in a growing general medical practice, although, for obvious reasons, outside the purview of the National Health Service. It has now become apparent that these requirements are such as to necessitate the provision of a separate organisation if they are to keep pace with the developments fit underwater medicine.

A deficiency of the present state of affairs is that there is no centre, in this country or elsewhere, to which reference can be made for up-dated, authoritative advice and expertise, based on codified information which would laid to improved standards in the practical medical care of divers. Neither is there a centre where factual information on divers' health is available to provide the vital basis for quantification of risks, which is fundamental to an effective insurance facility to safeguard both diver and employer. Hitherto, such arrangements as have been available for the provision of immediate skilled medical advice in times of emergency have depended upon ad hoc arrangements between diving companies and a few individual doctors, who in turn have drawn on the only other available source of expertise in this field, which has been so willingly provided by the Medical Officers of the Royal Navy. The numerous deficiencies inherent in this arrangement include the difficulty of contacting the appropriate person or persons, the absence of a focal point of reference to gather and to make immediately available the appropriate information, and the lack of continuity in the management of diving emergencies. A further feature is the need to expand the basic facilities which exist at the present time to meet the increasing demand which is forecast in this field.

Discussions with a wide variety of interested and affected persons and bodies, including the Department of the Medical Director-General (Navy), the Chairman of the Medical Research Council Decompression Sickness Panel, the Department of Energy, the Department of Employment, Members of Parliament, oil companies, diving companies, divers, insurance underwriters at Lloyds, and medical practitioners engaged in the field of underwater medicine, both in the UK and abroad, have resulted in the establishment of an organisation to be called 'Divers Medical Centres' and incorporating the Institute of Diving Medicine. This has bean warmly welcomed by all those consulted.

Functions

The terms of reference of the Institute include:

(i) Provision of an "expert advisory service" on a 24 hour basis for diving emergencies. This will require the Institute to maintain an up-dated index

of world authorities on all aspects of hyperbaric medicine, which will be immediately available for its medical officers.

(ii) To keep a register of divers, to which admission will be renewable annually, following a routine medical examination by one of the Institutes appointed medical practitioners. This will enable the diver to establish his medical fitness to an employer's satisfaction.

(iii) To perform routine medical examinations of divers according to the standards laid down in the ClRIA Code of Practice.

(iv) To keep all divers' medical records within clinical confidentiality.

(v) To act as a focal point for research and the collection of data and the exchange of information on the medical problems of diving. Also to provide a library of books, journals, and other publications referable to the medical problems of diving.

(vi) To co-ordinate the investigation of diving accidents and provide appropriate and independent reports to affected parties.

(vii) To provide or obtain expert witnesses, when required.

(viii) To provide instruction in diving medicine, especially for oil rig medical orderlies.

The Institution and Diving Medical Centres will maintain close liaison with those academic centres involved in hyperbaric research, but it is important that they should remain independent, in order to retain the goodwill of the divers, for whose benefit they are primarily being established. For the same reason it will be essentially a practical Institution, whose main function will be to provide practical advice on day to day problems, particularly decompression sickness, as well as being an instrument through which controls of the medical aspects of diving can be exercised.

Diving Medical Centres and the Institute have been established on the basis of the existing facilities at Great Yarmouth, which include a nucleus of four trained doctors, whose experience in providing emergency consultation of the kind described in paragraph (i) above has successfully met the demands of the past eight years. This has also resulted in the accumulation of the largest and most comprehensive data bank of case histories and records, relating to some 900 commercially-employed divers.

Provision must obviously be made to cope with the shifting centres of influence of offshore exploration, construction and production. Plans have already been agreed to establish a Diving Medicine Centre at Aberdeen to meet the needs of divers in the Northern North Sea. It is envisaged that further centres will be required at other locations of intensive offshore activity.

The policy of the organisation will be directed by a Medical Advisory Board, chaired by Professor Dennis Walder, and consisting of representatives of the country's foremost experts in the various aspects of underwater medicine.

Membership

The Institute, which has been established as a non-profit making organisation, will

derive its income from membership fees and subscriptions. Its facilities and the results of its research will be made available to its members, who will among other advantages, receive the benefits of insurance cover at reduced rates of premium.

The demands which are being and will increasingly be made on the Institute will best be served by the establishment of four separate but inter-related classes of membership.

(i) A limited number of companies and other organisations have been and are being invited to subscribe to or accept founder membership.

(ii) Corporate membership is open to any trading company or body corporate involved or interested in the employment of divers.

(iii) Membership will also be offered to governmental departments, commercial or trading bodies or persons sponsoring particular aspects of research by the Institute.

(iv) Subscribing membership will be confined to individual divers and diving personnel.

It is estimated that the annual budget will be not less than £100,000.

The Institute is already engaged in analysing the medical records which it possesses, in order to quantify insurance risks more accurately and its current activities also include the training of doctors in emergency procedures based on the latest advances in this field.

Conclusion

The establishment of an Institution of this nature, must of necessity, leave many imponderables in a field which is so relatively unexplored as that of underwater medicine. The size, scope and complexity of the Institute's activities must be so designed as to meet the full demands of an expanding industry, upon which the economic and political future of the UK is so dependent, in the last quarter of the Twentieth Century. Certainly the experience of the past eight years has indicated the profound need for a unique centre based on informed and up-dated information and expertise which can reduce the trauma and unnecessary tragedy. It is our firm belief that the Institute of Diving Medicine will offer such a facility.

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The Department of Energy Statute, Offshore Mineral Workings Act Special Diving Regulations 1974, become effective from 1 January 1975. Among other things they specify that a diver shall have a medical examination performed by one of a number of approved doctors throughout the UK, and they define standards. The approved doctors, and all those working in the Institute of Diving Medicine are so approved, are licensed by the Medical Branch of the Department of Employment. Any doctor wishing to be so approved has to satisfy the Department of Employment that he has had sufficient instruction and practical experience in underwater medicine to be competent to conduct medical examinations of commercial divers to the standards laid down under the new Act. There is at the moment no Examination or Diploma or statutory

qualifications to which a potential appointed doctor must aspire before he can be appointed. Each one is considered on his merits by a panel of Government Appointed Doctors, who in turn are advised by those senior members of the profession whose knowledge and expertise in the field is without question.

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Appendix

REPORT ON MEETING HELD TO DISCUSS THESE PROPOSALS
(12 September 1974)

Dr Cox outlined the need for such an Institution and described how he and his colleagues at Great Yarmouth had been providing a service for the diving industry for the past eight years which could form the bones of the Institute. They held medical records of approximately 700 divers, which contained information from some 1,200 medical examinations and 425 consultations in connection with diving. He said that, in effect, the Institute had been operating for the previous 8 years and the intention now was to put it onto a more formal and financially sound basis so that it could expand its activities and extend the services which it was already offering. He described the support already received from a great many bodies and, in particular, the support which was promised from the insurance industry. The Institute would be in existence and operating from a number of different centres, wherever it was required, including Aberdeen immediately.

Dr Cox confirmed that a working partnership existed with the Respiratory Physiology Unit of King's College Hospital and that a number of research projects were being considered.

Prof. Walder then spoke, welcoming the initiative that led to the formation of the Institute and endorsing the need for such an organisation, which was vital to the diving industry. He stressed the need for it to be operational in a number of centres but with a single headquarter.

Mr David Price, Financial Adviser to the Institute, said that the estimated cost would be between £100,000 and £200,000 per annum to run it and to finance its researches. It was intended to obtain this from the industry on the basis of the benefits that would result to both the divers and those employing them. He suggested several possible means of subscribing both by individual divers and companies. A full medical examination and licencing as fit to dive, in line with the proposed Government legislation, would probably cost £100 per annum.

During the discussion that followed Dr Cox said that divers on the list at the Institute would have lower Insurance rates and therefore be less expensive to employ. He had discussed the proposals in the USA and at the recent Conference in Copenhagen and had no doubt that in time there would be an international organisation.

Mr J Dawson of CT Bowrings welcomed the Institute from the underwriters' point of view. He stressed that at present the Medical aspects of diving were quite unevaluated from the insurance aspect and the Institute would enable this situation to be put right.

Commander T Lovell-Smith endorsed this and emphasised how, at the present time, the medical screening aspect was particularly difficult to assess.

Commander David Elliott welcomed the Institute and emphasised the importance of medical standards and of a need for a co-ordinated Emergency and Information Service. He welcomed the prospect of the research activities and asked for clarification on the point of the training of doctors. Dr Cox replied that he envisaged that the training of doctors was only to ensure that they were able to perform medical examinations of divers to the standards set by the Institute.

Commander Warner, Department of Energy, welcomed the Institute but queried the wording of the function relating to the investigation of accidents, since this was a statutory duty of his Department. Dr Cox said there was no question of usurping this, rather that it was seen as a means of co-operating to ensure that the medical aspects were fully considered.

Dr Colin Jones of UK Operators Offshore Association welcomed the initiative. Mr John Prescott, MP, expressed concern at the reluctance of companies to show their hands with regard to contributions. He felt that if the industry itself did not finance the Institute, then it was likely that the Government would need to step in. Mr Peter White of Ocean Technical Services Ltd. complimented the service presently being provided and noted that Insurance premiums were currently very high. He wondered whether the Institute's activities would be able to reduce them. Dr Cox said that there had been long discussions with the insurance market and there was no doubt that accident cover premiums would be able to be reduced, although employers liability was a slightly more difficult matter.

Mr Dearman, Northern Divers Ltd., asked about the reaction of divers themselves to the Institute. Dr Cox replied that as there was no representative organisation on behalf of divers, it was difficult to approach them as a body and get their views.

Since this meeting further discussions have been held with a number of interested people and the current situation is that a doctor has been retained to analyse urgently the ECG tracings held by the Institute and that active negotiations are being undertaken regarding several other research projects. Financial support has been promised from a number of companies and active discussions are in progress to produce firm figures of the insurance advantages offered to companies or individual divers on the Register.

SNIPPITS

NOTICE on a computer in London:

ACHTUNG
ALLES LOOKENPEEPERS

> Das computermachine ist nicht fur gerfingerpoken und mittengrabben. Ist easy schnappen der springenwerk, blowenfusen und poppencorken mit spitzensparken. Ist nicht fur gerverken bei das dummkopfen. Das rubbernecken sightseeren keepen hands in das pokets - relaxen und wach das blinken-lights.

Correspondence for Dr RAF Cox should be addressed:

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SURVEY UNDERWAY ON BONE NECROSIS

LCDR George M Adams, MSc, USN

Faceplate Vol. 5, No. 3

While diving is considered a reasonably safe endeavour, knowledgeable participants maintain an awareness of various potential hazards. The unexpected occurrence of decompression sickness on a “safe” decompression table is an ever present possibility; the enhanced possibility of decompression sickness from deeper and/or longer dives is well documented. Air embolism from improper exhalation while surfacing is always possible. Barotrauma with resultant ear and/or sinus involvement is also a constant possibility in any dive. While these possibilities are always present, they are all therapeutically manageable if adequate planning and precautions are taken.

There are diving problems that are not always recognized. Hearing loss and deafness have been recognized as possibilities that are under investigation for understanding, management, and prevention. The long-term consequences of central nervous system involvement in diving accidents are also of increasing concern. Currently being evaluated are the possible effects of diving on a diver’s hones.

Bone abnormalities with the characteristics of aseptic bone necrosis or dysbaric osteonecrosis have been found in divers throughout the world. A survey for the presence of bone abnormalities, as determined by X-ray techniques, has been in progress in the US Navy for a number of years. In accordance with recent requests from the Diving Research Branch, Naval Submarine Medical Research Laboratory (NAVSUBMEDRSCHLAB), a number of active duty divers have been and are being surveyed radiologically for the presence of bone abnormalities. Various facts are gradually becoming evident from this survey.

Bone abnormalities consistent with the characterization of dysbaric osteonecrosis or aseptic bone necrosis have been found in some active duty divers. The exact percentage of cases is not yet known, but the occurrence of disabling bone abnormalities appears to be quite low (less than 0.45 percent). One or more incidents of decompression sickness do not seem to predispose the diver to the occurrence of bone abnormalities; nor does a diver’s age appear to be related to the occurrence of this condition (within the normal age range of divers). No apparent correlation between the occurrence of bone abnormalities and the diver’s NEC designation has been established for NEC’s 5311, 5342, 5343 and 8493. These conclusions are based on preliminary data and will require additional input for verification. The causative factors that lead to the occurrence of bone abnormalities are not known at this time.

The effective pursuit to understand this subject is a task utilizing many Navy resources. Direction and guidance in the medical management of existing problems is a function of the Bureau of Medicine and Surgery. An active survey to establish a true incidence of this condition and to understand causative factors has been assigned to the NAVSUBMEDRSCHLAB at the Submarine Base, Groton, Connecticut. Objective diving data is supplied by the Naval Safety Center via the OPNAV Form 9940 input. Consultation services are provided by many facilities, including the National Naval Medical Center and the Armed Forces Institute of Pathology. In addition, an international group of experts is actively involved in finding the best possible approach to understanding and managing this problem.

The participation of many individual divers, the co-operation of various commands and activities, and the continuing involvement of many facets of the US Navy's biomedical research program are directed toward the safety of the individual diver in his duties. Doubtless there will be discussion and concern among Navy divers coincident with this official activity; rumors may circulate in various quarters about a variety of possibilities. To ensure an adequate presentation of reliable information, periodic status reports will appear in Faceplate. The purpose of these efforts is to assure participants that diving remains a safe endeavour, if standard precautions are observed.

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LCDR Adams has kindly offered to supply further information on the progress of this investigation at a later date.

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AN EXPOSURE TO RISK REGISTER FOR COMPRESSED AIR WORKERS

PD Griffiths

Trans. Soc. Occup. Med. 1971; 21: 123-125

The assessment of risk to which men in industry are exposed can be a thankless task because of the large number of variables and lack of essential data.

The hazards to which men are exposed when employed in compressed air in tunnels and caissons, and as divers, and known originally under such names as Divers' Palsy and Caisson Disease have been realised for very many years and considerable research concerning the aetiology and prevention of decompression sickness, as it is now called, has been carried out in the past, in particular by Paul Bert in Paris around 1870, and at the beginning of this century by Professor Haldane.

In 1945 the Ministry of Labour and the Institution of Civil Engineers decided to revise the Compressed Air Regulations, and it was then realised that very little was known about the risk involved and the reaction of men when actually employed in high working pressures, sometimes exceeding 40 psig on a civil engineering contract.

The first serious investigation of such a contract was carried out on the Tyne Pedestrian Tunnel 1948-1950 by Professor Walder and Professor Paton on behalf of the

Medical Research Council, and their important report was published in 1954 by the Stationery Office.

Since 1957 more data have been collected from all contracts in this country whare men have worked in compressed air. These include the Clyde, Dartford, Blackwell and Tyne Tunnels, Tilbury, Dungeness 'A', Dungeness 'B', Wylfa, Fawley and Hartlepool Power Stations and a large number of smaller contracts involving sewage disposal, water supply, bridge foundations and harbour works. Since an international working party was arranged in London by the MRC Decompression Sickness Panel in 1965 considerable useful information has been collected from abroad, in particular from the United States of America.

The MRC decided to establish a Central Registry of compressed air workers whare the mass of data already collected could be stored an assessed and from which research could be continued. This registry, the only one of its kind was established hare in Newcastle in 1964.

Although originally the investigations concerned the aetiology of decompression sickness, they ware extended from 1958 to cover the long-term ill effects of decompression, aseptic necrosis of bone, and during the last few years they have again been extended to cover the hazards to which commercial divers are exposed. In assessing exposure to risk thare are two essentials:-

(a) The intensity of the hazard (which naturally varies from contract to contract and even hourly on any one contract).

(b) The period of exposure to that hazard.

We are lucky in having a large quantity of reasonably accurate data, but in retrospect one wishes that even more data had been collected in the earlier days - items which, at the time, ware considered to be of little importance. This is one of the lessons I imagine we all learn.

What do we hold at the Registry?

The main file contains the names, date of birth and occupations of almost 10,000 men who have worked in compressed air, and the contracts on which they have been employed. Some have worked on one contract only, some on as many as ten. Thare are also separate files for each contract, recording details of men's experience. Identification is occasionally a problem, particularly with regard to Irishmen, a number of whom forget the year in which they ware born and change their names at the drop of a hat, for various reasons, and so many of them are called Pat. Thare are over twenty Pat Gallaghers on the list.

Of a large proportion of these men we have personal details such as height and weight, their medical history, and details of their exposure to increased atmospheric pressure. The latter includes the number and length of shifts worked, the working pressures, the decompression procedures, the details of decompression sickness, if any, and details of the therapeutic procedures. Their occupations, such as engineer, miner, fitter and carpenter are known precisely.

The collection of data from contracts is not always easy - unlike a firm in industry which exists over a period of many years, the compressed air jobs may be completed in a few months or, st the most, three to four years and then the men disperse, only

a small proportion of them being found on subsequent contracts, may be completed in a few months or, at the most, three to four years and then the men disperse, only a small proportion of them being found on subsequent contracts.

The details of the individual experience to compressed air are recorded on men-lock registers. This is mandatory and the register is the property of the contractor, but is made available for us to copy. The remaining data which we require are not required by regulation, but are kept for us voluntarily by the medical officer and the medical attendants on pro-formata provided by the registry. Regular visits are made to the sites and there is no doubt that our advice concerning the decompression procedures and treatment of the men is fully appreciated.

Radiological examinations of joints produce special problems in that they have to be made on a voluntary basis, although 'regulation' in most other countries.

Whether the examinations are made at any x-ray unit attached to a site medical centre, at a mobile unit visiting the site or at an adjacent hospital, considerable organisation and the co-operation of the contractor's agent are required. Here it should be mentioned that, on the whole, co-operation of the contractors and their agents and staff in all our investigations has been good, and we are grateful to them.

1660 man have been radiologically examined, some of them a number of times, so we have 2400 sets of films of the shoulder, hip and knee joints, ie. approximately 15,000 radiographs. Of the 1660 men examined 330 have positive radiological signs of aseptic necrosis of bone. This figure of 20% must be viewed with care, as the men examined do not represent an absolutely true random selection; it is nevertheless alarming.

In the earlier stages of the investigation it became obvious that the statutory decompression procedures were inadequate in that:

1. A considerable number of cases of decompression sickness followed exposures to pressures below 18 psig and the decompression tables covered only working pressures above 18 psig.

2. Far too many men developed simple bends, and even more important, the much more serious Type II form of decompression sickness particularly when working for shift periods of over four hours and when working at the higher pressures. (800 cases of compression sickness were treated in each of two major contracts).

3. Too many men developed aseptic necrosis of bone.

With regard to bone damage it was shown that the longer a man's experience at pressures over 18 psig and the higher the average working pressure the more likely he was to develop aseptic necrosis. On the other hand one exposure of eight hours to 35 psig and five shifts at only 17.5 psig can cause definite bone changes. Over 30% of men well experienced in high pressure work were found to have positive bone changes, and about a quarter of the lesions were juxta-articular and so potentially disabling. We know of over fifty men with a damaged articuler surface and so suffering some degree of disablement. Some men have more than one joint affected, and four men who worked only on one contract had a damaged joint surface within 18 to 24 months of their first experience in compressed air.

During 1968-69 “atlases” were produced - each one contains 80 radiographs demonstrating the various stages and types of aseptic necrosis of bone. They were well received and were soon distributed on request to a number of countries. Requests are still being received for this atlas, but the preparation is very laborious and we have not had time to produce any more as yet.

In 1966 Dr Hempleman produced his revised (longer) decompression tables which, with the approval of HM Factory Inspectorate, have been used on all compressed air contracts where the working pressure has been above 14 psig since that date. We are now comparing the efficacy of the new procedure with that of the old with regard to both decompression sickness and bone necrosis. So far we are optimistic, but further data, preferably from one or two large contracts, are required before a final assessment can be made. Many contracts are being postponed for financial reasons.

Plans are now well advanced for computerising the data we already possess and those we hope to collect in the near future.

We have fairly recently investigated divers, of whom many are now based on the East Coast. Of these, 200 have undergone radiological investigation of their major joints, and in co-operation with CIRIA and commercial diving firms, details of divers’ medical examinations, individual diving experiences and attacks of decompression sickness are being collected and filed. So far the results have been satisfactory in that bone damage is not commonly seen. These divers are frequently exposed to much greater pressures than are men working in tunnels but for much shorter periods. This could be taken as an indication that the length of exposure is of paramount importance in the development of bone necrosis. So it may be that if our new decompression procedures for tunnel workers are not as successful as is hoped, then a reduction of the shift periods as the working pressure increases will have to be advised; this is already being done in the United States and some other countries. Our main objective is to reduce the risk to the men to an acceptable level and at the same time to prevent a contract involving the use of compressed air from being an uneconomic proposition. So for the time being we are experimenting with decompression procedures but maintaining the standard eight-hour shifts.

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Snippits

A “severed hand” was found by two men near the mouth of Narrabeen Lagoon in the early hours of Sunday morning while they were out fishing. With horror they saw what looked like a gloved hand in the wet sand. They took it to Manly Police Station. It was later taken by police to Manly Hospital where it was clinically examined. Study showed it may belong to a conjoi marine growth.

(*Manly Daily*, 23 February 1972)

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PLEASE NOTE: Subscriptions are NOW DUE!!

MEDICAL RESEARCH COUNCIL DECOMPRESSION SICKNESS PANEL

The Medical Research Council Decompression Sickness panel, Chairman: Professor Dennis N Walder, was formed in 1957 to investigate the causes, treatment and possible prevention of decompression sickness among compressed air workers constructing a tunnel under the River Thames at Dartford in Kent. The results of this and subsequent investigation of other compressed air contracts led to a dissatisfaction with the statutory British decompression tables then in use and the recognition that aseptic necrosis of bone was more prevalent among hyperbaric workers than was previously suspected. New decompression tables ware introduced in 1966 and there is some evidence to suggest that their use has decreased the incidence of decompression sickness. The effect of the new tables on bone necrosis is still under investigation.

With the discovery of gas and oil under the North Sea, diving activities in that area have increased on an unprecendented scale. The Panel, with the help of the Royal Naval physiological laboratory (RNPL) and the Underwater Engineering Group (UEG) of the Construction Industry Research and Information Association (CIRIA) has taken the opportunity to investigate decompression sickness and bone necrosis among divers. New decompression schedules for divers have been devised by RNPL and promoted by UEG and the Panel. These are not yet widely used and their efficiency in reducing decompression sickness is difficult to assess.

A standard medical examination for fitness to dive has been drawn up by the Panel with the help of UEG and has been adopted by doctors examining divers throughout the country. A copy of each completed medical form is filed in the Panel's Decompression Sickness Central Registry at the University of Newcastle upon Tyne. After 3 years the Registry holds medical records of almost 600 divers.

An investigation into aseptic necrosis of bone in divers was instigated in 1969. In 4.5 years 1666 sets of bone radiographs (AP both shoulders, AP both hips and Lateral, both knees) have been obtained from 929 divers. Twenty-three men (2.48%) are deemed to have positive lesions of bone necrosis, 12 juxta-articular and 11 medullary. All but one of the men with positive lesions have dived deeper than 50m. Research is continuing and results will eventually be computer analysed for significant patterns.

In a new set of diving regulations to come into force in 1975 the British Government has instigated Statutory control of diving from offshore installations in the waters around the British Isles. The regulations require that the medical examination of divers and record keeping of a diver's experience shall conform to the standards advocated by the panel and will enable an investigation in greater detail to be carried out into the efficiency of decompression schedules used in British waters with the eventual aim of reducing, and perhaps eliminating, the hazards of bends and bone necrosis in divers.

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SNIPPITS

You gotta be in the swim to be in the swim ... Major AB, a non-RAN Navy doctor, is one of 12 RAN and foreign medicos doing a course in underwater medicine at HMAS Penguin in Balmoral. Diving is part of the course, but the Major had a problem before coming

to Sydney. He couldn't even swim, let alone dive. So he had a crash course of swimming lessons before coming to Sydney. Now, they say, he's almost out'Shaneing Gould.

(*Daily Telegraph*, 3 May 1974)

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SOCIETY NOTES

The Extraordinary General Meeting voted overwhelmingly to pass the proposed change in the Constitution of SPUMS. There is no longer any bar to candidates on ground of domicile. Does this effect YOUR willingness to stand for the Committee?

To assist candidates for the Diploma, a list of Basic Reading books is now being prepared and will be published when available. Preparatory study will be essential to enable full benefit to be obtained from the course at SUM and Prince Henry Hospital Hyperbaric Unit. No Know, No Pass.

The intention to publish this Newsletter quarterly is dependent on articles being presented on time. No Write, No Read.

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MICRO AIR EMBOLISM AND LUNG ANATOMY
(Address to "Oceans 2000" October 1973)
Prof. Dennis Walder

I want to say something about micro air embolism. In Great Britain we have come to classify decompression sickness as being of two types Type 1, otherwise known as "the bends" in which there is pain in a limb but no constitutional upset. The pain may be very severe but the subject is not ill, doesn't look ill, and doesn't feel ill. Type II may be present in one of several ways as a disturbance of the central nervous system with paralysis and/or loss of sensation, usually in the limbs as a disturbance of the cardiovascular system with pain in the chest similar to that which occurs following a coronary thrombosis or as a disturbance of the respiratory system with difficulty in breathing and an associated blue appearance. This latter condition is known as the "chokes". In all these type II forms of decompression sickness there is a constitutional upset. The subject looks ill, feels ill and unless something is done quickly he may suffer permanent damage, or even die.

As you know, classically decompression sickness is thought to be due to the presence of bubbles in the body. It is said that these bubbles arise because the decompression procedure has been too fast and sore of the body's tissues have been left with an excessive amount of gas which has come out of solution in the form of bubbles. The longer and deeper the dive the more gas will be taken into the tissues and the greater will be the danger of decompression sickness. Conversely, short shallow dives in which very little gas enters the tissues wall be safe, a fact recognised by the existence of no-stop decompression schedules.

Occasionally, however, a diver who has only carried out a short dive at shallow depth,

say for a few minutes at 30 feet, will develop the signs and symptoms of decompression sickness. This can cause consternation and disbelief unless the mechanism by which this condition can cause consternation about is appreciated.

The suggested explanation is that when a diver is at depth a small pocket of air becomes trapped in his lungs and on the subsequent decompression when this pocket expands it bursts into his circulation as a stream of bubbles which give rise to the signs and symptoms Type II decompression sickness. This could be called micro air embolism because it is different from the situation which occurs when a man carries out a free ascent and inadvertently keeps his glottis closed. In this case the air in his lungs is trapped and when it expands it builds up a pressure till it finally bursts through into the circulation to give rise to a massive air embolism. The two situations are quite different as the former can occur in a diver who is returning normally to the surface after a shallow dive and the signs and symptoms are indistinguishable from Type II decompression sickness.

When we examined the lung radiographs of men who suffered from such unexpected Type II decompression sickness we sometimes saw something very interesting. The men had cysts in their lungs. The condition obviously required close investigation. It transpired that small animals undertaking short shallow simulated dives never suffered from cysts in the lung and this gave us a clue. The structure of man’s lung is different from that of an animal.

In both man and animals’ the lungs have a branching system of airways which, like the branches of a tree, conduct the breathed gases to little air sacs which are arranged on the branches like the leaves of a tree. It is at the air sac that the exchange of gases with the blood takes place. The whole lung structure is covered over by a membrane which is called the pleura. Man differs from animals in that here and there the pleura dips down between the groups of air sacs to form partitions. These partitions contain some loose material which enables their two sides to slip one against the other during small movements of the lung. At the extremity of each partition runs a branch of the thin walled pulmonary vein.

When a diver is at depth all the air sacs are filled with gas at the same pressure as the breathing gas. As the pressure of the breathing gas is reduced during the subsequent decompression the gas in the air sacs will normally vent freely through the airways. If, however, some branch airway becomes blocked by, for instance, a viscid blot of sputum the gas in the air sac served by that airway will not be able to vent and will therefore distend. After a few feet of ascent there will be some air sacs that are distending and some that are remaining the same size because they are able to vent in the normal way. As a result of this a shearing force will be set up along the partition and eventually the tissues will rupture and tear. The tear will involve both distended and non-distended air sacs as well as the thin-wailed vein. As a result of this, air will enter the vein and be conducted to the heart, from which it will be pumped round the circulation to give rise to the signs and symptoms of Type II decompression sickness.

Experiments with isolated lungs using various differential pressures between adjacent groups of air sacs have shown that this is a reasonable explanation of what takes place. Pressure differentials of as little as 2 psi, the equivalent in diving depth change of as little as 4 feet, can result in lung damage and micro air embolism.

There is an important practical implication of these findings. It means that if you go diving when you have, or have recently had, a cold, influenza or an attack of bronchitis, which has left you with some viscid mucus in your chest, then you are in danger of getting an unexpected attack of severe Type II decompression sickness. All the men I have known who have suffered from an unexpected attack of Type II decompression sickness have been found on enquiry to have had a cold in the week or ten days prior to the dive and had presumably returned to diving before their lung mucus had had time to return to normal.

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Brief Profile

Prof. Dennis Walder is the leading expert in Britain on bends and compressed air problems. He is Chairman of the Society for Underwater Technology diving technology committee, President of the Undersea Medical Society and of the European Undersea Bio-Medical Society and Chairman of the Medical Research Council Decompression Sickness Panel. He is based on the Department of Surgery, University of Newcastle upon Tyne.

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NINETY SECOND DEEP SCUBA RESCUE

GD Harpur, MD

(NAUI News January 1974)

It is proposed in this study to review the problems posed by the unconscious diver and to present solutions available to the diver attempting rescue.

The unconscious diver has ceased to breathe. There may be several reasons - depletion of supply, contaminated supply, equipment malfunction, the little appreciated danger of cold, or other medical problems. He will have lost his regulator, and his oxygen stores rapidly deplete. Unless he, or a rescuer is able to replenish these, he will die.

Illustration No. 1 shows a comparison of oxygen consumption with elapsed time in a non-breathing subject whose heart is still beating. Depending on the reason for his loss of consciousness he is left with a certain amount of time until he will have sustained irreversible damage to his brain and only a little longer before he will die. At the point in time when his arterial pO_2 drops below the level of 40 mmHg, (normal level = 80-90), his consciousness will be very much impaired. The time remaining after this until his pO_2 arterial drops to levels which will result in a permanent alteration in the diver's central nervous system is approximately 90 seconds. This does not mean that anyone found on the bottom known to have been down in excess of this time should be abandoned or handled differently, but attempts to point out that we should aim at developing a rescue technique which will take less than 90 seconds.

ILLUSTRATION NO. 1 (page 18A)

What is needed to treat an unconscious diver, assuming intact circulation, is a source of oxygen and ventilation to remove CO_2. Is this possible deeply underwater? It may be. A standard two stage regulator with purge button cannot be utilized as a ventilator on the surface as the exhaust ports free flow, any attempt to obstruct them can lead to application of full intermediate pressure to the lungs or instant embolus. In water it is possible to ventilate with a regulator because of the substantial pressure gradient which exists for very small differences of depth (eg. 44 lbs. per sq. inch per foot or in centimetres of water 1 cm of water pressure per 1 cm depth). By inverting the victim it is possible to have a pressure on the exhalation ports of the regulator 30mm. In excess of the pressure on the lower chest wall (in this case since the diver is inverted it would be his upper chest wall). The regulator must be inserted with the victim upright and purged before inverting the unconscious diver for as the victim is turned to the inverted position the reversal of the pressure gradient to which the chest is exposed will result in an effective inspiration. The victim would inhale water, then, if the regulator is not in place (see Illustration No. 2). In most situations this technique is of no particular value and because it is difficult to perform alone valuable time may be wasted. If the diver begins to recover underwater serious problems are bound to ensue with panic no matter how experienced the person is. The technique may be useful, however, in situations such as saturation diving, cave diving, or wreck diving where either a habitat is close to hand or escape to the surface would result in severe decompression illness. If the surface is not accessible this technique might be useful.

It is worth emphasizing at this point that the unconscious diver's air supply must be suspect. If his tank is not empty, why is he in difficulty? Regulator malfunction or contaminated air supply may be possible to rule out. If the safety of his supply is uncertain then the rescuer's supply would be the only source available and the procedure becomes increasingly unwieldy unless an octopus regulator is being used. Mouth-to-nose resuscitation can be and has been carried out successfully by my associates and me but requires an extremely relaxed operator with previous practice. The hazard of recovery and ensuing panic is ever present. The exact technique for performing both mouth-to-nose and the previously mentioned artificial ventilation with regulators of all types will be described in detail in a separate paper to follow. There remains but one obvious source of air for an unconscious sport's diver - the surface air.

Hazards exist on the surface too. Boyle's Law has to be considered. Boyle's law will have its greatest effect between 30 feet and the surface when the air in the lungs will expand to twice its original volume. If a person leaves 30 feet with 4.0 litres of air in his lungs he will have 8.0 litres of air in his lungs on reaching the surface if none escapes.

If he has only 6.0 litres of a total lung volume he will have ruptured his lungs and probably have sustained an air embolus.

In an unconscious diver the following can obstruct the air passage.

1. Flexion of the neck. While true for inspiration or driving air into the lungs, it is not valid for exhalation because the pressure of air from below can passively open the passage. This is similar to a cork in a bottle which can be pushed out from below and rapidly becomes loose yet wedges tightly if pushed down (see Illustration No. 3). A simple experiment can prove this - draw in the biggest possible breath and have someone push the chin down on the chest

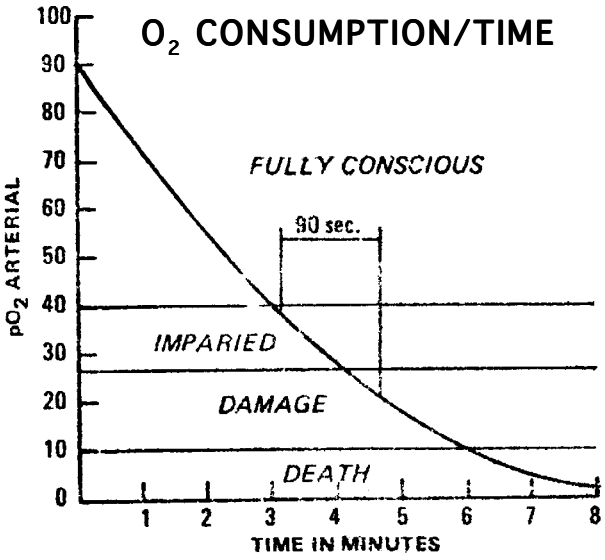


ILLUSTRATION NO. 1

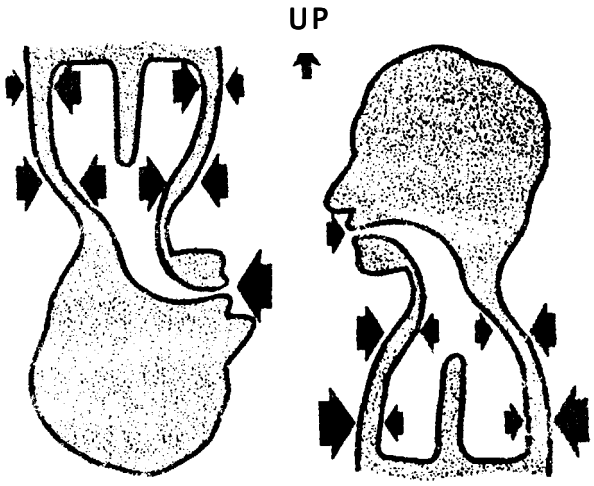
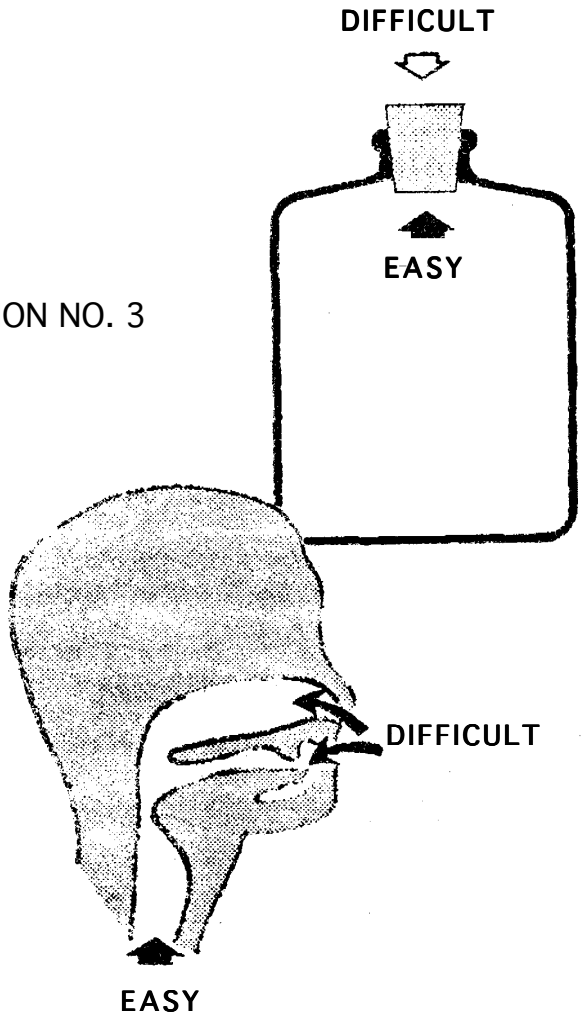


ILLUSTRATION NO. 2

ILLUSTRATION NO. 3



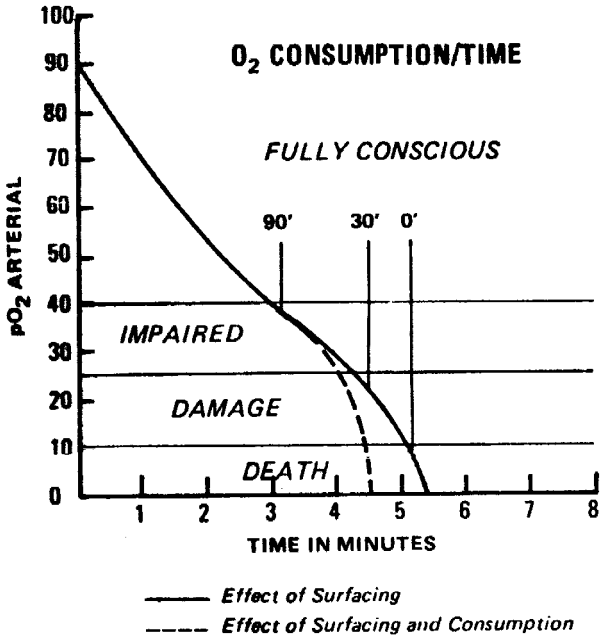


ILLUSTRATION NO.4A

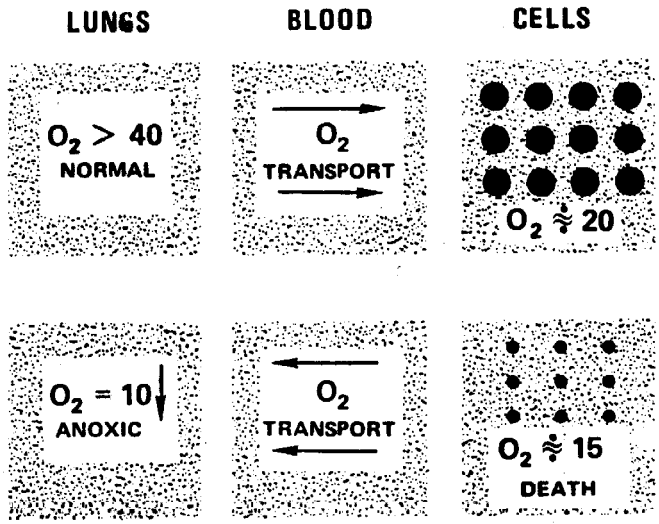


ILLUSTRATION NO.4B

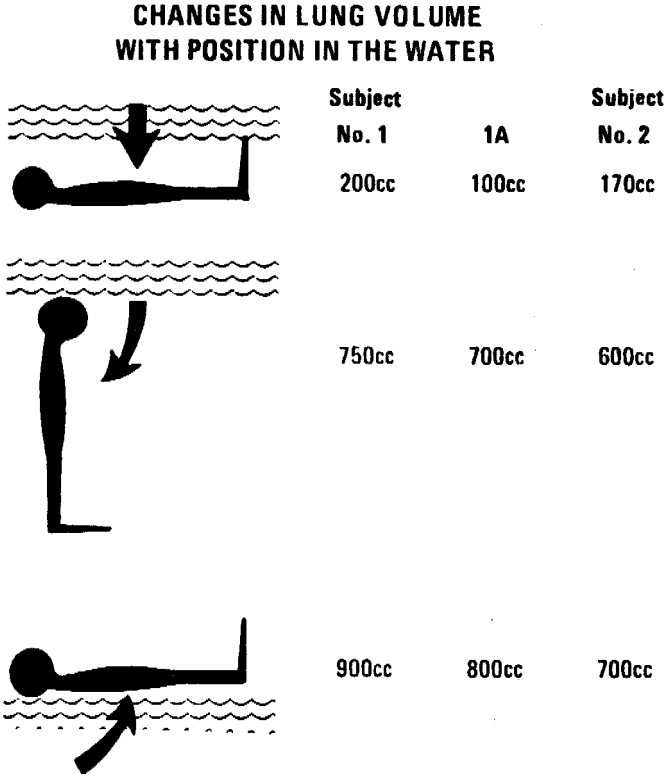


ILLUSTRATION NO.5

as hard as possible, by relaxing, the air comes out. This has been repeatedly verified on anaesthetized subjects. Air can't be forced into the lungs with the neck flexed but it can flow out.

ILLUSTRATION NO. 3

2. What about flow rate obstruction? Can expansion of the gas take place so rapidly that the respiratory tree is unable to handle the flow involved? Divers can achieve flow rates in excess of 400 litres per minute without encountering difficulty. To achieve these kinds of flow rates while surfacing a man with a 7 litre chest would have to ascent 30 feet to the surface in less than 1/60 of a minute or under 1 second, unlikely at any buoyancy. The fact that this can be safely accomplished is further substantiated by experience in the high altitude chambers where the rate of change for the same pressure differential is extremely rapid during a procedure known as explosive decompression. During this particular procedure the person does the equivalent of ascending 15 feet to the surface in less than 1/100 of a second.

3. Laryngospasm could be present especially if water has impinged on the vocal cords. Again the larynx is like a bat wing door, it opens in one direction even when in spasm. This, too, has been confirmed in anaesthetized subjects during operations. Embolus in the unconscious victim is probably near impossible but in a panic-stricken, conscious victim all sorts of voluntary mechanism exist, whereby be can prevent air leaving his chest. A look at data from high altitude chamber work where as many as 3-400 people a year undergo explosive decompression verifies this. In a normal decompression run a change in ambient pressure from 14.4 lbs. per sq. inch to 8.6 lbs per sq. inch takes place in less than 1/100 of a second which is the equivalent of an instant trip from 15 feet to the surface without ill-effects and without embolus occurring in any of the subjects. This indicates that the person in air who is not frightened about drowning and therefore not desperately hanging on to his air permits the air to escape and that it can do so passively and safely at very high rates. On the other hand there are many examples in diving where air embolus has been sustained with changes of as little as 8 feet to the surface, but in these instances it was in a subject who is in a foreign environment, panicky, and attempting to hold his air by voluntary mechanisms. In any instance where a diver is brought from the water and found to have an air embolus, it is my contention that the air embolus was sustained before unconsciousness ensued, not after. Even if laryngospasm is present at the outset, spasm will relax as the pO_2 decreases.

The effects of Boyle's Law as the diver surfaces results not only in the expansion of the gases in the chest but also in a fall in the respective partial pressures of the gases present including O_2 in both the victim's lungs and in the victim's blood (see Illustration No. 4 A). If the victim leaves the bottom at 30 feet with a pO_2 arterial of 40mm by the time he reaches the 15 foot level the pO_2 arterial is down to 30mm on the basis of pressure change along with no allowance for his consumption. By 2-3 feet he has a pO_2 arterial of below 25mm, a pO_2 level capable of producing permanent damage. If he started at a depth of 90 feet his pO_2 at 30 feet will be maximum of 20 and by 15 feet a maximum of 15mm of mercury at which point his blood may be giving off oxygen into his lungs. This state results in an almost instant depletion of blood and tissue stores. The blood literally takes O_2 from the tissues,

brings it hack to the lungs causing anoxic changes or death (see Illustration No. 4 B). To save the diver he must get through this zone as rapidly as possible. One foot per second or even 2 feet per second are obviously far too slow. At one foot per second it will take 90 seconds to get from the bottom alone. It becomes apparent that not only is the best source of air the surface, but that ascent should be as rapid as possible even if the rescuer cannot safely keep pace.

ILLUSTRATION NO. 4B

The suggested technique for saving an unconscious diver is as follows: a diver is found lying on the bottom, (eg. 60 feet) unconscious, regulator out. The weight belt and mask are removed, the diver is raised to a vertical position, his vest is pulled and he is allowed to ascend, the rescuer following, to institute artificial respiration on the surface. What is happening physiologically when the diver is rotated into the vertical plane? The graduent of pressure on the chest wall from the water will cause the lung volume to decrease and any excess air will come out of the mouth. This will purge the airway from below without the danger of driving water into the larynx and precipitating laryngospasm. As the unconscious diver begins to rise the expansion of air within the chest will continue until the pressure required to further expand the chest wall and offset the 30 cm of water gradient between the base of the lung and the mouth exceeds the pressure required to open the airway from below and allows the excess to stream out of his nose and mouth. When he arrives at the surface provided he is wearing a standard vest (which will float him on his back), he will first shoot from the water into the air then fall back into a horizontal float supported by his vest. The sudden removal of the 30 cm of water gradient due to his vertical position and immersion in the water will result in a passive inspiration of 6-900 cc of air without any assistance. This was verified by the following experiments.

First, relaxed subjects connected to spirometer recording air into and out of the chest were lowered horizontally into a swimming pool and the volume of air leaving their chests passively was measured. They were then permitted to hang vertically and again the air leaving the chest with this change in attitude was measured. Finally they were raised out of the water to a horizontal position and the air entering the chest measured and the following figures were obtained (see Illustration No. 4). The degree of relaxation of the subject must be suspect and so to be certain subject was anaesthetized, a tube put in his throat and he was put back into the pool repeating it all again which was done with the results labelled 1A (Illustration No. 5).

CHANGES IN LUNG VOLUME
WITH POSITION IN THE WATER

ILLUSTRATION NO. 5

The next illustration, No. 6 gives a comparison of the time required for each phase of the various methods of rescue and a comparison of some of the hazards. From the totals the advantages of what has been advocated in this discussion seem clear, in addition, it has been pointed out by references to the high altitude and anaesthetic experiences the hazards of embolus for the unconscious victim are vastly over-rated

compared to such hazards as fulminating anoxia, an inevitable consequence of ascent whose effects can be minimized only by the most rapid ascent possible. In addition, the victim receives that crucial first breath upon arriving at the surface as a bonus without any assistance from the rescuer.

In this brief report I have reviewed deep scuba rescue and have developed a simple, effective method for accomplishing deep scuba rescue in less than 90 seconds.

COMPARATIVE TIME COST

	New Way	Brand "X"
Remove Weights	1.5 sec	1.5 sec
Replace Regulator and Purge	N/A	5.0 sec + (20 sec)
Extend Head Squeeze Chest	N/A	2 sec May induce vomiting
Pull Vest	0.5 - 1.0 sec	N/A
Invert Victim	N/A	2-5 sec Aspiration
Trip Up (30 ‘)	4 sec or less	15-20 sec
Approx. Time to (1) First Breath (2) Start AR	 6-8 sec 10-20 sec	 25-33 sec 25-33 sec

ILLUSTRATION NO. 6

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Brief Profile

Dr GD Harpur became especially interested in the correct response to finding that one’s buddy had lost consciousness when he heard of an incident in 1972 where the victim survived but the assisting diver held his breath while excited in the ascent and suffered an air embolism that left a residual paralysis. Another incident later in the year again resulted in complete recovery of the victim but an excited “bystander” followed too rapidly up the last 20 feet and suffered a fatal air embolism. The significance of the unconscious/ survival and conscious/air embolism relationship in these incidents led to the formulation of this article. The views here expressed are worthy of wide circulation.

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AVASCULAR BONE NECROSIS SURVEY (SYDNEY)

Dr Ian Unsworth

A Skeletal Survey for AVBN is being organised at the Prince Henry Hospital at Little Bay, Sydney for sports and professional divers. With this pathological condition it is important to maintain a consistent level of radiographic interpretation and for the same criteria of x-ray change to be used to chart the presence, regression or advancement of the condition.

Straight A-P x-rays of joints (shoulders, hips and knees) and long bones are used for occasional divers. Tomography is used for professional and active sports divers, as also for proven lesions.

It is suggested that examination be on an annual basis for professional divers and active sports divers, two yearly for occasional sports divers.

Examinations are performed at the Prince Henry Hospital, Little Bay, Sydney, NSW 2036. Further information can be obtained from Prof. Bryan Williams, Department of Radiology or Dr Ian Unsworth, Hyperbaric Unit, Prince Henry Hospital.

This survey is intended to plot the presence and progress of the disease and to obtain information concerning the incidence of the disease in the different categories of diver and hyperbaric chamber personnel. It will also cover Workers Compensation Cases. To get the fullest information from such a survey assistance is requested in the provision of as many divers as possible. Preliminary studies of the first 50 sports divers has revealed some unexpected findings and it is hoped as many cases as possible be reviewed.

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A PLEA FOR A CENTRAL REGISTRY OF HYPERBARIC WORKERS

HW Gillen, MD

(Aerospace Medicine, April 1972, Vol. 43, 466-467)

Occupational health needs are often poorly described and less understood. Commercial tunnel work and professional diving have been the sources of considerable misinformation on the health and safety hazards of both occupations. One outstanding health risk emerging from years of professional experience is the problem of osteogenic necrosis (often called aseptic bona necrosis). The relationship of this health hazard to other hyperbaric problems is not known, although very little data exist. While cause is unknown, many seem possible. No treatment is known except for avoidance of exposure and mechanical joint replacement. Such a health risk within an occupation requires major efforts for solution. While the industry of caisson work has been almost completely unionized and considered by the agencies of Workman’s Compensation, the diving industry, in many instances, has not been.

The diving industry has operated for many years from the uncertain base of physical courage and a desire to eat. The risks have been frequently recognized, but little has been planned deliberately to avoid the risks until recently. Some diving risks have been admitted only in recent years. Attempted accident analyses do suggest that people remain the basis of most man-machine problems. Only recently has the diving

industry, under the pressure of advanced techniques, begun its own training programs. Not all risks are subject to the techniques of safety system analysis. Some medical problems, while tentatively accepted, continue to defy analysis because of the lack of data and concepts applicable. Such a problem is osteogenic necrosis, a problem known for many years. The probable multiple etiologic mechanisms should be subject to factorial analysis.

Osteogenic necrosis occurs in two general forms. One destroys the articular surfaces of certain joints preferentially, while the other occurs in the shafts of long bones, usually without human incapacitation. For many years, osteogenic necrosis has been frequently observed among caisson or tunnel workers and has been denied by and among professional divers. However, in retrospect, individual examples have been known for years. Advanced diving techniques, such as saturation diving, have renewed interest in the problem within the diving industry. Radiographic surveys were initiated by employers and by Federal agencies concerned with the health of their own employees; many symptom-free examples have been found, usually with shaft lesions. The problem has high significance to workmen's compensation programs, to the insurance agencies and to the employees themselves, since the risk is present while a direct relationship to experience is not. The lack of etiologic information makes prevention difficult to program. No information exists on treatment that reverses lesions. The need for data collection is acute, and perhaps critical in any reasonable time frame. The national requirements for increased facilities in water distribution, sewage collection, transportation and petroleum production will increase the employment of hyperbaric environmental workers, each of whom is potentially vulnerable to osteogenic necrosis.

Data collection therefore has become a national health need. Data collection on the problem of osteogenic necrosis among caisson workers and professional divers will provide centralized collection of diving experience, radiographic studies, life habits and health characteristics of a large number of exposed persons over many years. The collected data should then be subjected to evaluation and analysis and the results reported epidemiologically. Survey questionnaires must be designed for field coding to provide needed data to be selectively supplemented by interview techniques and by investigations. Persons skilled in long-range health studies of this scope should be retained by contract when their established competency, including both electronic data processing skills and availability of the necessary resources, has been established. Prior experience in this specific area of osteogenic necrosis, diving or caisson work, is not needed as expert advice is readily available by consultation. The critical need is in the data collection, bio-medical analysis and evaluation of health survey problems.

The data collection must be involuntarily; the provision of data must be a requirement of employment, and the responsibility must lie with the employer. Whenever an abnormality is discovered from radiologic or medical examination, this information should be reported to the employee. He stands in the privileged position of requesting less hazardous employment, which it should be the requirement of the employer to provide, if at all possible, or of accepting the risk himself. The development of osteogenic necrosis among persons employed in hyperbaric occupations is a known risk. It should not be considered evidence of negligence by the employer, as neither the causes nor the preventions are known. Therefore, pension rights should be assigned as they are under the Mine Safety and Health regulations, and should not be the subject of litigations. With required data, employee privilege and assigned pensions not subject to litigations and many current problems within the diving and caisson

occupations may be avoided. The employee is given the privilege of protecting himself, the employer is given the protection from unwarranted lawsuits, and the pension disability costs will be reduced. The health of the entire community will be enhanced, its safety improved and its survival assured. A National Registry must be established.

A national effort of this scope will provide epidemiologic data that will be extremely valuable. Since we are not certain of the causes of bone necrosis, nor the relationship of various suspect factors, systematic data collection empirically selected offers the only opportunity for immediate profitable study. The establishment of a national registry under contract and funded by the National Institute of Occupational Safety and Health will provide the opportunity and the mechanism to evaluate and analyze data collected nationally under the authority of the Occupational Safety and Health Act of 1970; that law (public Law 91-596) describes the responsibility to conduct research in areas identified as occupationally important for safety and health. The national registry would provide data of collateral significance not now available, including the qualifications and numbers of persons employed and the amount of work done within these industries. Other health and safety problems might also he identified that are not now recognized because of the wide dispersion of isolated data. The national registry for aseptic bone necrosis will provide, for the first time, data needed to describe the industries of caisson construction and professional diving, and some of their medical risks.

In the United States, under the authority of the Occupational Safety and Health Act of 1970 (Pl. 91-596) we have for the first time, the opportunity to document the employment and injury experience by occupation and the relation to exposure risks, and the health pattern of those employed in professional deep sea diving and caisson work. It is possible, using regulations published by the Department of Labor, on the advice of the National Institute of Occupational Safety and Health, to require that all hyperbaric exposures of all individuals employed be recorded and filed centrally, and to require certain health standards and certain health examination techniques to be routinely applied to all individuals who are admitted to the acceptable risk pool.

In the United States, we are not able to define the extent of the problem as we have no index or central registry of individuals who work in a hyperbaric environment.

There is a tremendous advantage in having central registry of health data, including the data obtained from serial pre-employment examinations, and examinations of individuals who plan to be employed in hyperbaric environments. Such data, if procurable under the authority of the Occupational Safety and Health Act of 1970, would permit the definition of the problem of osteonecrosis related to hyperbaric exposure, and would provide the opportunity to explore and investigate other potential hazards of repetitive exposure to hyperbaric environments.

A very rough current estimate suggests that there may be 5,000 people who are habitually employed in either commercial diving or caisson work. The total number may be larger, but the experience obtained at large construction projects suggests that there are many peripatetic workers who work for very short periods, increasing the probable total figure. The steady workers who essentially complete the task are a fairly small group. The men employed in this work often wander from one job to another, or one employer to another, while a small group is employed by a single contractor. Therefore, their work records, exposure records, and health records are now essentially unobtainable. Their injuries represent a major known risk, which is now not preventable under the acceptable standards of employment. It will be only

by the compulsory accumulation of data that more acceptable standards of employment can be achieved on the basis of improving the health and safety aspects of employment. Individual decompression injuries will always occur.

A national data collection activity aimed at specifically improving the safety and health of employees within the professions concerned can only be achieved by the use of the Occupational Safety and Health Act of 1970, and by the co-operation of the Occupational Safety and Health Administration of the Department of Labor. If the Department of Labor is willing to require of all employees the collection and filing of continuous data according to regulations posted by the Department of Labor, we will be able to learn, at an experience level, those factors which are pertinent to the current injury rates among the employees within the hyperbaric professions.

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A POLICY WE WILL FOLLOW:

The critics who claim that science sees the world as banally clear-cut and everyday will have to realise that more and more scientists are coming to feel like JBS Haldane, who once said: "The world is much queerer than we realise", though perhaps not all would go along with the way he finished that remark, "in fact, I think it is queerer than we can realise".

Dr David Davies, the Editor of the British Science Journal "Nature" told delegates to the ANZAAS Congress (21 January 1975) that more scientists should be prepared to "fly a kite" in full expectation of them being shot at.

He said: "Literally half a million journals throughout the world report dull experiments people have made. There are very few journals where people can really chance their arm. We have to go for the ideas when they first surface, where they may be disproved".

Dr Davies said an example of adventurous scientific research was the work into the claims of psychic power by the Israeli spoon bender, Uri Geller. Many scientists looked down their noses at such research and maintained that there was no point in publishing it. The decision to publish, said Dr Davies, was taken because in his opinion it was in the interests of science to get it out and get it known. He believed that science developed by outrageous ideas. "One works up to new levels of understanding by something that seems absurd at the time. The image of scientists often projected is of men who know it all, who never get caught and who never have to say "I don't know".

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REPORT ON CARDIO-PULMONARY RESUSCITATION SEMINAR
2 NOVEMBER 1974

Dr Don Harrison,
Assistant Director, Department of Anaesthetics, St Vincents Hospital, Sydney

The Faculty of Anaesthetists of the Royal Australasian College of Surgeons conducted a one day Seminar on Cardio-Pulmonary Resuscitation with medical and non-medical representatives of the major resuscitation bodies, medical societies and government

organisations present. Papers were presented to the following:

a. Diagnosis and Management of Respiratory or Cardio-Pulmonary Arrest
b. Basic Training in Cardio-Pulmonary Resuscitation
c. The Teaching of Basic Techniques
d. Advanced Training
e. The teaching of advanced techniques
f. Who should be taught and what should they be taught?
g. Aftercare
h. Pain Relief
i. The co-ordination of resuscitation activities.
j. Assessment, certification and re-assessment

Of the many theoretical and practical problem which were discussed at length the most important concept which emerged was the need for the formation of an Australian Resuscitation Council to set standards in the various aspects of cardio-pulmonary resuscitation which were discussed at the Seminar.

SEMINAR ON ACCIDENT PREVENTION AND COMMUNITY FIRST AID
April 1975

The Royal Australasian College of Surgeons and the Faculty of Anaesthetists is to hold a Seminar on Accident Prevention and Community First Aid. Two sections within this Seminar will further elaborate on many of the matters raised at the November 2nd Seminar. These sections are a Faculty contribution on Resuscitation and First Aid for the injured or dying and a section on Aquatic Injuries organised by the NSW and Queensland members.

The Seminar is designed to present a wideranging view of the problems of rescue, resuscitation and transport within the community. It will not deal in depth with one single problem but rather investigate the broad picture of accident prevention and management. The section on Aquatic Injuries will include a part on diving.

THE RESUSCITATION RESEARCH COUNCIL

The Resuscitation Research Council is a group with representatives from all the major resuscitative bodies in NSW. It was formed to encourage the spread of information throughout the community on cardio-pulmonary resuscitation following the guidelines on this topic developed in the late ’50s and early ’60s. Following a very active involvement in these matters in the mid ’60s the Resuscitation Research Council had a period of quiescence but is now functioning again with vigour.

It is investigating many of the aspects of resuscitation mentioned above. This Council is an important body as there appears to be no similar group in Australia in which so much mutual discussion takes place amongst bodies involved in the teaching or application of resuscitation techniques. It also has strong connections with other multi-member groups such as the Water Safety Council and many groups are represented on both.

Just Remember:-

The environment was there first.
The fauna and flora think it's their sea
We are returning to the sea.. they stayed there.

"SAY, WHERE CAN A CREATURE GET TREATMENT FOR THE BENDS AROUND HERE??"

VILA CONFERENCE

It would be appreciated if any member planning to come to Vila by an independent route could let us know and at the same time enclose the $10 Conference Fee.

Diving

We have taken over all diving facilities on the island so, if you plan to make your own arrangements and wish to dive, please inform us of this so that you may be included in the party.

Accommodation

If you are undecided as to whether to attend or not, please let us know, as this looks like being the best attended conference to date and we wish to ensure sufficient accommodation has been reserved well in advance. It would be a shame to have to split the party because of a rush of last minute replies.

Scientific

We already have a well balanced programme in hand but will be happy to accept further contributions. If, however, you do not wish to lecture on this occasion perhaps you would like to volunteer to chair one of the sessions. The names of Chairmen and Speakers will appear on the printed program, as a convenience to those attending and also for the benefit of your tax file on this meeting.

Please send Conference Fees, etc. to

Dr J Parer
11 Tindale Street
PENRITH NSW 2750

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ACKNOWLEDGEMENTS

This issue of the Newsletter has received generous support from ROCHE Pharmaceutical. In particular, we have to thank Dr JT Baker, Director of the ROCHE Research Institute of Marine Pharmacology, for his personal interest in our Society's efforts towards increasing diving safety. It is hoped the events noted in the cartoon never arise, or if they should occur he sends in an Incident Report

A special welcome and thanks are extended to Mr Peter Harrigan for offering his considerable skills as a cartoonist for our amusement and edification.

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