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European Journal of Underwater and Hyperbaric Medicine

Official NEWSLETTER

EUBS European Underwater and Baromedical Society

CONTENTS

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EDITOR **Peter HJ Mueller** **eubs@hbo-mannheim.de**
Speyerer Strasse 91-93, D-68163 Mannheim/Germany

ASSISTANT EDITOR Hyperbaric Medicine and Clinical Applications: **Till S. Mutzbauer**
ASSISTANT EDITOR Occupational Medicine, Compressed Air Work: **Birger Neubauer**
ASSISTANT EDITOR Physiology and Medicine of Diving, Fitness to Dive: **Kay Tetzlaff**

CORRESPONDING ORGANISATIONS

ECHM	European Committee for Hyperbaric Medicine
SPUMS	South Pacific Underwater Medicine Society
UHMS	Undersea and Hyperbaric Medicine Society

MANUSCRIPTS: see INSTRUCTIONS TO AUTHORS on inside of back cover.

FROM THE EDITOR

Dear Readers!

Today you are holding in your hands the first issue of the **European Journal of Underwater and Hyperbaric Medicine (EJUHM)**. This transformation of the **EUBS Newsletter** had been proposed to the **Executive Committee** in 1998 at the **Annual Scientific Meeting of the EUBS** in Stockholm, and after primary considerations to the **General Assembly** at the **EUBS Meeting** last year in Israel.

A survey was conducted to determine the most suitable name for this new journal, and the majority supported a clear vote for the **EJUHM**. The change of name of the **EUBS Newsletter** towards **European Journal of Underwater and Hyperbaric Medicine** was approved by the **EUBS Executive Committee** this year and an ISSN listing was applied for. The new journal now has its ISSN and will hopefully be better recognised in the future.

However, this new journal still remains the **EUBS Newsletter** for you. It will also continue the numeration of the **Newsletter** to enable you to follow the course of the **EUBS Newsletter**, and as other European Societies or Committees will start to use the **EJUHM** as their source of information we will continue the numeration of these publications wherever existing. Negotiations have already started with interested European organisations and societies.

Papers are now accepted for publication in the new journal **EJUHM**. You may send them by email or by disk directly to me, or you send them via one of the representatives in the **International Editorial Board** (see also **Instructions to Authors**). I have not been able to identify a person willing to support the scope of the **EJUHM** in every country with members in the **EUBS**, so please do not feel disappointed if your country is not represented yet.

Those of you wishing to publish in their original language are reminded that at least an English abstract of the paper is required. If you have difficulties with that please rely on a member of the **International Editorial Board** to assist you. Papers in a language other that English or German will not be edited any further, they will have to appear as I receive them! Make sure that the spelling is correct and no major mistakes are in your text.

We start this issue with a new **Series of Original Papers** and it will be called **"Back to Fundamentals"**. This issue is devoted to modelling of bubble dynamics, and Valerie Flook has bravely stepped forward and submitted a paper. I am very grateful for this.

In an attempt to find a **Guest Editor** for the series I have been in contact with Prof. Bill Mapleson, Professor Emeritus of the Physics of Anaesthesia, University of Wales College of Medicine at Cardiff, United Kingdom. He has a very high reputation in anaesthetics having spend a lot of time studying uptake and distribution of inert anaesthetic gases and volatile anaesthetics while he worked as a physicist in the Cardiff Anaesthetic Department until his recent retirement. If you know the Mushin/Thompson book about ventilators ("Automatic Ventilation") he was a joint author of editions subsequent to the first.

Unfortunately his workload does not permit him to be the **Editor** for the series, but he has granted me the permission to quote from his review:
"It appears that Valerie has plugged the Van Liew and Burkhard model into the 8-compartment physiological model and found that it works. What I find absolutely fascinating are the shapes of the curves of "load" in Fig. 2 of the paper against time: exponential decay

Continued on page 16

EUBS EXECUTIVE COMMITTEE

PRESIDENT
Dr. Greta Bolstad
SINTEF UNIMED
N-7034 Trondheim, Norway
Tel.: +47-73596899 Fax: +47-73591005
e-mail: greta.bolstad@unimed.sintef.no

VICE PRESIDENT
Dr. Ramiro Cali-Corleo
Hyperbaric Unit, St. Luke's Hospital
G'Mangia, Malta
Tel.: +356-234765 Fax: +356-372484
e-mail: iro+danm@mail.waldonet.mt

IMMEDIATE PAST PRESIDENT
Dr. Juergen Wenzel
Walhallstrasse 36, D-51107 Koeln, Germany
Tel.: +49-2203-601 3370 Fax: +49-2203-68323
e-mail: juergen.wenzel@dlr.de

PAST PRESIDENT
Dr. Alessandro Marroni
Via Pugile 82, Roseto Abruzzi, Italy
Tel.: +39-85-8930333 Fax: +39-85-8930050
e-mail: alexnu@daneurope.org

SECRETARY
Dr. Joerg Schmutz
Foundation for Hyperbaric Medicine
Kleinhuningerstrasse 177, CH-4057 Basel, Switzerland
Tel.: +41-61 631306
e-mail: joerg.schmutz@hin.ch

TREASURER &
MEMBERSHIP SECRETARY
Mrs. Angela Randell
Benview, Prospect Terrace
Port Elphinstone, Inverurie AB51 3UN, United Kingdom
Tel.: +44-1467-620408
e-mail: benview@abel.co.uk

MEMBER AT LARGE 1999
Dr. Noemi Bitterman
Technion
P.O.Box 8174, Haifa 3308, Israel
Tel.: +972-4-8347171 Fax: +972-4-8346631
e-mail: haimb@tx.technion.ac.il

MEMBER AT LARGE 1998
Dr. Peter Germonpré
Centre for HBO-Therapy, Queen Astrid Military Hospital
Rue Bruyn 200, B-1120 Brussels, Belgium
Tel.: +32-2-264 4868 Fax: +32-2-262 1480
e-mail: peter.germonpre@hmra.smd.be

MEMBER AT LARGE 1997
Dr. Igor Mekjavic
Institute of Physiology, University of Ljubliana
1105 Ljubliana, Slovenia
Tel.: +386-61-317152 Fax: 386-61-1324181
e-mail: eubs@guest.arnes.si

NEWSLETTER EDITOR
Dr. Peter HJ Mueller
HBO-Zentrum Rhein-Neckar, Diakoniekrankenhaus
Speyerer Str. 91-93, D-68163 Mannheim, Germany
Tel.: +49-621-8102 390 Fax: +49-621-8102 393
e-mail: eubs@hbo-mannheim.de

PRESIDENT'S COLUMN

Dear members and friends,

this is the first issue of our new journal the "European Journal of Underwater and Hyperbaric Medicine", which is going to substitute our EUBS Newsletter. Lets hope it will turn out to become a popular journal, and that our editor will receive plenty of contributions from our members. I also hope that the step that has been taken by changing our Newsletter to a journal will show that EUBS is an alive and flourishing society which will attract a substantial number of new members. I wish to congratulate our editor Dr. Peter HJ. Mueller and his editorial board with their initiative and wish them all the best of luck in their future work with our journal.

As you all know, SINTEF Unimed, my employer, has acted as the EUBS Proceedings Library for quite a number of years. Our secretary, Brit Gullvåg, who has been in charge of the library, has recently left SINTEF to start her own company together with a few other colleagues. Therefore, the Proceedings Library will be moved to NUI AS (the Norwegian Underwater Institute), in Bergen, Norway, where their librarian, Bente Telle, will take over the responsibility. She will prepare some information on how she will run the library for the next issue of the journal. Until then, if you have any inquiries about the library, do not hesitate to call NUI AS on Tel. +47 55 94 28 00 and ask for Bente, or send an e-mail to <**nui@nui.no**>.

We are getter closer to our Annual Scientific Meeting, which, as you all know, will take place in Malta this year. I feel certain that it is going to be a good meeting, both scientifically and not the least, socially. The organisers of our EUBS meeting are known to be both fun and interesting, and the program that our Vice-President Iro Cali-Corleo as Secretary General has put together for us this year certainly looks promising. I am looking forward to the event, and I hope you will be there too!

As the meeting in Malta comes up, my time as your president will end, and Iro will be taking over. Since I do not know exactly when the next issue of the journal will be released, I would like to take this opportunity to thank you, our members, for all the support you have given me and the society during my now almost three years as president. As a consequence of me pulling back and Iro coming forward as President, we need to elect a new Vice-President. Included in

this issue of the journal, you will find ballot sheets with candidates for both the Vice-Presidency and for a new Member at Large. To make it easy for you to vote, we have enclosed an envelope with our address, which you can use to return your filled out ballot sheets. So, do your duty right now, and vote for your favourite candidates.

See you in Malta!

Best regards, Greta

MEDICAL ASSESSMENT OF FITNESS TO DIVE

By David Elliott

The harmonisation across Europe of medical standards that are used in the assessment of working divers was the theme of a 2-day meeting held at the Royal Society of Medicine in London on 8th & 9th April this year. Harmonisation of diving procedures, particularly the Health & Safety aspects, is an objective of the European Diving Technology Committee (EDTC). This is a tri-partite committee to which each European nation can nominate one government representative, one employer representative and one trades union representative. Because of the physiological aspects of diving, each nation can also nominate, as a full voting member, one medical doctor.

It was the Medical Sub-Committee (Charman : Juerg Wendling, Switzerland) of the EDTC that, together with the European Committee for Hyperbaric Medicine (ECHM), produced the agreed training objectives for all categories of hyperbaric doctors that were discussed at the European Undersea Biomedical Society (EUBS) meeting in Slovenia in 1998. This has since been ratified by the main committees of the EDTC and ECHM.

The current objective, that of harmonised fitness assessments for working divers across Europe which does not concern the ECHM, is being driven by a small EDTC working group (Juerg Wendling, Tor Nome and David Elliott). They met, opportunistically, over the past 18 months to prepare a harmonised approach based on the content of the U.K. Guidance (M.A.1) but with every paragraph of it open to interactional review and comment.

To facilitate this process the EDTC agenda was thrown open to public discussion. It was an open forum at one of the annual meetings for medical examiners of divers sponsored by Biomedical Seminars. These meetings were designed as annual revision courses for U.K. Health & Safety (HSE) Approved Medical Examiners, but are also attended by many whose primary interest is within recreational diving. The 2-day meeting, chaired by David Elliott and Nick McIver (of the North Sea Medical Centre), was attended by representatives of most European nations, plus doctors from Malaysia, Australia, USA, Canada, the Middle East and South Africa.

The meeting opened with a general review of the purpose of and the procedures for medical assessments both for working divers (Walter Maas, the Netherlands) and recreational divers (Iro Cali-Corleo, Malta). Dr. Wendling then reviewed the need for harmonisation within the EU and beyond, and outlined the way to do this that is being taken by the EDTC.

The major part of the meeting was taken up by a detailed review of the principal organ systems but, even in two days, not everything could be covered. To facilitate this process the handout for delegates was based on the existing HSE guidelines but interspersed with boxes containing the many suggestions for change previously made by members of the EDTC.

Cardio-vascular assessment was addressed by Peter Wilmshurst (UK), a cardiologist who some years ago drew early attention to the PFO and who is also a member of the U.K. Sports Diving Medical Committee.

Stephen Watt (UK) of Aberdeen University reviewed all aspects of pulmonary assessment and was followed by Joop Madsen (Denmark) who reviewed the various options for exercise testing and the assessment of physical fitness.

The unique otological problems of diving were reviewed by Lorrie Henderson (Canada) and included a video-presentation by Bill McNicoll (UK) who at the last minute was not able to attend the meeting.

The medical and physiological problems of women in professional diving were addressed by Maida Taylor (USA) who, as a bonus, also delivered a succinct evaluation of seasickness remedies in relation to diving safety.

A particular area of controversy is that of the development of diabetes in an established diver. This was dealt with by Chris Edge (UK) who also covered the restricted acceptance of selected diabetics in recreational diving.

The need to monitor for dysbaric osteonecrosis, as the only well-proven long-term occupational hazard of professional diving, was emphasised by David Elliott (UK) who also reviewed the other potential long-term effects of diving, particularly in the CNS.

The neurological aspects of fitness to dive were covered by David Dick (UK), a neurologist who sees many patients with decompression residua. He also presented a video on the techniques of neurological examination. The neuro-psychiatric aspects, too often neglected, were reviewed by Brian Lunn (UK) who emphasised the possible sequelae of acute neurological decompression sickness.

The final area for discussion was that of the resumption of diving after a neurological decompression injury and the presentation on this was made by David Elliott and Nick McIver.

Many ideas were given an airing at this 2-day meeting and much information was exchanged. An audio-tape recording was made for reference purposes but, because this was merely one step on the pathway towards a harmonised document, no proceedings will be published of these intermediary discussions.

The Royal Society of Medicine was also the last in the 15-year series of annual weekend meetings sponsored by Biomedical Seminars, due to the transition of both David Elliott and Nick McIver into (partial) retirement. However, in response to demand, they have agreed to help regional diving doctors set up one-day meetings at some local venue or hostelry as required. Some probable sites include Plymouth and the Isle of Man (or the Lake District) and other possible venues include Hull, but no details have been settled.

For European diving doctors a suggestion was put forward that Biomedical Seminars could hold a Saturday meeting at a venue close to an airport such as Schipol in the Netherlands. Though still at an early state of planning, another opportunity may be provided by a week of diving and lectures in Bonaire, 6-12 May 2001.

Those interested in any of these should enquire from Karen Reeves (e-mail: Karen@biomedseminars.co.uk) as a mailing may go out in the Autumn, but no promises.

EUBS Executive Committee Nominations for Vice-President in 2000

Noemi Bitterman, D.Sc.

Technion, - Israel Institute of Technology.
P.O.Box 8174, Haifa 31080, Israel.
Tel: 972-4-8347171, Fax: 8346631
E mail: noemib@tx.technion.ac.il
Military rank: Lt. Colonel (CDR, Navy) ret.

Education & Scientific experience

1982	D.Sc. in Physiology, Faculty of Medicine, Technion - Israel Institute of Technology.
1985 - 1987	Post doctoral fellowship, Department of Physiology, School of Medicine, University of Pennsylvania USA.
1993	Command and Staff College I.D.F.
1999 –	M.Sc. in Industrial Design, Technion, Haifa.

Teaching Activities

1990 –	"Diving and hyperbaric Physiology", Faculty of Medicine, Technion, Haifa (course for graduate & post graduate students).
1982 –	Teacher in numerous courses on diving physiology & hyperbaric medicine in the Navy (INHI); Human Oceanography, Haifa University; "Window-on-Science" USAF School of Aerospace Medicine BAFB; Technion, Israel Institute of Technology; Interuniversity Institute of Marine Sciences.
1999 –	"Diving and hyperbaric Physiology", Israel Maritime College

Positions

1990 - 1997	Director of the Hyperbaric Research Unit of the Israeli Naval Medical Institute (INHI).
1999 –	The S. Neaman Institute for Science & Technology, Technion, Haifa

Awards

1999	The Albert Behnke Jr. Award, Undersea & Hyperbaric Medical Society.

Public Professional Activities & Administrative posts

1989	Scientific committee, XVth Annual Meeting of the EUBS on Diving & Hyperbaric Medicine.
1993 –	IUPS Commission on Undersea & Hyperbaric Medicine
1994 –	Board of Directors of the Interuniversity Institute of Marine Sciences- Eilat. Head of Diving Committee.
1995 –	Council of the Israel Society for Oxygen & Free Radicals Research.
1997	Meeting Organizing Committee of 5th International Meeting on High Pressure Biology- St. Petersburg.
1998 –	Council of the Israel Society for hyperbaric and diving Medicine and Physiology.
1998	Committee for hyperbaric oxygen therapy, under the Israel Society for Hyperbaric and Diving Medicine and Physiology.
1998	Organizing & Scientific committees, 25th Annual Meeting of the EUBS on Diving & Hyperbaric Medicine, Eilat, Israel.
1998	Member at Large- European Underwater and Baromedical Society.
2000	Scientific committee, 27th Annual Meeting of the EUBS on Diving & Hyperbaric Medicine, Malta,

Membership in Scientific and Professional Societies

- European Underwater and Baromedical Society.
- Israel Society for Physiology and Pharmacology.
- Undersea and Hyperbaric Medical Society.
- Israel Society for Oxygen & Free Radicals Research.
- The Oxygen Society.
- Israel Society for Hyperbaric and Diving Medicine and Physiology.
- Human Factor and Ergonomics Society.
- Medical System and Rehabilitation Group.

EUBS Executive Committee Nominations for Vice-President in 2000

Seppo Antero Sipinen

Finnish Naval Headquarters
P.O.Box 105, FIN 00201 Helsinki
Phone: +358-9-18124211, Fax :18124212
e-mail: seppo.sipinen@sotlakl.inet.fi

Education

1965	Graduated, Pohjois-Haagan yhteiskoulu, Helsinki
1965	German, pro exercitio,University of Helsinki
1965	inorganic chemistry, cum laude approbatur,
1965	Physics, cum laude approbatur, - " -
1966	German for foreign students, University of Freiburg, Federal Republic of Germany
1966	Latin for foreign students, - " -
1967	Natural Sciences, - " -
1968	Candidate of Medicine, - " -
1968 - 1970	Visiting Candidate of Medicine, University of Bern, Switzerland
1971	M.D., University of Freiburg im Breisgau, Federal Republic of Germany
1972	M.D., University of Helsinki
1973	Swedish, official examination, Helsinki
1979	Specialist in Obstetrics and Gynecology, University of Helsinki
1981	Doctor of Medical Science, -"-
1992	Germany, official examination, -"-
1994	Diving Medicine and Hyperbaric Oxygen Treatment, specialist, -"-
1996	Docent in Diving and Hyperbaric Medicine, University of Turku

Military education

1973 –	Conscription
1974	- reserve officer school in infantry - NAVY diver training course
1974	Lieutenant junior grade in reserve
1975	Lieutenant (M) in reserve
1983	Lieutenant senior grade (M)
1984	Lieutenant commander (M)
1986	Advanced course for specialized officers, Military Academy Helsinki
1986	Commander, junior grade (M)
1990	Commander (M)
1994	National Defense Course
1996	Captain (Navy MC)
1998	Senior Officers Course, Military Academy Helsinki
1996	National Defense Course,
1999	1st repetition

Professional positions held

1983 –	Surgeon General of the Finnish Navy
1983 –	Head of the Naval Department of the Research Institute of Military Medicine
1998 –	Head, Research Institute of Military Medicine
1983 –	Consultant of Gynecology and Obstetrics of the Finnish Defense Forces
1994 –	Consultant of Diving Medicine of the Ministry of Social Affairs and Health, National Research and Development Center for Welfare and Health in Finland (STAKES)
1976 - 1977	Consultant of the Compressed-Air Work of the Subway in Helsinki
1977 - 1982	Lecturer of Diving and Hyperbaric Physiology and Medicine, University of Helsinki
1977 - 1986	Member of the Research Group of Steroid Research Laboratory, Department of Medical Chemistry, University of Helsinki
1984 - 1986	Consultant of the Development Group of Hyperbaric Oxygen Treatment of the State Medical Department in Finland
1985 - 1986	Head of the Diving and Hyperbaric Medical Treatment of the State Salvage Education Institute in Finland
1989 - 1990	Consultant of the Development Group of Professional Diving in the National Board of Labor Protection in Finland

Scientific Societies

1975 - 1977	The Finnish Society of Diving and Hyperbaric Medicine, secretary
1992 - 1995	European Underwater and Baromedical Society, executive board, Member at Large
1977 - 1999	The Finnish Society of Diving and Hyperbaric Medicine, president,
1999 –	Executive Board, Member at Large
1977 –	Undersea and Hyperbaric Medical Society, USA, member
1985 –	European Undersea Biomedical Society, member
1986 –	European Diving Technology Committee, member, representative for Finland
1991 –	Scientific Board of the Divers Alert Network in Europe, member
1991 –	European Committee for Hyperbaric Medicine, member
1995	President of the XXI Annual Meeting of the European Underwater and Baromedical Society in Helsinki, Finland, 28th June - 1st July 1995

Other societies / activities

1976	Finnish Sport Divers Federation, safety committee, member
1977 - 1979	Finnish Sport Divers Federation, safety committee, president
1977 - 1979	Finnish Sport Divers Federation, executive board, member
1980	Finnish Sport Divers Federation, medical committee, president

Prices and Awards

1988	Medal for Military Merits, Finnish Defense Forces
1988	Silver Medal, Finnish Sport Divers Federation
1989	Diver of the Year, Finnish Sport Divers Federation
1995	Knight, First Class. Order of the White Rose of Finland
1999	Gold Medal, Finnish Sport Divers Federation

EUBS Executive Committee Nominations as Member at Large for 2000

Martin Robert Hamilton-Farrell, BSc, MRCP, FRCA.

Consultant in Anaesthetics and Hyperbaric Medicine, Whipps Cross Hospital, London, England since 1987.
Hospital appointments –
Director of Intensive Therapy Unit, 1992-1999.
Chairman of Drug and Therapeutics Committee since 1997. Chairman of Medical Education and Research Charitable Trust since 1998.
Hyperbaric appointments –
Chairman of British Hyperbaric Association, 1992-4.
Member of Royal College of Physicians Working Party on Hyperbaric Medicine, 1993-4.
Co-ordinator of BHA National Audit on the management of carbon monoxide poisoning, 1992-6.
Chairman of BHA Working Party on the management of carbon monoxide poisoning, 1997-9.
Chairman of Local Organizing Committee for ECHM Consensus Conference on the management of diabetic foot lesions, London, 1998.
Member of Executive Board of ECHM since 1998.
British representative in Action B14 of the European Commission Cooperation on Science and Technology (COST), on Hyperbaric Medicine, since 1999.

EUBS Executive Committee Nominations as Member at Large for 2000

Mikael Gennser, Ph.D.

Researcher at the naval medicine laboratory of the Swedish **National Defence Research Establishment (FOA)** since 1990, presently responsible for the research in submarine rescue.
Graduate of the United World College of the Atlantic, 1975. Chemistry studies at the University of Lund, graduating from medical school at the University of Lund/University Hospital of Malmö, graduate studies in hyperbaric physiology at the Karolinska Institutet, Stockholm in 1983.
Thesis entitled "Influence of high hydrostatic pressure and high gas pressure on beating frequency, rhythm, and mechanical activity of isolated atrial muscle", defended 1989.
Since 1990 involved in research regarding deep submarine escape and survival in cold water. The last five years the submarine escape project has been carried out in co-operation with DERA, UK.
Since 1981 regular attendee of the EUBS meetings and contributing several papers to the EUBS proceedings.
Editor of the proceedings for the EUBS meeting in Stockholm 1998.

EUBS FINANCIAL STATEMENT FOR THE PERIOD 1ST JANUARY TO 31ST DECEMBER 1999

INCOME

Membership		4,180.60
Corporate Membership		579.00
Interest on Bank Account		201.03
Total		**£4,960.63**

EXPENDITURE

Secretarial Fees			600.00
Newsletter	- NHC	1,097.00	
	- NHC	1,119.00	
	- Peter Mueller	443.71	2,659.71
Bank Charge – Foreign Cheque			10.80
Website Setup and Site Charges -			208.59
Cardnet Charges			278.50
Printing			95.18
Student Grants - 1999			2,162.89
Student Grants - 1998			319.15
Student Grants - 1998			685.73
Postage/Telephone etc.			267.30
Executive Committee Expenses - AGM			84.43
Total			**£7,372.28**

Expenditure over Income **£2,411.65**

Bank Balance	
Account Balance as at 1 January 1999	£16,368.76
Stamp Stock and Cash in Hand at 1 January 1999	17.30
	£16,386.06
Less Expenditure over Income	2,411.65
	£13,974.41
Account Balance as at 31 December 1999	£13,974.41
Stamp Stock and Cash in Hand at 31 December 1999	0.00
	£13,974.41

Assets	Purchase	Depreciation	WDV
Fax Machine	565.00	0.00	0.00
Computer	1,081.00	0.00	0.00
Printer	307.00	122.00	0.00

Note: Assumed 3 years Asset Life for office equipment

The Membership Secretary and the Newsletter Editor would like to remind all Members of the EUBS to notify the Society of changes of their address immediately and pay the Annual Dues dutifully!

LETTERS TO THE EDITOR

Dear Peter

I feel I must write to you and ask the members of EUBS if there are readers interested in Technical articles and matters concerning HBO safety. I am interested in communicating with like-minded people who may have an interest in the following things for example.

- Health and Safety.
- Risk Assessments.
- Fire.
- Electrical equipment evaluation and testing programs.
- Certification of clinical facilities.
- Training.

I feel that generally all organisation's hyperbaric publications (**EUBS, BHA or UHMS**) are dominated by medical matters and are therefore aimed at doctors.

I feel sure that with a little encouragement technicians may like to communicate with each other, either though your publication or directly with each other via e-mail. I am sure if units communicated more then this would avoid duplicating work.

I wonder how many units have seen the excellent fire testing video from the **GKSS** meeting in May 1999 or the tests done in Italy following the Milan disaster.

We should be encouraging a more "Team Approach", but to do this we need to have technicians prepared to stand up and present papers at meetings and write articles for the newsletters. I wonder if we need to form a breakaway group, which I personally am not in favour of yet, (again will not help the "Team").

Medicine and Science is all well and good but let's not forget the hardware that makes it all possible. There are many technicians that provide safe environments for us to work in. We must promote international communications on matters of safety standards, health of the staff, equipment evaluation and technical problem solving.

Let us work together, rather than in isolation, to avoid a local incident that will affect the whole hyperbaric community. For example test your own fire extinguishers for yourself at depth (I suspect you may be disappointed by your results). List various standards available in different units in order that safety directors can cross reference if they wish or apply standards where their own country may not have suitable legislation of their own.

All I ask is for all involved on technical matters to promote our knowledge base and improve standards where necessary. If you are interested, communicate with me, let me have your thoughts. Perhaps the EUBS newsletter can provide a technical section.

In the **UK** the **BHA** annual meetings and newsletters are 95% medicine and we rarely ever hear from technicians. Last year the **UHMS** meeting at Boston had more technical presentations than ever before and the fire/fogging meeting in **Lübeck** was of great excellence.

List suggestions for presentations you would like to hear, avoid the politics, and encourage the "Team Approach"- Doctors, Nurses and Technicians. The chamber can not function or treat safely without any one of these groups. All groups are as important as each other. How many technicians are actively involved in their countries hyperbaric organisation's committees? Or do we leave it to the Doctors as in the **UK**.

One final note for the practical readers get your self a copy of **Tom Workman's** new book called

"Hyperbaric Facility Safety: A Practical Guide" (available from Best Publishing).

Editor: Why not do a book review starting with this one?

Yours sincerely

Roly Gough-Allen
Supply and Demand
Three Point Cottages
Barton Road, Turnchapel
Plymouth PL9 9RQ
Devon, United Kingdom
Tel/Fax: 00 44 1752 492490
E-mail: rolyga@eurobell.co.uk

ORIGINAL PAPERS

THE PHYSICS AND PHYSIOLOGY OF DECOMPRESSION

By Valerie Flook, Ph.D.

Physiological models of decompression have had a bad press for many years because they were found to be inadequate in describing reality, especially for longer deeper hyperbaric exposures. In an attempt to match theoretical predictions to outcome more and more imaginary tissues were added to the model thereby extending the range of time constants (Berghage et al 1978). The concept of thresholds was invoked to explain the fact that some pressure changes appeared never to give trouble in the form of overt symptoms (Workman and Bornmann 1975). The concept that bubbles are stabilised by a skin of proteins has been used to explain the long persistence of bubbles. Do we need this added complexity? How far can we get if we assume that the gas dynamics and bubble dynamics of decompression depend on the anatomy and physiology of the body and the laws of physics?

Time constants and gas dynamics

We do not need imaginary tissues with imaginary half times. The time constant of a tissue is fully defined in terms of the capacity which the tissue has for inert gas and the rate at which blood brings inert gas to, or removes it from, the tissue. The total volume of gas taken up by a tissue is determined by the solubility of gas in the tissue, the volume of the tissue and the partial pressure of the inert gas. The rate at which the gas is taken up is determined by the tissue:blood partition coefficient. This concept is described in Mapleson (1963). The information which will allow time constants to be calculated is in the physiological and physical chemistry literature dating back over 6 decades. Studies into the uptake and distribution of anaesthetic agents in the 1940-60's showed that grouping the tissues into 8 groups having similar time constants adequately described the uptake of inert gases. Table 1 lists tissue groups and time constants for nitrogen, argon and helium.

Compartment	Nitrogen	Helium	Argon
1	0.86	0.86	0.86
2	1.87	1.87	1.87
3	3.07	3.07	3.07
4	5.31	5.31	5.31
5	12.25	12.25	12.25
6	50.62	50.62	50.62
7	69.14	69.14	69.14
8	211.3	88.73	246.77

TABLE 1: Time constants in minutes

Taking these simple concepts we see that even in the absence of bubbles gas washout will last longer than gas uptake unless the tissues are saturated, because the process is exponential; most succinctly described as needing 5 time constants to complete the process. Figure 1 shows, as the dotted line, the pressure profile; as the dashed line arterial partial pressure of inert gas; as the solid line tissue partial pressure of inert gas. Figure 1A shows what will happen in the tissues of compartment 4 on a 7.5 minute exposure to 10 metres if we assume that no bubbles form. Uptake is limited to 7.5 minutes, washout takes 5 time constants 26.5 minutes. On the other hand, even if the tissue is saturated by being at pressure for at least 26.5 minutes it will still only take 26.5 minutes to washout, provided no bubbles form, figure 1B. The two-headed arrows give the explanation for this. They represent the driving force for gas movement which is always the difference between the arterial partial pressure of inert gas and the tissue partial pressure of inert gas. In figure 1A, an unsaturated tissue, the driving force at

the beginning of washout is much lower than for either uptake or washout from saturation

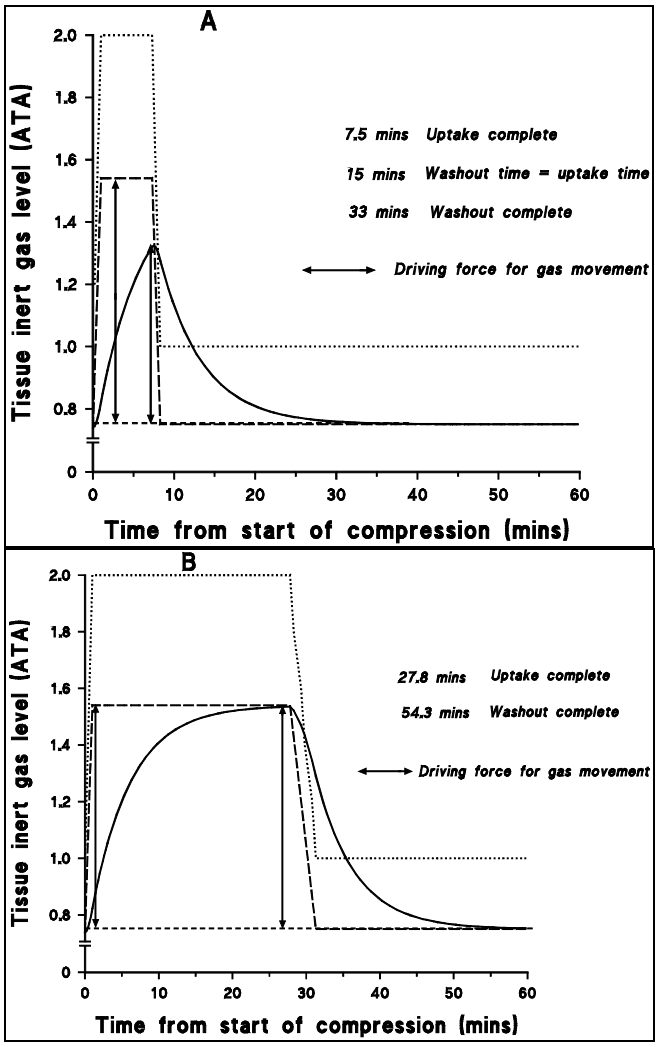

Figure 1: Tissue inert gas partial pressure for exposure to 10 metres. Dotted line is pressure profile, dashed line is arterial partial pressure of inert gas, solid line is tissue partial pressure of inert gas

Consequences of bubbles

In 1993 Van Liew and Burkard published an equation set which describes the physical process of bubble growth and decay taking into account:

- the gas load;
- the pressure profile;
- blood flow and diffusion of gas in tissue;
- the solubility and partition of the inert gas in tissue;
- total dissolved gas pressure and surface tension.

It would be possible to develop a more complex equation set than those of Burkard and Van Liew but given the great variability between individuals, and within any individual, it is only ever possible to predict what might happen in more general terms and for that the simplest approach may be sufficient.

What happens if bubbles form? Consider the situation in compartment 4 for a 10 metres exposure for 309 minutes which is just on the No-Stop decompression limits according to USN tables. Figure 2 shows the effect of bubbles on removal of inert gas following decompression at 10 metres per minute. The dotted horizontal line shows the nitrogen load before compression. The finer dashed line is the bubble growing and decaying. The heavier dashed line is the tissue nitrogen load if bubbles do not form. The solid line is the tissue nitrogen load when bubbles form. When there are no bubbles the nitrogen washout is exponential, governed by the time constant of the tissue. The solid line shows that the inert gas removal initially follows this exponential course but, as the bubbles begin to grow, they exert an increasing influence on the removal of inert gas, gradually dominating it and causing a linear washout out, which continues until the bubbles have gone. Thereafter the gas washout follows the tail end of an exponential curve.

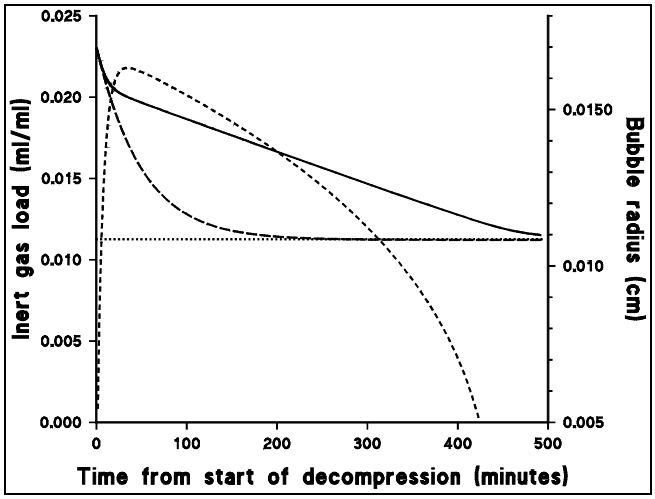

Figure 2: The effect of bubbles growth on inert gas load following a no-stop decompression from 309 minutes at 10 metres. See text for details.

The characteristics of the solid line cannot be described by a time constant, there is no meaningful constant which can describe it. However it useful to look at the effect which the formation of bubbles has on the time taken to remove half of the extra inert gas load. The values are shown in Table 2 for the 7 compartments which are predicted to form bubbles on this No-D exposure. Also given in Table 2 are the half times for the tissues derived from the time constants in Table 1, that is for washout when no bubbles form.

Compartment	No bubbles	Bubbles
2	1.3	1.7
3	2.1	2.5
4	3.7	4.1
5	8.6	9.4
6	35.3	176
7	48.2	185
8	147.5	3625

Table 2: Time to remove half the inert gas

It is worth noting that after this No-D exposure the bubbles are still dominating the removal of gas from fat more than 60 hours after the end of the dive. This is possibly the explanation why physiological models which took no account of the effect of bubble formation could not explain observations despite the addition of longer and longer time constants. None of the time constants used adequately took account of the effect of bubbles and, in addition, that approach influenced predicted gas uptake as much as washout. Those models did not build in a factor for the gross asymmetry between uptake and washout.

How do the bubbles have such a big effect on gas washout? The explanation relates to the magnitude of the gas:blood partition coefficient. For the gas to be removed from the body it has to be taken from the bubbles, through the tissues, to the blood, to be carried in the blood to the lungs. Once bubbles have formed a dynamic equilibrium exists and gas is partitioned between the tissue, blood and the bubble. Table 3 shows the gas:tissue partition coefficients for the 3 inert gases of interest in diving. Blood and bubbles compete for gas, the balance is in favour of the gas phase. The gas:tissue partition is the rate limiting factor.

Gas:tissue partition
Nitrogen 67:1
Helium 112:1
Argon 33:1

TABLE 3:

So far this has not taken any account of bubbles which might form in flowing blood. For these bubbles the gas:blood partition coefficient will not play a rate limiting role, indeed the circulating blood will speed up the removal of inert gas. However by far the major portion of inert gas which has to be removed from the body is in the tissues and can only move into the blood by diffusion so that the rate limiting factor is gas:blood partition for removal of most of the inert gas.

It is interesting at this point to look at how the three different gases might behave. Argon has the highest solubility in tissue, which means the greatest volume of gas available for bubbles. Figure 3A shows bubble growth, expressed as the volume of gas carried in bubbles per ml of tissue, in muscle following decompression from the No-D 10 metres exposure used in the previous example. Conditions are taken as being the same for each gas so, although it is unwise to use the information from a theoretical model in a fully quantitative way, it would seem safe to conclude from figure 3A that considerably more gas is carried in bubbles when argon is the breathing gas than either of

the other two gases. Figure 3B shows the reduction in inert gas load as the bubbles resolve. The arrows mark the time taken to reduce the extra inert gas to half. Other aqueous tissues would show a similar picture to figure 3.

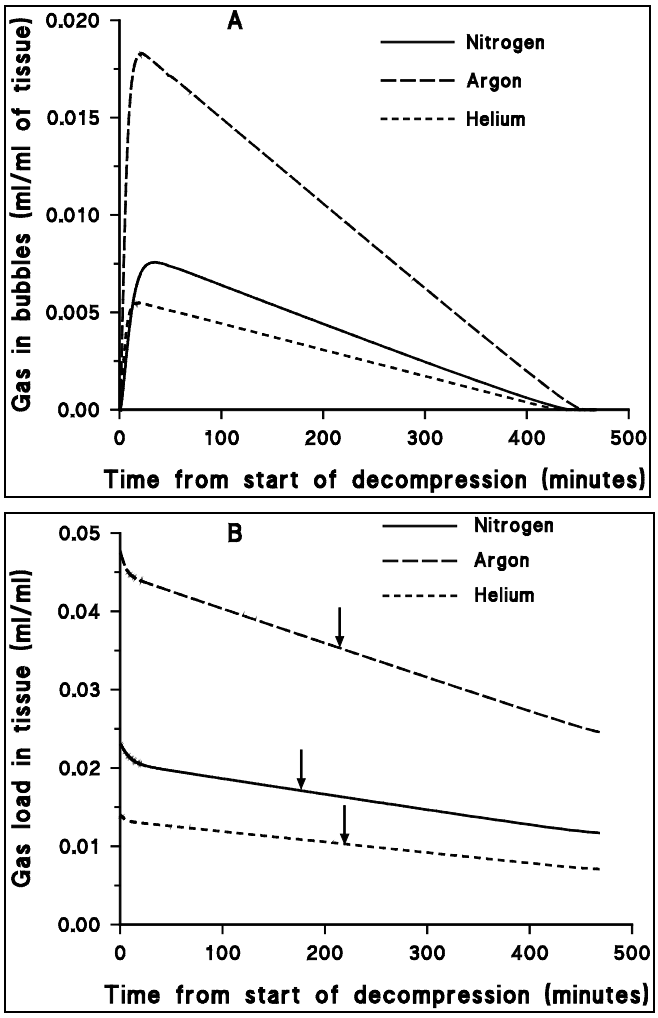

Figure 3 **A** Bubble growth. **B** Tissue gas load

Is this approach useful?

This is an entirely theoretical approach with many assumptions built in to it. Set against this is the fact that all the values used in the calculations derive from standard physiological and physical literature. Many of these values have a degree of uncertainly attached to them in that individuals differ from the average. The importance of the deviation from average man can be evaluated by carrying out sensitivity tests. From these it is evident that the characteristics of the hyperbaric exposure itself far outweighs the effect of any recorded variation in the physiological and physical values used.

Does this approach give anywhere near the right answers? It has been possible over the last 5 years to compare predictions from such calculations with experimental work carried out by others. Some of these will be mentioned briefly here.

The first opportunity came through working with the decompression team in Trondheim. Several series of experimental hyperbaric exposures in anaesthetised pigs, in which pulmonary artery bubbles were counted using ultrasonic scanning, contributed to figure 4 in which the predicted maximum volume of gas in bubbles in central venous blood has been compared with peak bubble counts. Each point is the average of several experiments, 14 different types of exposure contributed, ranging from short bottom times with no-stop decompression to long exposures with staged, continuous, surface oxygen (Sur-D), or gas switch decompressions. Obviously a scaling factor is involved in setting the points down at the intercept of predicted and measured bubbles but the line of best fit drawn through the points has a correlation coefficient of 0.91 demonstrating that at the very least a wide range of types of exposure can be ranked in terms of predicted bubble production.

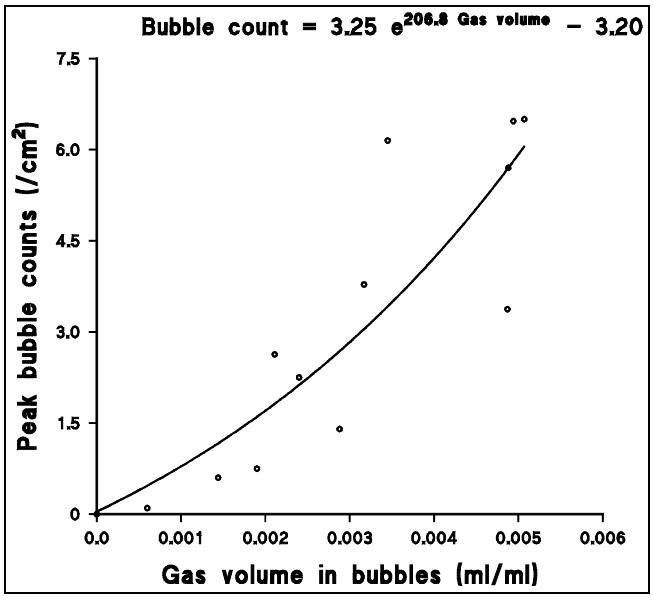

Figure 4 Predicted volume of gas carried as bubbles in pulmonary artery compared to peak bubble counts recorded in anaesthetised pigs

In addition to predicting the extent of bubble production this approach can also say something about the duration of bubbles. Table 4 shows the model predictions of the duration of bubbles following submarine escape decompressions together with the duration of bubbles detected by Doppler in experimental work, (Sneddon et al). The relationship in figure 4 has been used to convert the predictions from gas carried as bubbles to bubble counts.

Escape depth (msw)	**220**	**250**	**280**
Experimental result			
Peak bubble score	1	3-	3+
Duration (mins)	120-180	180-240	>360
Theoretical result			
Peak PA bubbles	2.77	4.78	9.94
Duration (mins)	185	240	320

TABLE 4

The model has also been used to simulate the accelerated decompression described by Flynn et al (1999) and demonstrates that central nervous system bubbles will form in about half the subjects right at the beginning of the decompression. This fits with the pattern of DCI hits found in those trials and it also demonstrates how this type of approach can be used to design decompressions. An adjustment to the early part of that accelerated decompression would have resulted in a very much reduced chance of bubbles forming and a clean outcome without necessarily adding to the decompression time.

Several problems relating to treatment of decompression bubbles have been analysed using this model. Figure 5 shows very preliminary data from ongoing trials. The model predicts that, though both USN6 and USN6A treatments will resolve bubbles, after some types of primary exposure bubbles will reform on the first move of USN6A due to the inert gas loading during the time at maximum depth. There are two stages to treatment of decompression bubbles, the bubbles must be resolved but the inert gas must also be removed from the body and this takes time, as is apparent from figure 2. If time is not allowed within the treatment for this to happen any subsequent move could cause bubbles to reform and treatment tables which use inert gas make this particularly likely. There are some approved decompression tables, currently in use, following which none of the accepted treatment tables will completely remove the inert gas from the body before the final decompression.

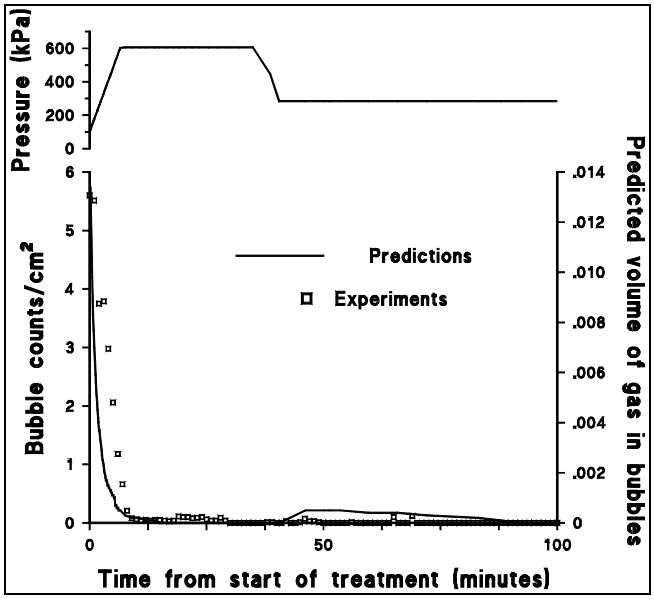

Figure 5: Treatment by USN6A following severe primary exposure

Conclusions

Having used this approach to modelling decompression for several years, and having worked with several groups who are reporting experimental results in terms of bubbles rather than symptoms, it has become apparent that this simple approach works. No theoretical model can be used to predict what might happen in an individual because, to do that, we would have to have detailed knowledge about the relevant physiology in that individual throughout the whole hyperbaric exposure. A theoretical model can, at best, predict what will happen on average to a group of individuals. The experience gained so far indicates

that, for purposes of ranking decompressions, as few as 6 individuals contributing to the average is sufficient. For matching bubble predictions with recorded outcome from carefully controlled trials, 20 subjects appears to be sufficient.

This work would appear to be telling us:

- that something equivalent to extremely long time constants are necessary to explain what happens after a decompression but that these relate not to the physiology but rather to the physical properties of the inert gas and bubbles and that there is a gross asymmetry between gas loading and unloading;
- that, though thresholds may be necessary to explain the appearance of symptoms, no threshold other than those relating to surface tension and total dissolved gas load are necessary to explain the formation of bubbles;
- that if bubbles do form "skins", the presence of these has no obvious effects on the time course of bubble resolution. They seem not to act as a significant barrier to the diffusion of inert gas.

References

1. **Berghage TE, Goehring GS, Donelson C.** Pressure reduction limits for rats subjected to various time/pressure exposures. Undersea Biomed Res 5: 323-334, 1978.
2. **Flynn ET, Maurer J, Latson GW.** Acceleration of saturation decompression with 100% oxygen: Phase 1. Undersea Hyper Med. 26 Suppl: 46, 1999.
3. **Mapleson, W.W.** An electrical analogue for uptake and exchange of inert gases and other agents. J. Appl. Physiol. 18:197-204, 1963.
4. **Seddon FM, Loveman GAM, White MG.** Doppler ultrasound detectable bubbles following brief exposure to pressure. Undersea Hyper Med. 23 suppl: 27, 1996.
5. **Van Liew, H.D. and M.E. Burkard.** Density of decompression bubbles and competition for gas among bubbles, tissue, and blood. J. Appl. Phyiol. 75: 2292-2301, 1993.
6. **Workmann RD, Bornmann RC** (1975) Decompression Theory: American Practice. In: The Physiology and Medicine of Diving. Eds Bennett PB and Elliott DH. 2nd Edition London: Baillière Tindal.

Authors Address for correspondence

Valerie Flook, Ph. D.
Unimed Scientific Ltd.
National Hyperbaric Centre
123, Ashgrove Road West,
Aberdeen AB16 5FA
United Kindom
E-mail: v.flook@abdn.ac.uk
Telephone: 44 (0)1224 680907
Fax: 44 (0)1224 680908

FUTURE EUBS MEETINGS

2001	**Germany**	**2002**	**Belgium**
2003	**Denmark**	**2004**	**France**
2005	**Spain**	**2006**	**Norway**
2007	**Croatia**	**2008**	**Austria**
2009	**United Kingdom**	**2010**	**Greece**

Announcement of Non-EUBS courses:

13.-17.11. 2000 Graz: Course on Clinical Hyperbaric Medicine by E.P. Kindwall (Medical College of Wisconsin, U.S.A). Conference location: Dept. of Thoracic and Hyperbaric Surgery and Dept. of Anaesthesiology and Intensive Care Medicine, LKH-Universitätsklinikum, Auenbruggerplatz 29, A-8036 Graz.

18. 11. 2000 Graz: 2. Interdisziplinäres Grazer HBO-Seminar: „Hyperbare Sauerstofftherapie in Neurochirurgie und Neuropädiatrie – eine Option?“ Arbeitsgruppe für hyperbare Anästhesie der Univ. Klinik für Anästhesie und Intensivmedizin und Klinische Abteilung für Thorax- und Hyperbare Chirurgie der Univ. Klinik für Chirurgie, LKH-Universitätsklinikum , Auenbrugger Platz 29, A-8036 Graz.
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Fax: 0316-385-3847. Tel.: 0316-385-7923 or - 4663.
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BOOK REVIEW

Hyperbaric Facility Safety: A Practical Approach.

Editor: Wilbur T. Workman

Best Publishing Co., Flagstaff, 1999

ISBN: 0-941332-76-4

Price: 128.00 $US

In his letter to me (see page 3) Roly Gough-Allen has requested a review on this book. Nobody not been actively involved in the book has been willing to write a review, I therefore rely on easily available information.

The following reviews and comments were found on the internet. All opinions expressed represent the views of the authors, but I believe that those of you working actively in hyperbaric medicine will agree after having read the book.

Peter

Book Description

This book was written with the objective in mind of creating a comprehensive source document to assist established hyperbaric programs, serve as a safety primer for those developing programs throughout the world, and to help cultivate the mindset so vital to maintaining a safe environment for staff and patients alike. The information contained in this publication applies both to operational and clinical hyperbaric facilities.

Table of Contents

A comment from the Editor:

"First textbook devoted solely to hyperbaric facility safety"

It is not uncommon to search through the world's textbooks on hyperbaric medicine and find a chapter or two devoted to hyperbaric facility safety. Generally, these chapters have been well done but do not provide an in-depth discussion of the interrelated aspects of hyperbaric safety. After almost 30 years of active involvement in hyperbaric facility operation, safety, and standards development, I felt it was time for the first textbook devoted solely to this multifactorial subject - one that is... read more

Wilbur T. Workman, MS, CHT
Workman Hyperbaric Services, Inc.
18111 Copper Ridge Drive
San Antonio, Texas 78259, USA
Tel (210) 490-6999
Fax (210) 490-9777

A review from a very prominent reader:

"Needed Hyperbaric Safety Book Sets Global Standard. An indispensable reference for hyperbaric oxygen facilities."

This new book is a gold mine of vital technical information regarding standards and operating procedures for clinical hyperbaric facilities. Its international scope is impressive as it covers standards observed in the United States as well as Europe, South America, South Africa, Japan, Australia and the rest of the Pacific Rim. It is an authoritative reference produced by a Who's Who of internationally recognized engineers, facilities designers and operators who participate on key standards committees such as the American Society of Mechanical Engineers, the National Fire Protection Association, the Food and Drug Administration, the European Committee for Hyperbaric Medicine and the European Diving Technology Committee, just to name a few.

Anyone contemplating building a hyperbaric facility should read this book first, which will put them in a position to save thousands of dollars and avoid ending up with the wrong equipment permanently installed. It should be a ready reference for standard setting in every hyperbaric unit world-wide.

The book gives detailed explanations and standards for electrical, piping, pressurization, breathing gas, fire suppression and ancillary support systems. Special chapters also cover an analysis of chamber accidents, their causes and prevention, the roles of oxygen and static electricity in chamber fires, risk assessment and failure analysis and much on quality control and preventative maintenance programs. Training program requirements are also outlined.

In short, if one is practicing hyperbaric medicine or contemplating entering the field, this book has got to be on one's bookshelf. There is no other book like it.

Eric P. Kindwall, M.D.,
Associate Professor in Hyperbaric Medicine
260 Bunker Hill Dr.
Brookfield, WI 53005, USA

Review from another reader:

"The hyperbaric safety environment gets a great assist"

Tom Workman has done his homework. While he personally has been involved with hyperbaric safety for a very long time, he still gathered together a group who collectively has a wealth of experience in hyperbaric safety.

As the former staff liaison for the Technical Committee on Hyperbaric & Hypobaric Facilities, I had the privilege of working with (former) Lt. General Workman. Not only did he chair the committee, he made certain that experts in various aspects of hyperbaric safety were appointed to help develop and refine fire safety standards for hyperbaric facilities.

He has taken the subject of safety in general a big step forward by tapping these and other experts, and provided them with a podium to help teach others about hyperbaric safety. The result is a very comprehensive book on the subject. Operating hyperbaric facilities is a hazard in and of itself. The NFPA standard on the subject has help over the past 25 years to reduce the risk from fires immensely. Mr. Workman's new book will be of equal help for users, researchers and manufacturers in reducing the other hazards associated with hyperbaric operations. I thus recommend this book without any hesitation.

Burton Klein, PE
Klein Associates Newton,
Newton, Massachusetts, USA

And a comment from the Publisher:

Hyperbaric Facility Safety is a complex issue that covers an extremely broad range of topics: safe engineering design practices, regulatory guidance, training, staffing, maintenance, operational procedures, etc.. Tragic accidents in the international hyperbaric medicine community have focused attention on the need for more comprehensive information on this multi-factorial topic.

Best Publishing Company
2355 North Steves Boulevard
P.O. Box 30100
Flagstaff, Arizona 86003-0100, USA

FROM THE EDITOR

Continued from page 1

when there no bubbles; linear decay, with a terminal exponential phase, when there are bubbles. This exactly matches the effect on the pattern of flow from the lungs in passive expiration, of changing from a linear resistance to a square-law resistance.

Another item that fascinates me is the use of gas/tissue coefficients (instead of the invariable tissue/gas, or blood/gas or tissue/blood coefficients in anaesthesia). Once seen, this is obviously extremely helpful conceptually: the formation of bubbles in the tissue is then seen to be rather like suddenly lacing the tissue with lipid (for a gas with a high lipid/water coefficient)."

Those of you who had not realised that I am an anaesthesiologist will now have noticed. I found it personally very fascinating to find similarities in the ways we describe uptake and giving off of gaseous anaesthetics in the model Valerie uses to describe bubble formation. And those similarities in basic physiology were the reason to start the **Series "Back to Fundamentals"**. For the future of the series I would like to ask what areas you readers might want fundamentals/educational papers on.

The **EJUHM** welcomes not only **Original Papers** and **Research Reports**, but also **Clinical Communications** and **Case Reports**, **Review Articles** and **Technical Communications**. **Letters to the Editor** are encouraged and any discussion deriving from communications will be published whenever appropriate. Furthermore the **EJUHM** will be containing the **Program and Abstracts of the EUBS Annual Scientific Meeting** every year.

I hope you do like the new shape of your **Newsletter** and you will support the concept of the **EJUHM**. Enjoy reading it!

Peter

INSTRUCTIONS TO AUTHORS

The **EJUHM** welcomes contributions (including letters to the Editor) on all aspects of diving and of hyperbaric medicine. Manuscripts must be offered exclusively to the **EJUHM**, unless clearly authenticated copyright exemption accompanies the manuscript. All manuscripts will be subject to peer review, with feedback to the authors. Accepted contributions will be subject to editing.

Manuscripts are accepted in English, and also in major European languages (French, Spanish, Italian and German) when accompanied by an English abstract and a letter of recommendation of a member of the **International Editorial Board**.

Contributions should be sent to
Dr. Peter HJ Mueller, Editor EJUHM, C/o HBO-Zentrum Rhein-Neckar am Diakoniekrankenhaus Mannheim, Speyerer Strasse 91-93, D-68163 Mannheim/Germany. Fax: +49-621-8102 393. Phone: +49-621-8102 390. E-mail: eubs@hbo-mannheim.de

Requirements for Manuscripts
The **EJUHM** is composed on a PC using Word processing. Documents are acceptable on disc or by e-mail. Illustrations and tables should **NOT** be embedded in the Word document, only their position indicated. All tables are to be separate documents. Illustrations should be separate documents in Word or TIFF, clearly marked with the format used. **References should be in the correct format, shown in the next column.** Submissions must be accompanied by two printed copies of all text, tables and illustrations.

The printed copies should be double-spaced, using both upper and lower case, on one side of the paper only, on A4 paper. Headings should conform to the format in the **Journal**. All pages should be numbered. No part of the text should be underlined. These requirements also apply to the abstract, references, and legends to figures. Measurements are to be in SI units (mm Hg are acceptable for blood pressure measurements) and normal ranges should be included. All tables should be double spaced on separate sheets of paper. **No vertical or horizontal rules are to be used.**

Photographs should be glossy black-and-white and slides should be converted to photographs before being sent. Colour reproduction is not available. Legends should be less than 40 words, and indicate magnification.

Abbreviations do not mean the same to all readers. To avoid confusion they should only be used after they have appeared in brackets after the complete expression, e.g. decompression illness (DCI) can thereafter be referred to as DCI.

The preferred length for original articles is 2,500 words or less. Inclusion of more than 5 authors requires justification. Original articles should include a title page, given the title of the paper and the first names and surnames of the authors, an abstract of no more than 200 words and except in unusual situations be subdivided into Introduction, Methods, Results, Discussion and References. After the references the authors should provide their initials and surnames, their qualifications, and the positions held when doing the work being reported. One author should be identified as Correspondent for the Editor and for readers of the Journal. The full current postal address of each author, with the Telephone, facsimile numbers and e-mail address of the corresponding author, should be supplied with the contribution. No more than 20 references per major article will be accepted. Accuracy of the references is the responsibility of authors. Acknowledgments should be brief.

Abstracts are also required for all case reports and reviews. Letters to the Editor should not exceed 400 words (including references which should be limited to 5 per letter).

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1. Thorsen E, Risberg J, Segadal K, Hope A. Effects of venous gas microemboli on pulmonary gas transfer function. Undersea Hyperbaric Med 1995; 22:347-353.
2. Hempleman HV. History of decompression procedures. In: Bennett PB, Elliott EH, eds. The physiology and medicine of diving. London: WB Saunders, 1993:324-375.
3. Kindwall EP, Goldmann RW. Hyperbaric medicine procedures. Milwaukee, WI: St. Luke's Medical Center, 1970.

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The **EUBS** endorses the principles of the Declaration of Helsinki on the treatment of human subjects and approved guiding principles in the care and use of animals. Any report of experimental investigation on human subjects must contain evidence of informed consent by the subjects and of approval by the relevant institutional ethical committee.

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EUBS Annual Scientific Meeting Malta 2000

Dear Friends and Colleagues!

As you probably are already aware **the EUBS Annual Scientific Meeting in 2000** is being held from the **14th to the 17th of September**. The team and **General Secretary Dr. Ramiro Cali-Corleo** are hard at work to prepare the meeting.

The conference is being held at one of the leading 5 star hotels on the island, the **Westin Dragonara Resort**, situated near the sea on the outermost edge of Paceville, the main night-spot and entertainment area of the island. It also features the Casino de Malte, an internationally known casino. For those who choose to stay there the guest rooms are oversize and equipped with all the features one expects in a luxury hotel. However the rates are very favourable.

The other hotels offered are also within a few minutes walking distance from the conference hotel and although officially classified as four star hotels offer very high standards. These have been offered at 3 star prices for this conference. For those of you who may wish to extend the visit in order to participate in one of the organised pre- and post-conference activities or even to have a few days of extra relaxation, these hotel prices also apply for any extra days of stay.

In order to encourage students to attend, besides the usual low cost student lodging there will also be 10 sponsored stays in one of the leading conference hotels for bona fide students who are actively participating in the meeting.

The organisers have also managed to keep the conference fee and the banquet fee to pre-3rd millennium prices. Transfers to and from the airport can also be arranged by booking a return transfer with the conference secretariat.

The **Conference Banquet** venues at the **Sacra Infermeria**, one of the most important buildings in the **City of Valletta**, this building served as the central hospital of the Order of St John from the late 16th Century. The four course gala dinner also includes a pageant, folk show and a dance band.

The rest of the social program promises to be varied with both international and local elements represented. A complete program will be offered but there will be plenty of options for those who wish to do their own thing. Optional activities include a recreational diving program, theme evenings and tours and excursions.

The **Scientific Program** includes invited lecturers, discussions as well as the usual oral and poster presentations. A special effort is being made to maintain a balance between clinical and scientific presentations and between commercial diving, recreational diving and HBO therapy. The call for abstracts has been mailed to all the society members.

Besides the conference itself there will also be **ECHM** workshop, a **DAN Europe** seminar and an introductory course in diving medicine under the auspices of the **University of Malta**.

Full details of these activities and other information will be included in the second announcement and also on the **EUBS** website: **http://www.eubs.org/eubs2000_1.htm**

This meeting will also officially launch the **European College of Baromedicine**, an academic institution, the need of which has long been felt in **Europe**.

Therefore we remind you to participate in the 26th Annual Scientific Meeting of the European Underwater and Baromedical Society in September 2000 in Malta.

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