

factors of physical exertion by the victim and the in water location of the problem.

Acknowledgment

This report could not have been prepared without the generous help and forbearance of those charged with the management of the documentation concerning such fatalities. This is true of every State and includes the Police service in some States in reference to cases where no inquest was considered necessary. Others who supplied identification of cases or supplied information are also thanked. It is hoped that one day there will be a wider involvement in this project by members of the diving community.

PROJECT STICKYBEAK DATABANK

The objective of this on-going project is to identify factors which influence the safety of divers. Reports are requested concerning incidents of all types and severity, particularly where there has been a successful outcome. **MEDICAL CONFIDENTIALITY** is given to every communication received.

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THE WORLD AS IT IS

SHRINKING DIVING RESEARCH DOLLARS

John Williamson

The following Editorial by Dr. Peter Bennett appeared in the November/December, 1992 issue of *Alert Diver*, the magazine in the USA's Divers Alert Network (DAN). The message has direct relevance to Australian and New Zealand diving medicine.

"DAN (Divers Alert Network, Inc.) research in the last few years, with support by NOAA (National Oceanic and Atmospheric Administration) and DEMA (Divers Equipment Manufacturers Association), has primarily been concerned with the epidemiology of diving accidents and has focussed on factors which could be modified to help reduce such accidents and deaths or to help in treatment.

However, there was and is a greater concern. I have been in diving medical research since 1953 and have worked in four countries. Thus, I was in the middle of the tremendous growth and worldwide interest in diving medicine following World War II. The US and British navies spearheaded this uniquely productive research effort and supplied considerable financial support. The growth of deep commercial diving in support of the offshore oil industry in the 1960's stimulated additional interest and finance too in exploring oxygen-helium and trimix (oxygen-helium-nitrogen) deep diving. Other Navies and governments around the world also initiated similar diving research laboratories, and the National Institutes of Health (NIH) in the United States supported major multi-chamber research laboratories at Duke University Medical Center, the University of Pennsylvania and at the University of Buffalo.

However since 1972, when I became Director of the Duke University Hyperbaric Program, research funds have been steadily shrinking. But none of the major diving problems of decompression illness, nitrogen narcosis, or oxygen toxicity, are solved, nor do we know very much about their mechanisms. Today, for example, there are more dive algorithms for tables and computers to bring a diver safely back to the surface than you can count on your fingers. We obviously have much to learn since they cannot all be right! The nitrox controversy will renew interest in oxygen toxicity information and so on. Recreational diving must therefore find its own research funds if it wishes to move forward. There will be little help from the government!

Some time ago, I reported to you of the formation of the Recreational Diving Research Foundation by DAN, PADI (Professional Association of Diving Instructors) and DEMA with a view to promote research dollars for needed research. In the last few years we were able to accumulate only some \$67,000, about one third what one normal NIH research grant would cost today! With the advent of a new research granting organisation by PADI in 1991, it became clear that the RDRF could not compete for the same few dollars from the same few divers. So we decided to close the RDRF and after peer review, to disperse several one year grants to the following researchers: George Meyer, an engineer, and Mark Perry, Executive Director of the Florida Oceanographic Society, to Study the "Practical Limitations of miniature scuba cylinder alternatives"; Jolie Bookspan PhD, of the University of Pennsylvania, to study the "Detection of endogenous gas phase formation in humans at altitude"; Wayne Gerth, PhD, of Duke University Medical Center, to study "Quasi-physiological models for calculating flying after diving guidelines"; and Judy Lasher DPsych, with help from Mercy Hospital, in Miami, to

study "Trait anxiety sensation seeking and experience as predictors of non-fatal scuba diving injuries".

Their research results will soon be reported and hopefully the new PADI Foundation can then take over where the RDRF left off. However, this year only \$50,000 was available from PADI, less than the RDRF, and much, much more is required! Hopefully this will increase but this drop in the bucket will inevitably fail to keep many skilled researchers in diving medicine. The problem with research support is not unique to diving but is a national economic problem too. It is one we should not ignore, for in research is our security for the safety and health of recreational divers now and for the future.

Peter Bennett PhD, DSc
Executive Director, Divers Alert Network"

It is now clear that compressed gas (mainly air) diving as both a recreation and an occupational pursuit, involves a major population base in Australia and New Zealand.^{1,2,3} Such diving brings with it a small but definite risk of injury,^{4,5} (sometimes fatal⁶), and a need for properly funded research effort into safety improvement. The public of both nations in general remain ignorant of the magnitude of the diving population, the rapidity of this increase in diving number during recent years, and, with the possible exception of oil exploration, of the significance of such activities to their respective national well being. The maintenance of bridges and harbours, shipping and marine biological research, undersea cables and pipelines, oceanography, military and defence activities, and by no means least, tourism^{2,7} are all dependant upon safe and competent diving.

Australia and New Zealand have a proud pioneering record in modern diving medicine. The South Pacific Underwater Medicine society (SPUMS), building on the distinguished efforts of the countries' Navies, and of people like Edmonds, Slark, Swain, Thomas, Lowry, Lourey, Walker, Knight, McKenzie, Acott, and more recently Davies, Gorman and colleagues, now occupies a key guiding role in diving medicine in the two countries. With the network of Hyperbaric Medicine Units associated with major hospitals, functioning around Australia and New Zealand on a 24 hours basis, diving medicine (with the intimately related hyperbaric medicine) is slowly taking a legitimate place within medicine at large. However, in addition to other members of the public, many medical practitioners, medical school staff, and hospital and government bureaucrats still remain unaware of the need for education in these fields, let alone the magnitude of the funding need for research.

Until now, such Australian and New Zealand funding has, with isolated notable exceptions,^{8,9} limped along, piggyback style, on the clinical activities and good will of

a handful of energetic and enthusiastic people (including those named above). No serious, long-term funds, of the amounts referred to by Dr. Bennett, have ever been provided. Some of the disparate members of the giant recreational diving industry are beginning to contribute spasmodic and relatively tiny sums towards the maintenance of Australia's 24 hours, user free (inside Australia) Diver Emergency Service (DES/DAN) telephone. (The epidemiological data gathered by DES/DAN Australia is rich research material.⁴) These small contributions are accompanied by expectation of skilled 24 hour medical and retrieval cover, at no personal diver cost!

Two major and related attitudinal changes are now required. The 24 hour provision of expert medical advice on an emergency basis, as presently provided in Australia by DES/DAN, requires secure and steady funding, A voluntary DES/DAN membership subscription fee by each diver that leads to independent insurance cover for diving, is a successful North American recipe. The New Zealand DES service already has secure funding from the New Zealand Underwater Association, an example for Australian recreational divers! The Australian recreational diving population alone is more than large enough to emulate this. In any case, a continuation of the blind assumption among most, but not all, recreational divers and diving retailers in Australia that the expenses of the DES/DAN service will be underwritten by "the government" (Heaven help us!), or by "someone else", is doomed. Divers can expect to be presented with the bill for their retrieval and recompression from now on, and those costs aren't peanuts!

The second major change in attitude required is the appreciation by the recreational diving industry itself (presently preoccupied with internal commercial competition), of the value of, and need for major funding for Australian and New Zealand diving medical research. As Bennett has indicated for North America, but this applies even more so to Australia and New Zealand, the "drop in the bucket" funding so far provided is Mickey Mouse stuff! Real diving medical research (including that derived from the valuable DES/DAN data and the exciting Diving Incident Monitoring Study (DIMS)¹⁰ requires real funding, \$100,000 plus, annually, to produce high quality work. It is potentially an enormously fruitful research field.

There is so much in diving medicine recognised as relevant to safety and efficiency (all the areas mentioned by Bennett, together with equipment design, training, rescue, crisis management, oxygen administration, diving instrumentation, and so on) which has never been adequately investigated, or in which knowledge is inadequate. The recreational diving population needs to assume responsibility for its own destiny, and to get behind diving medicine in a meaningful way. The alternative is recurring accidents, a diminishing safety record, and the threat of "government" regulation.

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SCUBA SAFETY IN QUEENSLAND

Jeffrey Wilks

Introduction

During the 1991 calendar year there were 54,153 new open water certifications issued throughout Australia by the four major scuba training agencies (NASDS, NAUI, PADI, SSI).¹

Queensland's popularity as a major diving destination is not surprising, given the close proximity of the

Great Barrier Reef. Scuba diving is therefore a very high profile tourism activity for the state, with an estimated 100,000 introductory or resort diving courses being conducted each year. These courses generate an estimated \$6 million in direct revenue for dive operators.^{2,3}

An important consideration in promoting scuba diving as an activity for tourists is the ability to guarantee that the experience will be safe and enjoyable. In a previous paper, ten separate groups of recreational divers were identified in Queensland.⁴ A major study was undertaken to count the number of dives made in the state during the 1991 calendar year. Support from four of the Australian scuba training agencies, by way of sharing their confidential certification figures, and from 111 Queensland companies providing numbers on their resort and social dives, allowed the calculation of a very conservative 677,767 dives to be made for the year.

Placing accidents in perspective

In order to determine whether scuba diving in Queensland during this period really was a safe activity, the four Australian training agencies were again approached with a request to provide information on the number of accidents reported by their Queensland members during 1991. An accident is broadly defined by the training agencies and usually includes an injury or illness, ranging from minor to severe, which is the result of participation in diving activities.

It should be noted that the training agencies require their members to submit an accident report form whenever an accident occurs. This requirement is part of the agencies' standards and is linked to members' insurance. All members at leadership level (instructors, assistant instructors and divemasters/dive controllers) need to comply with this accident reporting requirement.

During the 1991 calendar year there were 24 Queensland accidents reported to the training agencies. As a proportion of the 677,767 dives reported in 1991, the Queensland accident rate is 0.00003541. That is equivalent to 35 accidents per one million dives.

Several points of clarification need to be made about this figure. First, the total number of dives made each year in Queensland is still not known. The figure of 677,767 is based on the first ever reliable count of dives, but only covers five of the possible 10 diver categories. The figure is therefore very conservative, but seems to be in keeping with non-empirical "guesstimates" offered in other published literature.^{5,6}

The second point to be made is that not all accidents that occur in Queensland (or any other Australian state or territory) will be reported to these four training