

E-NEWS

EDITOR'S NOTE – July 2024

The E-News is the monthly newsletter of CUHMA, the primary outlet to share news/announcements, upcoming events, abstracts of recent publications, job postings, professional perspectives, and images of relevant professional scenes. Submission of applicable content is welcome. New issues are released on the last business day of each month. Past issues are available at <https://cuhma.ca>. Direct correspondence to info@cuhma.ca.

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NEWS/ANNOUNCEMENTS

Shackleton's Final Vessel - m/v *Quest* - Located

The contributions of Sir Ernest Shackleton to polar exploration are unparalleled both for the successes of his team and a failure that was turned into a world class success. The latter concerned his vessel *Endurance* which was trapped in the Antarctic ice for a year, with one part of the crew document its crushing and ultimate sinking in 1915, and another part of the crew completing an almost unimaginable trip of 1300 km (800 mi) in a lifeboat followed by mountainous hiking to reach a whaling station on South Georgia Island to initiate successful rescue the entire 28-person crew complement.

The last ship that Shackleton sailed on was the *Quest*, a converted Norwegian sealer. The ship departed from London in September 1921 for his fourth expedition to Antarctica. Shackleton died of heart failure in January 1922 at the age of 47, just before the ship reached South Georgia Island where his fame was so firmly established and where he was ultimately buried. This Shackleton-Rowett expedition was considered the last of the heroic age of Antarctic exploration.

The *Quest* continued as a working vessel for another 40 years. She was hunting seals when she struck ice that caused damage leading to the ultimate sinking in May 1962 in the Labrador Sea, with no loss of crew.

The *Endurance* was located by remotely operated vehicles on March 05, 2022 at a depth of 3008 m (9842 ft) in the Weddell Sea. She was found in a well-preserved state, upright with her name visible on the intact stern.

The *Quest* was located using side-scan sonar on June 09, 2024 at a depth of 390 m (1280 ft), east of Battle Harbour, Labrador during a dedicated Shackleton-*Quest* expedition led by the Royal Canadian Geographical Society. The *Quest* was found in a well-preserved state, upright with many structures intact. The next expedition will deploy remote operated vehicles for further evaluation.

<https://www.cnn.com/travel/article/ernest-shackleton-endurance-shipwreck-found-scn/index.html>

<https://canadiangeographic.ca/articles/wreck-of-quest-famed-antarctic-explorer-sir-ernest-shackletons-last-ship-found-in-labrador-sea/>

<https://www.youtube.com/watch?v=tCIHn2DxVno>

<https://rcgs.org/about/news-releases/rcgs-finds-wreck-of-quest>

UPCOMING EVENTS

SEALAB 60th Anniversary Celebration

The US Navy SEALAB program was created to develop and deploy underwater habitats and technology to assess the human response to saturation diving environments. SEALAB I was located at a depth of 59 m (192 fsw) for an 11-day mission in 1962. SEALAB II was located at a depth of 62 msw (205 fsw), with three teams in residence for a planned 15 days (one person, astronaut Scott Carpenter, stayed for 30 days). SEALAB III was located at a depth of 190 m (610 fsw), but a series of delays and problems that included the death of a diver ended the program in 1969. A 60th anniversary event will be held July 19-20, 2024 at the Man in the Sea Museum in Panama City, FL. Visit: <https://maninthesea.org/sealab-60th-anniversary>.

EUBS Annual Scientific Meeting 2024

The 48th annual scientific meeting of the European Underwater and Baromedical Society will be held September 16-20 in the port city of Brest, France. Visit: <https://eubs2024.sciencesconf.org>

Divescapes Scuba Conference 2024

The Divescapes scuba conference and exhibition is a product of the Alberta Underwater Council. The program includes international speakers, workshops, and trade show booths. The event will be held October 18-19 at the Deerfoot Inn and Casino in Calgary, AB. For more information, visit: <https://www.divescapes.ca>.

DEMA Show 2024

The Diving Equipment & Marketing Association (DEMA) show will be held November 19-22 at the Las Vegas Convention Center in Las Vegas, NV. The long-standing industry event promises 500 exhibitor booths, educational seminars, and a variety of evening events. Visit: <https://www.demashow.com>.

RECENT PUBLICATIONS

Ceniza MA, Madraga KF, Magnanao MN, Labrador MMR, Rivera M, Bacharo KBB. Scuba diving-related fatalities in the Philippines from 2008 to 2022 as reported in online news media. J Sci Med Sport. 2024 Jun;27(6):368-372. doi: 10.1016/j.jsams.2024.04.004.

The present study aims to investigate the demographics and characteristics of scuba diving fatalities in the Philippines which can help in the identification of local trends and ultimately in the development of appropriate preventive measures. Data on scuba diving-related fatalities in the Philippines from 2008 to 2022 were manually retrieved from online news media sources. Information on age, sex, nationality, certification, purpose, and causative factors, whenever possible were collected and analysed. A total of 39 fatalities were identified having a median age of 43.5 (range 20-80). Majority of victims were males (n=30), and of foreign ethnicity (n=26). Asphyxia was identified as the possible disabling injury in almost half of the cases (n=17). The causes of death based on autopsies were determined only for few cases which included drowning (n=2), heart attack (n=1), and traumatic injuries from a dynamite blast (n=1). Potential vulnerable groups were identified to be the ageing population and foreign tourist divers. In the absence of an existing database, this preliminary report provides the best available evidence at this time concerning scuba diving fatalities in the Philippines.

Currie JR, Gawthrope IC, Banham ND. The use of hyperbaric oxygen for avascular necrosis of the femoral head and femoral condyle: a single centre's experience over 30 years. Diving Hyperb Med. 2024 Jun 30;54(2):92-96. doi: 10.28920/dhm54.2.92-96.

Introduction: Avascular necrosis (AVN) is a rare progressive degenerative disease leading to bone and joint destruction. Patients often require surgical intervention. Femoral AVN is the most common anatomical location. Hyperbaric oxygen treatment (HBOT) has been shown to be effective in AVN. We present data collected from one centre over a 30-year period and compare the results with other published data. Methods: A retrospective chart review of all patients receiving HBOT for AVN at Fremantle and Fiona Stanley Hospitals since 1989 was performed. The primary outcome was radiological appearance using the Steinberg score, with secondary

outcomes being subjective improvement, the need for joint replacement surgery and rates of complications. Results: Twenty-one joints in 14 patients (14 femoral heads and seven femoral condyles) were treated with HBOT since 1989. Two patients were excluded. Within the femoral head group, nine of the 14 joints (64%) had stable or improved magnetic resonance imaging (MRI) scans post treatment and at six months (minimum); 10 joints (71%) had good outcomes subjectively, three joints required surgical intervention, and three patients developed mild aural barotrauma. Within the femoral condyle group, all five joints had stable or improved post-treatment MRI scans (four had visible improvement in oedema and/or chondral stability), four joints reported good outcomes subjectively, none of the patients required surgical intervention (follow-up > six months). Conclusions: This single centre retrospective study observed prevention of disease progression in femoral AVN with the use of HBOT, comparable to other published studies. This adds to the body of evidence that HBOT may have a significant role in the treatment of femoral AVN.

Daubresse L, Vallée N, Druelle A, Castagna O, Guieu R, Blatteau JE. Effects of CO₂ on the occurrence of decompression sickness: review of the literature. Diving Hyperb Med. 2024 Jun 30;54(2):110-119. doi: 10.28920/dhm54.2.110-119.

Introduction: Inhalation of high concentrations of carbon dioxide (CO₂) at atmospheric pressure can be toxic with dose-dependent effects on the cardiorespiratory system or the central nervous system. Exposure to both hyperbaric and hypobaric environments can result in decompression sickness (DCS). The effects of CO₂ on DCS are not well documented with conflicting results. The objective was to review the literature to clarify the effects of CO₂ inhalation on DCS in the context of hypobaric or hyperbaric exposure. Methods: The systematic review included experimental animal and human studies in hyper- and hypobaric conditions evaluating the effects of CO₂ on bubble formation, denitrogenation or the occurrence of DCS. The search was based on MEDLINE and PubMed articles with no language or date restrictions and also included articles from the underwater and aviation medicine literature. Results: Out of 43 articles, only 11 articles were retained and classified according to the criteria of hypo- or hyperbaric exposure, taking into account the duration of CO₂ inhalation in relation to exposure and distinguishing experimental work from studies conducted in humans. Conclusions: Before or during a stay in hypobaric conditions, exposure to high concentrations of CO₂ favors bubble formation and the occurrence of DCS. In hyperbaric conditions, high CO₂ concentrations increase the occurrence of DCS when exposure occurs during the bottom phase at maximum pressure, whereas beneficial effects are observed when exposure occurs during decompression. These opposite

effects depending on the timing of exposure could be related to 1) the physical properties of CO₂, a highly diffusible gas that can influence bubble formation, 2) vasomotor effects (vasodilation), and 3) anti-inflammatory effects (kinase-nuclear factor and heme oxygenase-1 pathways). The use of O₂-CO₂ breathing mixtures on the surface after diving may be an avenue worth exploring to prevent DCS.

Elliott EJ, Price K, Peters B. Formulating policies and procedures for managing diving related deaths: a whole of state engagement from frontline and hospital services in Tasmania. *Diving Hyperb Med.* 2024 Jun 30;54(2):86-91. doi: 10.28920/dhm54.2.86-91.

Introduction: Tasmania is a small island state off the southern edge of Australia where a comparatively high proportion of the 558,000 population partake in recreational or occupational diving. While diving is a relatively safe sport and occupation, Tasmania has a significantly higher diving death rate per head of population than other States in Australia (four times the national diving mortality rate). Methods: Three compressed gas diving deaths occurred in seven months between 2021-2022 prompting a review of the statewide approach for the immediate response of personnel to diving-related deaths. The review engaged first responders including the Police Marine and Rescue Service, hospital-based departments including the Department of Hyperbaric and Diving Medicine, and the mortuary and coroner's office. Results: An aide-mémoire for all craft groups, digitalised checklists for first responders (irrespective of diving knowledge), and a single-paged algorithm to highlight inter-agency communication pathways in the event of a diving death were designed to enhance current practices and collaboration. Conclusions: If used, these aids for managing diving related deaths should ensure that time-critical information is appropriately captured and stored to optimise information provided for the coronial investigation.

Emmert W, Banham ND, Gawthrope IC. Survey comparing the treatment of central retinal artery occlusion with hyperbaric oxygen in Australia and New Zealand with the recommended guidelines as outlined by the Undersea and Hyperbaric Medical Society. *Diving Hyperb Med.* 2024 Jun 30;54(2):97-104. doi: 10.28920/dhm54.2.97-104.

Introduction: Central retinal artery occlusion (CRAO) presents suddenly causing painless loss of vision that is often significant. Meaningful improvement in vision occurs in only 8% of patients with spontaneous reperfusion. Hyperbaric oxygen treatment (HBOT) is considered to be of benefit if commenced before retinal infarction occurs. The Undersea and Hyperbaric Medical Society (UHMS) guidelines on the management of CRAO were last amended in 2019. This survey questioned

Australian and New Zealand (ANZ) hyperbaric medicine units (HMUs) about the incidence of CRAO cases referred and compared their subsequent management against the UHMS guidelines. Methods: An anonymous survey via SurveyMonkey® was sent to all 12 ANZ HMUs that treat emergency indications, allowing for multiple choice and free text answers regarding their management of CRAO. Results: One-hundred and forty-six cases of CRAO were treated in ANZ HMUs over the last five years. Most (101/146) cases (69%) were initially treated at a pressure of 284 kPa. This was the area of greatest difference noted in CRAO management between the UHMS guidelines and ANZ practice. Conclusions: Few ANZ HMUs strictly followed the UHMS guidelines. We suggest a more simplified management protocol as used by the majority of ANZ HMUs.

Idris OA, Ahmedfiqi YO, Shebrain A, Al-Assil T, Pacione SC, Haj D, Motan AD, Momani F, Bzizi H, Jahromi BS, Lewis RM, Steeg KV 2nd. Hyperbaric oxygen therapy for complications in nipple-sparing mastectomy with breast reconstruction: a systematic review. *J Clin Med.* 2024 Jun 17;13(12):3535. doi: 10.3390/jcm13123535.

Background: Research advancing effective treatments for breast cancer is crucial for eradicating the disease, reducing recurrence, and improving survival rates. Nipple-sparing mastectomy (NSM), a common method for treating breast cancer, often leads to complications requiring re-operation. Despite advancements, the use of hyperbaric oxygen therapy (HBOT) for treating these complications remains underexplored. Therefore, we analyze the efficacy of HBOT in the post-operative care of patients undergoing NSM. Methods: A systematic search was conducted using PubMed, Scopus, and the Cochrane Library. Studies were assessed for eligibility using the PICO (Population, Intervention, Comparison, Outcome) framework and classified based on American Society of Plastic Surgeons (ASPS) levels of evidence. Seven studies, totaling a pool of 63 female patients, met the inclusion criteria. Among these studies, four were categorized as Level III (57.1%), one as Level IV (14.3%), and two as Level V (28.6%). These studies focused on HBOT's role in wound healing, the successful salvage of breast reconstruction, and the optimal timing for HBOT. Results: This review revealed that HBOT indeed has potential for improving tissue oxygenation, vascularization, and, consequently, wound healing. It is noted that HBOT is efficacious for mitigating post-NMS complications, including infections, re-operation, flap loss, seroma, and hematoma. Conclusions: Overall, HBOT could be beneficial in standard post-surgical care protocols for patients undergoing NSM due to its role in mitigating common adverse effects that occur after mastectomy. Despite promising outcomes, the recent literature lacks rigorous clinical trials and well-defined

control groups, underscoring the need for further research to establish standardized HBOT protocols.

Melessen A, Wingelaar TT, van Ooij PJA. Clinical utility of dipstick urinalysis in assessing fitness to dive in military divers, submariners, and hyperbaric personnel. Diving Hyperb Med. 2024 Jun 30;54(2):105-109. doi: 10.28920/dhm54.2.105-109.

Introduction: Routine dipstick urinalysis is part of many dive medical assessment protocols. However, this has a significant chance of producing false-positive or false-negative results in asymptomatic and healthy individuals. Studies evaluating the value of urinalysis in dive medical assessments are limited. Methods: All results from urinalysis as part of dive medical assessments of divers, submariners, and hyperbaric personnel of the Royal Netherlands Navy from 2013 to 2023 were included in this study. Additionally, any information regarding additional testing, referral, or test results concerning the aforementioned was collected. Results: There were 5,899 assessments, resulting in 46 (0.8%) positive dipstick urinalysis results, predominantly microscopic haematuria. Females were significantly overrepresented, and revisions resulted in significantly more positive test results than initial assessments. Lastly, almost half of the cases were deemed fit to dive, while the other half were regarded as temporarily unfit. These cases required additional testing, and a urologist was consulted three times. Conclusions: To our knowledge, this is the most extensive study evaluating urinalysis in dive medical assessments. In our military population, the incidence of positive test results is very low, and there have not been clinically relevant results over a period of 10 years. Therefore, routinely assessing urine in asymptomatic healthy military candidates is not cost-effective or efficacious. The authors advise taking a thorough history for fitness to dive assessments and only analysing urine when a clinical indication is present.

Vivacqua A, Fan K, Gürtler A, Thieringer FM, Berg BI. An algorithm for jaw pain among divers. J Clin Med. 2024 May 28;13(11):3167. doi: 10.3390/jcm13113167.

Background: Temporomandibular disease (TMD) is commonly seen, and divers also experience pain in the temporomandibular joint (TMJ) or masticatory muscles. This article aims to provide a tool for diving physicians or medical professionals involved in diving medicine since jaw pain among divers is a pertinent subject and can be challenging to evaluate without some background in dentistry or maxillofacial surgery. Method: A basic algorithm was developed to provide a tool to differentiate jaw pains experienced by divers. Three brief case studies were developed, and five diving physicians were tasked with diagnosing the cases using the algorithm. Additionally, simple exercises and massage techniques that can benefit patients with TMD, particularly immediately after diving, are outlined. Results: All five diving

physicians successfully diagnosed the cases using the algorithm. However, three of them were unable to diagnose the first case (disc luxation) without consulting the algorithm. Nevertheless, all physicians acknowledged the utility of the algorithm. Conclusions: Jaw pain in divers can stem from diverse causes, but effective treatment options exist. Our study findings provide valuable insights to assist diving physicians in making accurate diagnoses and guiding appropriate patient management, which may include referrals to specialists such as dentists, maxillofacial surgeons, or orthodontists.

CUHMA-ACMHS is the Canadian voice for the advancement of hyperbaric and diving medicine throughout our country and beyond. Our activities include continuous medical education for physicians, nurses, respiratory therapists and anyone involved in the fields of hyperbaric and diving medicine. We are also promoting dissemination of clinical research, publishing position statements, liaising with related professional associations and government agencies. Our main goal is advocating on behalf of our patients. Our vision is to be the reference for the development and delivery of hyperbaric and diving medicine in Canada and beyond. Our mission is to promote excellence in hyperbaric and diving medicine through leadership in education, promotion of best practices and advocacy for our patients. Our values are excellence, leadership, collaboration, communication, and integrity.

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