CUHMA ACMHS
Canadian Undersea and Hyperbaric Medical Association
Association Canadienne de Médecine Hyperbare et Subaquatique

E-NEWS

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

International Meeting on Ultrasound for Diving Research Completed

Twenty-eight individuals came from seven countries for a September 21-24 meeting in Bonaire to review and update the 2015 consensus guidelines for the use of ultrasound in research[1]. The majority of the 2015 guidelines were upheld, some with revision, and new recommendations were added to reflect the advance of technology and practice. The updated consensus guidelines and relevant discussion will be published in the near future.

1. Møllerløkken A, Blogg SL, Doolette DJ, Nishi RY, Pollock NW. Consensus guidelines for the use of ultrasound for diving research. Diving Hyperb Med. 2016; 46(1): 26-32. PMID: 27044459.

Invitation to Participate in a Diving Safety Research Study

Djamdoudou Abdou Rahman, MD and Neal W. Pollock, PhD are conducting a research study focused on understanding diving incidents and identifying potential contributing factors. The project aims to gather insights and experiences from divers worldwide to assess and enhance the safety and well-being of the diving community. Support can be through participation and/or sharing the following survey link with any divers who may be interested.

The survey is voluntary and anonymous. It is expected to take 5 to 20 minutes to complete, depending on personal experience. Prerequisites include age ≥15 years, diving certification of any type, and an ability to complete the survey in English or French. Thank you in advance.

https://questionnaire.simplesurvey.com/f/s/diving_incident_survey.

UPCOMING EVENTS

Canadian Association of Wilderness Medicine 2025

CAWM is a non-profit organization with the goal of connecting Canadian practitioners and researchers with an interest in wilderness medicine, and in promoting the field as an area of focus and specialization. The sixth annual conference - Prepared for the Unpredictable: Advancing Medicine in the Wild - will be held October 03-05 in Canmore, AB and virtually in a hybrid format. Pre-conference workshops include advanced wilderness life support, technical rope rescue, and wilderness airway management. Visit: https://cawm.ca/cawm2025-2.

Brazilian Congress of Hyperbaric Medicine 2025

The 10th Brazilian Congress of Hyperbaric Medicine & 2nd Brazilian Congress of Hyperbaric Medicine will be held October 16-18 at the Hotel Laghetto Viverone in the Serra Gaúcha region of Brazil. The conference will address six main areas: maritime medicine, diving, hyperbaric oxygen therapy, safety in maritime environments, safety in hyperbaric environments, and wound care. Visit: https://sbmh.com.br/evento/10o-congresso-brasileiro-de-medicina-hiperbarica-2o-congresso-brasileiro-de-medicina-maritima.

RECENT PUBLICATIONS

Ekici M, Mazlum EC, Laçin MB, Akçin ME, Günay AE, Ozan F. The effect of hyperbaric oxygen therapy on lesion size in early-stage femoral head avascular necrosis. Diving Hyperb Med. 2025 Sep 30;55(3):192-6. doi: 10.28920/dhm55.3.192-196.

Introduction: Femoral head avascular necrosis (AVN) is a common orthopaedic condition that occurs when intraosseous microcirculation is compromised. Hyperbaric oxygen therapy (HBOT) increases tissue oxygen concentration, reduces oedema, stimulates angiogenesis, lowers intraosseous pressure, and enhances microcirculation. The aim of this study was to evaluate the effectiveness of HBOT in early femoral head AVN based on magnetic resonance imaging (MRI) findings. Methods: A total of 37 hips from 25 patients with Ficat Stage 1-2 femoral head AVN, followed between 2018 and 2021 and receiving HBOT at Kayseri City Training and Research Hospital, were retrospectively included. Thirty HBOT sessions of 90 minutes each were administered at 243 kPa

pressure (2.4 atmospheres absolute) with 100% oxygen breathing, along with a weight-bearing restriction protocol. Results: There were 20 females and five males. The mean (standard deviation) age was 46.9 (9.5). In pre-treatment MRI imaging, the mean lesion size was 29.87 (22.64) cm^3 in 20 right hips and 28.84 (14.95) cm^3 in 17 left hips (P=0.183). At the second month after treatment, the lesion size was 12.39 (11.26) cm^3 in 20 right hips and 21.81 (13.56) cm^3 in 17 left hips (P<0.001). The mean pre-post differences for the right and left hips was 17.48 (21.15) cm^3 and 7.02 (5.95) cm3 respectively (both P<0.001). Conclusions: Femoral head AVN is a progressive disease, with femoral head collapse exceeding 40% in a five-year follow-up. This study demonstrated a reduction in lesion size associated with HBOT in early stage femoral head AVN. In our opinion, HBOT is an integral part of the treatment for early-stage femoral avascular necrosis.

Gamarra E, Careddu G, Fazi A, Turra V, Morelli A, Trimboli P. Calibrating Dexcom G7 improves its performance in the context of repetitive recreational scuba diving in people with type 1 diabetes. BMJ Open Sport Exerc Med. 2025 Sep 1;11(3):e002809. doi: 10.1136/bmjsem-2025-002809. eCollection 2025.

Background: The use of continuous glucose monitors (CGM) in scuba diving for patients with type 1 diabetes (T1DM) shows potential but faces challenges related to accuracy. Previous research has highlighted the poor accuracy of the Dexcom G7 (DG7) in repetitive diving contexts. This study investigates the impact of calibration on the accuracy of DG7, providing valuable insights for patients and clinicians. Materials and methods: In August 2024, 'Diabete Sommerso' organised a 4-day diving cruise around Elba Island (Italy) with 15 participants, including individuals with T1DM. Each participant with diabetes wore two DG7 sensors (one on the arm and one on the abdomen), calibrated daily and compared the results to capillary glucose (Beurer GL50Evo as the reference). Accuracy was assessed using mean absolute relative difference (MARD)/median ARD, Food and Drug Administration (FDA) integrated continuous glucose monitoring (iCGM) criteria and Surveillance Error Grid (SEG) analysis. Hypoglycaemia detection and trends were also evaluated. Results: Eight participants with T1DM completed the study using 16 DG7 sensors with no detachments or skin reactions. Analysis of 765 sensor-capillary glucose pairs during 68 dives showed an overall MARD of 13.7%, with arm sensors (11% MARD) outperforming abdomen sensors (16%, p=0.0001). SEG analysis revealed that more than 97% of readings fell within the no-risk zone; however, the FDA's iCGM criteria for non-adjunctive use were not met. Conclusions: Calibration improved the accuracy of DG7 in repetitive diving for patients with T1DM. However, capillary glucose checks remain essential, as non-adjunctive criteria were not met.

Hendier L, Soule H, Abbas M, Pittet D, Pignel R, Boet S. Evaluation of bacterial survival on inert surfaces in a hyperbaric environment. Diving Hyperb Med. 2025 Sep 30;55(3):197-201. doi: 10.28920/dhm55.3.197-201.

Introduction: Surface cleaning and hand hygiene within hyperbaric chambers are challenging because of the risk of fire with currently used products containing alcohol or glycerine. This study aimed to investigate if hyperbaric conditions could have inhibitory effects on bacteria present on inert materials. Methods: We deposited Staphylococcus aureus (S. aureus) and Escherichia coli (E. coli) on inert materials in an experimental chamber (Comex1200Alu) and compressed the chamber environment with air (253 kPa, 95 min) (referred to as indoor). The control was contaminated materials placed outside the chamber (referred to as outdoor). We chose inert materials including plastic, metal, and seat upholstery (imitation leather). We measured bacterial growth and survival and compared the groups using a Student's t-test. Results: Regardless of the surface types tested, there were no significant differences in bacterial reduction between indoor and outdoor conditions for either E. coli or S. aureus and any of the materials (P>0.05). Conclusions: We found that pressurised air (253 kPa for 95 min) has neither proliferative nor bactericidal action on S. aureus and E. coli colonies deposited on inert surfaces compared to those present outside a hyperbaric chamber in normobaric air conditions.

Hoyt J, Murphy FG, Pollock NW, Kernagis D, Bird N, Menduno M, Bright J, Mitchell SJ. Revised guideline for central nervous system oxygen toxicity exposure limits when using an inspired PO of 1.3 atm. Diving Hyperb Med. 2025 Sep 30; 55(3): 228-36. doi: 10.28920/dhm55.3.228-236. PMID: 40986922.

Technical and scientific divers breathing gases delivering hyperbaric pressures of inspired oxygen may be at risk of developing cerebral oxygen toxicity which can manifest as a seizure with little or no warning. The principle preventative strategy is adherence to time limits based on inspired PO_2 levels promulgated in 1991. These limits had their origins in US Navy studies of exposures to higher inspired PO_2s than are typically utilised by modern divers. Indeed, the duration limits for inspired PO_2s in the range typically utilised by technical divers (≤1.3–1.4 atm) have relatively little experimental provenance. Contemporary technical dives often involve decompression durations that result in breaches of these limits, and anecdotally, this common occurrence seems associated with a low risk of cerebral oxygen toxicity. A committee of experts recently sought experimental evidence that might support an adjustment to the recommended duration limits for typical technical dives. Such evidence exists only for an inspired PO_2 of 1.3 atm, which is a common default in use of constant PO_2 rebreather devices. The (1991) limit for a single exposure to an inspired PO_2 of 1.3 atm is 180 min

with a 24-hour maximum of 210 min. Recent studies provide reassurance that dives with an inspired PO_2 of 1.3 atm consisting of up to 240 min of working dive activity followed by up to 240 min of resting decompression are associated with an acceptably low risk of cerebral oxygen toxicity. This recommendation was promulgated and endorsed at a recent workshop convened by the National Oceanographic and Atmospheric Administration (NOAA) involving technical and scientific divers.

Popovic DS, Koufakis T, Patoulias D, Stoian AP, Papanas N. Continuous glucose monitoring during recreational diving in type 1 diabetes: navigating clinical and technical uncertainties. Diabetes Metab Syndr Obes. 2025 Aug 27:18:3089-92. doi: 10.2147/DMSO.S538152.

Recreational diving with self-contained underwater breathing devices is gaining popularity worldwide as a sport and leisure activity. People living with type 1 diabetes mellitus (PLT1D) are no exception, although historically diabetes mellitus, especially insulin-treated, has been described as an absolute contra-indication for diving. However, based on observational data collected by the Divers Alert Network, the presence of background diabetes mellitus became only a relative contraindication for those without significant co-morbidities or long-term complications. Regarding diving activities among PLT1D, the primary concern is the risk of hypoglycaemia, especially in those with impaired awareness. Furthermore, symptoms consistent with hypoglycaemia could be confused with those originating from other factors related to diving. Although avoidance of hypoglycaemia is imperative among PLT1D practicing diving, the risk of severe hyperglycaemia should also be minimised. Continuous glucose monitoring (CGM) nowadays represents the standard of care for PLT1D, but its accuracy during diving activities is still a matter of debate. This commentary aims to summarize the existing data on accuracy, durability, and underwater performance of different CGM devices among PLT1D who engage in diving, and to call for additional research in the field. Based on available results, the application of real-time CGM still requires extreme caution since none of the existing systems has so far met the standards for accurate use in underwater conditions. Further improvements of contemporary CGM devices, validated through large-scale trials, are necessary before their widespread implementation among PLT1D practicing diving. Such advances should further enhance safety during this popular activity.

Querido AL, Wingelaar TT. Assessing dive fitness in individuals with autism spectrum disorder. Diving Hyperb Med. 2025 Sep 30;55(3):220-7. doi: 10.28920/dhm55.3.220-227.

Scuba diving requires situational awareness, cognitive flexibility, and the ability to adapt to changing conditions. For individuals with autism spectrum disorder (ASD), these demands may pose unique challenges due to differences in executive functioning, sensory processing, and social cognition. This article explores the key considerations in assessing fitness to dive in individuals with ASD, including the impact of comorbidities, medication use, and cognitive abilities on diving safety. To provide a broader perspective, we examine research on ASD and high-risk activities such as driving, where similar cognitive and decision-making challenges exist. Additionally, we discuss the role of neuropsychological assessments in evaluating a diver's cognitive fitness and the limited but emerging evidence on scuba diving interventions for individuals with ASD. While ASD is not an absolute contraindication to diving, a careful, individualised assessment is essential to determine suitability. This review aims to provide guidance for diving professionals and medical examiners in making informed decisions regarding ASD and scuba diving.

Stokes RJ, Watts D, Smerdon G, Hall SD, Bunn L, Marsden J. Vestibular rehabilitation and recovery in divers with inner ear decompression sickness: a case series. Diving Hyperb Med. 2025 Sep 30;55(3):202-11. doi: 10.28920/dhm55.3.202-211.

Introduction: The mechanism of injury and recovery of divers with inner ear decompression sickness (IEDCS) is not well understood and there is no consensus regarding management following recompression treatment. Given the rare occurrence, divers are not routinely offered the standard therapies that patients with other acute vestibular disorders may be offered such as vestibular rehabilitation. Methods: This is an observational case series of 13 divers presenting acutely with IEDCS to DDRC Healthcare in Plymouth, UK between July 2021 and January 2024. Vestibular and balance tests were undertaken to aid the treating dive physician in the diagnosis and management of the divers with both hyperbaric oxygen therapy and customised vestibular rehabilitation. Results: Average values for vertical perception, posturography, dynamic gait index and patient-reported outcomes measures improved by discharge and at the three month follow up despite 67% showing an ongoing positive head impulse test or nystagmus in the dark on videonystagmography at follow up. Conclusions: Divers should be warned that despite symptom resolution or minimal residual symptoms post-IEDCS there is a high rate of deficit evident on vestibular testing, and this, alongside investigation for a right to left cardiac shunt, should be a major consideration when considering returning to diving. For the clinician, a stopwatch timed Sharpened Romberg's test appears to be a reasonable method for monitoring progress of balance stabilisation during the treatment period. Early initiation of vestibular rehabilitation exercises should be considered for all divers with IEDCS.

van der Kooi BL, Hoedemaeker AD, Broekhuizen LN, van Ooij PJA, Wingelaar TT. The role and efficacy of ECG screening in assessing fitness to dive in military divers: implications of sports medicine standards. Diving Hyperb Med. 2025 Sep 30;55(3):212-9. doi: 10.28920/dhm55.3.212-219.

Introduction: Diving necessitates significant physiological adaptations, particularly within the cardiopulmonary system. Resting electrocardiograms (ECGs) are widely used in fitness to dive assessments, but their effectiveness in healthy young divers remains unclear. This study assessed the impact of applying sports medicine ECG criteria compared to traditional clinical standards, aiming to reduce (unnecessary) referrals to a cardiologist without compromising diver safety. Methods: In this retrospective study covering 10 years, ECGs from Royal Netherlands Navy divers were analysed. Abnormal ECGs identified by clinical criteria between 2010 and 2019 were re-evaluated using international sports medicine ECG criteria. A control group of normal ECGs was matched based on demographic factors. Statistical analyses were performed using Pearson's chi-squared and Fisher's exact test, with significance set at $P<0.05$. Results: Of a total of 3,020 ECGs, 156 were classified as abnormal by clinical criteria. Reassessment using sports medicine standards reduced the number requiring further investigation by 85.9%. In the control group, 1.0% of previously unremarkable ECGs were identified as requiring further investigation upon reassessment. Conduction disorders and rhythm disturbances were the most common findings. Conclusions: The findings of this study suggest that the application of sports medicine ECG interpretation criteria effectively reduces the number of ECGs requiring further investigation, thereby minimising referrals and associated costs. These results advocate for a re-evaluation of routine ECG screening practices in fitness to dive assessments in military divers, promoting a more tailored approach for this specific group.

Wagner ME, Yu E, Lussier A, Lin N, Guo H, Lindholm P. Serial chest computed tomography imaging in a freediver with a case of pulmonary barotrauma of descent (lung squeeze) showing the time course of resolution. Diving Hyperb Med. 2025 Sep 30;55(3):237-40. doi: 10.28920/dhm55.3.237-240.

Freedivers can suffer respiratory symptoms indicative of freediving induced pulmonary syndrome (FIPS). Aetiology includes immersion pulmonary oedema and barotrauma of descent in the tracheobronchial or pulmonary parenchyma, also colloquially called 'squeeze'. The pathophysiology and natural history are still largely unknown. This case report describes a freediver who developed haemoptysis following a 49 m personal best constant weight bi-fin dive, presenting with two episodes of haemoptysis within 24 hours post-dive. This style of diving entails finning down to the desired depth, turning with a single pull on the rope, and then finning up to the surface without use of the arms. The diver exhibited no other symptoms and remained haemodynamically stable. Computed tomography (CT) imaging performed two days post-dive showed ground-glass opacities in the right upper and middle lobes. Treatment involved hospitalisation, high-dose corticosteroids, and antibiotics. Follow-up CT scans post-dive revealed almost complete resolution (six days) followed by complete resolution of pulmonary abnormalities (21 days). This case is unique for its documentation of changes in lung findings over three sequential CT scans, providing a timeline of anatomical recovery. Serial CT scanning would not be routinely recommended from a radiation safety perspective but yielded interesting data into the time course of this trauma. The findings raise questions about the underdiagnosis of squeeze injuries, as this diver displayed minimal symptoms despite radiographic evidence of ground-glass opacities. This case highlights the need for standardised imaging and management protocols, as well as further research into the natural history and clinical significance of FIPS.

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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