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

# E-NEWS

## EDITOR'S NOTE – April 2025

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.

Neal W. Pollock, PhD
Université Laval

## UPCOMING EVENTS

### UMC Introductory Diving Medicine Course

Undersea Medicine Canada is offering a Level 1 'Introductory Course in Diving Medicine - Fitness to Dive' May 12-16 at the Atlantic Commercial Diving Centre in Summerside, PEI. An optional half-day pre-course will be held on May 11 for those wanting additional preparation for the program. Visit: https://underseamedicine.ca or contact Dr. Debbie Pestell at drdeb1@ns.sympatico.ca or 902-225-8214 for more information.

### DAN-UHMS Diving and Hyperbaric Medicine Special Topics Course

Divers Alert Network and the Undersea and Hyperbaric Medical Society will offer a deeper dive into select dive medicine and clinical hyperbaric medicine topics. The program is intended to add knowledge to an existing foundation of diving medicine. It will be held May 24-31 at Anse Chastanet on St. Lucia. Faculty include Jim Holm, Chris Logue, Simon Mitchell, and Neal Pollock. For more information: DAN@caradonna.com or 800-421-9999.

### AsMA-UHMS Joint Scientific Meeting 2025

The joint scientific meeting of the Aerospace Medical Association and the Undersea and Hyperbaric Medical Society will be held June 01-06 at the Hyatt Regency Hotel in Atlanta, GA. For more information, visit: https://www.asma.org/scientific-meetings/asma-annual-scientific-meeting/2025-asma-uhms-annual-scientific-meeting.

### EUBS Annual Scientific Meeting 2025

The annual scientific meeting of the European Underwater and Baromedical Society will be held September 02-06 in Helsinki, Finland. Information will be posted on the dedicated conference website: www.eubs2025.com.

## RECENT PUBLICATIONS

**Blogg SL, Azarang A, Papadopoulou V, Lindholm P. Agreement of precordial and subclavian Doppler ultrasound venous gas emboli grades in a large diving data set. Diving Hyperb Med. 2025 Mar 31;55(1):2-10. doi: 10.28920/dhm55.1.2-10.**

Introduction: Doppler ultrasound is used to detect inert gas bubbles in the body following decompression from dives. Two sites may be monitored, the precordial (PC) and subclavian (SC) positions. PC is the predominant site, allowing observation of bubbles returning from the entire body. However, the SC site provides unambiguous signals, whereas the PC site is noisy and difficult to grade. This retrospective study compared agreement of PC and SC Doppler data. Methods: Datasets from the large University of California at San Diego Doppler database were graded on the Kisman Masurel (KM) scale and included: one PC measurement at rest followed by three during movement (n=4 measurements); this was repeated for the left (n=4 measurements) and right (n=4 measurements) SC veins, producing a set of 12 grades. Primary analysis included: agreement between resting PC and SC grades, between movement PC and SC grades, and for unmatched grades, whether the SC grade was higher or lower than PC. Results: Four-hundred and fifty-three datasets were available (5,436 individual recordings). At rest, 281 (62.0%) PC and SC grades matched (weighted kappa agreement 0.33, 95% CI ± 0.04), while only 176 (38.9%) movement grades matched (0.29±0.02). Of the unmatched data, resting SC grades were higher than PC in 70.3% and lower in 29.6%; after movement, SC grades were higher in 45.8% and lower in 54.2%. Conclusions: These data revealed a large discrepancy between PC and SC grades. Overall, this suggests that Doppler observations from both positions will give the most comprehensive representation of bubble load.

**Currens JB, Doolette DJ, Murphy FG. Venous gas emboli (VGE) in 2-D echocardiographic images following movement: grading and association with cumulative incidence of decompression sickness. Diving Hyperb Med. 2025 Mar 31;55(1):44-50. doi: 10.28920/dhm55.1.44-50.**

Introduction: Venous gas emboli (VGE) are a common surrogate experimental endpoint for decompression sickness (DCS). VGE numbers are graded, and the peak post-dive grade is associated with the probability of DCS (PDCS). VGE are typically graded with the subject at rest when bubble numbers are stable, and again after limb flexions which elicit a transient shower of bubbles. Detection of VGE using two-dimensional (2-D) echocardiography has become common, but the principal grading scales do not specify how to grade VGE after limb movement. Methods: This was a retrospective analysis of 1,196 man-dives following which VGE were detected using 2-D echocardiography and graded on a scale 0-4 and 41 cases of DCS occurred. PDCS was estimated for each peak post-dive VGE grade from the cumulative incidence of DCS. Two different definitions of movement VGE grades were assessed in 84 measurements; the grade was either the maximum VGE number sustained for one diastole (1-cycle) or for six cardiac cycles (6-cycle). Results: For each peak post-dive VGE grade (maximum of rest or movement) the cumulative incidences of DCS (%) were: grade 0 (0%); grade 1 (1.3%); grade 2 (2.5%); grade 3 (4.6%); grade 4 (5.7%). When grading movement VGE, 57% of 1-cycle grade 4 were reduced to grade 3 using the 6-cycle definition. Conclusions: There is a need for consensus in the research community on how to assign movement VGE grades when using 2-D echocardiography. Publications should carefully explain methodology for assigning VGE grades and consider differences in methodologies when comparing historical data sets.

**Foy OB, Kumar A, Liang MI. Hyperbaric oxygen therapy: a practical guide for gynecologic oncologists. Gynecol Oncol Rep. 2025 Feb 12:58:101694. doi: 10.1016/j.gore.2025.101694. eCollection 2025 Apr.**

Hyperbaric oxygen therapy (HBOT) has several promising uses in the setting of gynecologic malignancy. Treatment for gynecologic malignancy frequently includes radiation, which can cause significant cell and tissue injury leading to long-term toxicities for patients. HBOT involves creating a high-pressure atmosphere in which the patient breathes 100% oxygen, which results in increased arterial pO2, vasodilation of hypoxic tissue, and decreased inflammatory cascades. This has been shown to be beneficial in treatment of common long-term toxicities associated with radiation. Response rates to HBOT are highest amongst patients with radiation cystitis (64-99%) and wound healing, necrosis, and fistula (50-100%). Significant benefit has also been seen in treatment of proctitis. HBOT has not shown any benefit in treatment of pain. Common risks of HBOT include middle ear barotrauma (42%) and sinus pressure, while more serious risks such as oxygen toxicity rarely occur. Patients should expect daily sessions for several weeks under the management of a certified HBOT provider.

**Lippmann J. Diving-related fatalities in Victoria, Australia, 2000 to 2022. Diving Hyperb Med. 2025 Mar 31;55(1):35-43. doi: 10.28920/dhm55.1.35-43.**

Introduction: The aim was to examine the diving-related fatalities in Victoria, Australia from 2000 to 2022, identify trends and assess existing and potential countermeasures. Methods: The National Coronial Information System and the Australasian Diving Safety Foundation (ADSF) database were searched to identify compressed gas diving and snorkelling/breath-hold diving deaths in Victoria for 2000-2022, inclusive. Data were extracted and analysed, and chain of events analyses conducted. Results: Thirty-six scuba divers, one diver using surface supplied breathing apparatus (SSBA) and 25 snorkellers/breath-hold divers were identified. Compressed gas divers were older than snorkellers (medians 47 vs 36 years) with a higher proportion being overweight or obese (89% vs 61%), half with pre-existing medical conditions which likely contributed to their deaths. Most snorkellers died from primary drowning, often associated with inexperience. Half of all victims were inexperienced, and more than half of the accidents occurred while diving for seafood, often in rough conditions. Only one third of victims were with a buddy at the time of their accident. Of those known to be wearing weights, three-quarters were still wearing them when found. Conclusions: Diving medical assessment in divers aged 45 years or older needs to be strengthened and obesity should trigger medical assessment in older divers. Other identified risks included seafood collection, diving in adverse conditions, ineffective or no buddy system, overweighting, poor buoyancy control and failure to ditch weights. Many are longstanding problems, so relevant messages are still not penetrating the community. Constant reinforcement through formal training, internet forums and targeted educational campaigns is required.

**Mason JS, Wilmshurst P, Gawthrope IC, Banham ND. Severe neurological decompression sickness associated with right ventricular dilatation and a persistent foramen ovale. Diving Hyperb Med. 2025 Mar 31;55(1):59-64. doi: 10.28920/dhm55.1.59-64.**

We present the case of a 28-year-old female diver who performed a scuba air dive with significant omitted decompression obligation. She developed constitutional and neurological symptoms. Brain magnetic resonance imaging post treatment demonstrated multifocal embolic infarcts and transthoracic echocardiogram with bubble contrast on day three revealed a persistent foramen ovale (PFO) and severe right ventricular (RV) dilatation. We postulate that the high venous bubble load from the

provocative decompression caused an increase in pulmonary artery pressure, leading to RV dilatation and increased right to left shunting of bubbles across her PFO, resulting in significant neurological deficits. This mechanism is analogous to that seen in acute thromboembolic pulmonary embolism.

**Oley MH, Oley MC, Iskandar AAA, Sukasah CL, Aulia I, Langi FLFG, Lampus HF, Sukarno I, Sukarno V, Faruk M. The effect of hyperbaric oxygen therapy on hypospadias reconstruction: a preliminary randomized controlled trial study of VEGF levels and HOPE score analysis. Arch Ital Urol Androl. 2025 Mar 20:13342. doi: 10.4081/aiua.2025.13342. Online ahead of print.**

Introduction: Hypospadias is a congenital abnormality of the urethral meatus in males. Hypospadias can be corrected by two-stage urethroplasty. Hyperbaric oxygen therapy (HBOT) can accelerate wound healing after surgery by increasing oxygenation, angiogenesis, and collagen synthesis. This study aimed to measure the effectivity of HBOT based on serum vascular endothelial growth factor (VEGF) level and hypospadias objective penile evaluation (HOPE) score in hypospadias reconstruction patients. Methods: This was a randomized controlled trial study. Hypospadias reconstruction was performed using the Sidik- Chaula and Manset Flap techniques. Each HBOT session ranged from 30-60 minutes, administered at 1-3 atm. Twenty subjects were divided into two groups: the HBOT and control groups. VEGF serum levels were measured 1 hour after the operation and 1 hour after every HBOT session. The HOPE score was assessed at the bedside by the attending physician, consisting of six items: the position of the meatus, the shape of the meatus, the shape of the glans, the shape of the penile skin, and the shape of the penile axis, including penile torsion and penile curvature. The data were analyzed with SPSS version 28, using the Shapiro-Wilk and independent t-test methods. Results: There was a trend of increasing VEGF levels as the number of HBOT sessions increased, with significant increase found in patients who underwent three (p=0.038), four (p=0.002), and five (p=0.008) HBOT sessions. We found a significant increase in the total HOPE score (p=0.028) and penile torsion score (p=0.006) in the HBOT group. Conclusions: HBOT can accelerate wound healing after urethroplasty. Three or more HBOT sessions are recommended after the repair of hypospadias.

**Shishido A, Schrank G, Vostal A, Uehling M, Tripathi R, Chintalapati S, Conway L, Kus N, DiChiacchio L, Kai M, Kufera JA, Rabinowitz R. Hyperbaric oxygen therapy for necrotizing soft tissue infections: a retrospective cohort analysis of clinical outcomes. Surg Infect (Larchmt). 2025 Mar 17. doi: 10.1089/ sur.2024.285. Online ahead of print.**

Background: Hyperbaric oxygen therapy (HBOT) is an adjunctive therapy for necrotizing soft tissue infections (NSTIs) that remains controversial due to lack of quality clinical evidence. This retrospective cohort examines the impact of HBOT on clinical outcomes from NSTI at a single center where evaluation for HBOT is standard of care. Methods: The COVID-19 pandemic disrupted HBOT service and NSTI cases went without HBOT treatment, allowing for a comparison of treatment groups. The clinical outcomes of 253 patients with NSTI that were evaluated for HBOT were compared; 143 (56.3%) received HBOT and 110 (43.3%) did not. Results: Baseline characteristics were similar except for surface area of the wounds and distribution on the extremities. More patients in the non-HBOT group died within 90 days of admission than those in the HBOT group (5.8% vs. 15.4%, p = 0.015). Further, patients with large wounds (≥450 cm2) and those with high APACHE II scores (≥18) who underwent HBOT had significantly lower risk of death than patients who did not (odds ratio [OR] 0.12, 95% confidence interval [CI] 0.02-0.72). Conclusion: Our study shows that there was a mortality benefit in patients with NSTI that was more significant in patients with large wounds and higher APACHE II scores.

**Smart D, Wilmshurst P, Banham N, Turner M, Mitchell SJ. Joint position statement on atrial shunts (persistent [patent] foramen ovale and atrial septal defects) and diving: 2025 update. South Pacific Underwater Medicine Society (SPUMS) and the United Kingdom Diving Medical Committee (UKDMC). Diving Hyperb Med. 2025 Mar 31;55(1):51-55. doi: 10.28920/dhm55.1.51-55.**

This consensus statement is the product of a workshop at the South Pacific Underwater Medicine Society Annual Scientific Meeting 2024 with representation of the United Kingdom Diving Medical Committee (UKDMC) present, and subsequent discussions included the entire UKDMC. A large right-to-left shunt across a persistent (patent) foramen ovale (PFO), an atrial septal defect (ASD) or a pulmonary shunt is a risk factor for some types of decompression sickness (DCS). It is agreed that routine screening for a right-to-left shunt is not currently justifiable, but certain high risk sub-groups can be identified. Individuals with a history of cerebral, spinal, vestibulocochlear, cardiovascular or cutaneous DCS, migraine with aura or cryptogenic stroke; a family history of PFO or ASD and individuals with other forms of congenital heart disease have a higher prevalence, and for those individuals screening should be considered. If screening is undertaken, it should be by bubble contrast transthoracic echocardiography with provocative manoeuvres (including Valsalva release and sniffing). Appropriate quality control is important. If a shunt is present, advice should be provided by an experienced diving physician taking into account the clinical context and the size of shunt. If shunt-mediated DCS is diagnosed, the safest option is to stop diving. Another is to perform dives with restrictions to reduce the inert gas load, which is facilitated by limiting

depth and duration of dives, breathing a gas with a lower percentage of nitrogen and reducing repetitive diving. Divers may consider transcatheter device closure of the PFO or ASD in order to return to normal diving. If transcatheter PFO or ASD closure is undertaken, repeat bubble contrast echocardiography must be performed to confirm adequate reduction or abolition of the right-to-left shunt, and the diver should have stopped taking potent anti-platelet therapy (low dose aspirin is acceptable) before resuming diving.

**Stevens G, Smart DR. The influence of wetsuit thickness (≥7 mm) on lung volumes in scuba divers. Diving Hyperb Med. 2025 Mar 31;55(1):27-34. doi: 10.28920/dhm55.1.27-34.**

Introduction: We hypothesised that although thicker (≥7 mm) wetsuits delay hypothermia and allow divers to dive in cooler waters, they may hinder pulmonary function. The aim of this study was to investigate whether thicker wetsuits worn by Tasmanian divers affected lung volumes, primarily the forced vital capacity (FVC) and forced expiratory volume, one second ($FEV_1$). Methods: Sixty-two volunteer active divers were recruited from recreational dive clubs and Tasmania's occupational diving industry. After confirming fitness and that the divers were currently active, spirometry testing was performed with and without the divers' usual wet suits, in a controlled dry environment. Suits were of varying thickness, but all were ≥7 mm thickness. Results: All divers had significantly reduced lung volumes when wearing ≥7 mm wetsuits. Recreational divers had greater decrements (-7% FVC and -5% $FEV_1$), compared to occupational divers (-3% FVC, -3% $FEV_1$). Males' lung volumes declined -4% FVC and -4 % $FEV_1$, whereas females declined -7% FVC and -6% $FEV_1$. Female recreational divers experienced the greatest negative impact from thicker wetsuits (up to 15% reduction in FVC), and this group also demonstrated an inverse relationship between increasing wetsuit thickness and declining lung volumes. Conclusions: Wearing thicker wet suits aids in thermal protection in temperate water diving but this study suggests it has negative effects on lung volumes. The real-life impact of this negative effect may be minor in fit healthy divers but might add additional risk to a less fit, recreational diving population with medical comorbidities.

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.

**Canadian Undersea and Hyperbaric Medical Association**

10 Plumtree Place, Portugal Cove-St. Philips,
Newfoundland and Labrador, A1M 3T1
info@cuhma.ca https://cuhma.ca

**Editor:** Neal W. Pollock, PhD - neal.pollock@kin.ulaval.ca