

E-NEWS

EDITOR'S NOTE – February 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.

Neal W. Pollock, PhD
Université Laval

NEWS/ANNOUNCEMENTS

CUHMA Affiliate Education Series on Safety

The second installment of this new program will be live streamed on Tuesday, February 06th at 1930 EST. Francois Burman will present on equipment safety in the hyperbaric environment. He is a registered professional engineer with 30 years of experience in the hyperbaric and diving field. He works for Divers Alert Network in North Carolina, promoting safety and accident prevention. He has authored numerous publications, including risk assessment guides for both clinical and recompression chamber facilities. He is active in developing numerous international hyperbaric standards, including those issued by CSA, ASME PVHO, NFPA, ECHM, and ISO. The following link can be used to join: <https://ulaval.webex.com/ulaval-en/j.php?MTID=me6a3731c65953390bf31aa1b16d8b6c1>

UPCOMING EVENTS

Boston Sea Rovers International Ocean Symposium

The 70th international ocean symposium and film festival will be held March 15-17 in Danvers, MA. For more information: <https://bostonsearovers.com/clinic-home>.

Canadian Underwater Conference 2024

The Diver Certification Board of Canada (DCBC) will hold the Canadian Underwater Conference & Exhibition March 24-26 at the Toronto Airport Marriot hotel. Visit: <https://www.underwaterconference.ca>.

AAUS Diving for Science Symposium 2024

The 2024 AAUS Diving for Science symposium will be hosted by the Smithsonian Marine Station at Fort Pierce with major contributions by Harbor Branch Oceanographic Institute, April 14-24 in Fort Pierce, FL. Visit: <https://aaus.org/annualsymposium>.

Ponza Rebreather Conference

The eighth iteration of the Ponza Rebreather Conference will be held May 8-12, 2024 on the island of Ponza, Italy (south of Rome and west of Naples in the Tyrrhenian Sea). Each day will include lectures and boat dives organized by the Ponza Diving Center. Space is limited. Visit: www.ponzadiving.com or info@ponzadiving.com.

UMC Level 2 Advanced Diving Medicine Course

Undersea Medicine Canada is offering a CSA Z275 Level 2 'Advanced Course in Diving Medicine: Diagnosis and Treatment.' This 6-day course will be held May 20-25, 2024 at the Atlantic Commercial Diving Centre in Summerside, PEI. Augmenting classroom instruction and case-based learning, site visits will allow observation of commercial diver training, diving, and hyperbaric chamber operations. A CSA Z275.2-15 Level 1 course or equivalent training is a prerequisite for this 45-h program. Find more information at <https://underseamedicine.ca> or contact Dr. Debbie Pestell at drdebl@ns.sympatico.ca or 902-225-8214.

UHMS Annual Scientific Meeting 2024

The annual scientific meeting of the Undersea and Hyperbaric Medical Association will be held June 12-15, 2024 in French Quarter of New Orleans. Visit: <https://www.uhms.org/education/annual-scientific-meeting/asm-registration.html#read-bio>.

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>

RECENT PUBLICATIONS

Choi S, Nah S, Han S. Correlation between time to hyperbaric oxygen therapy and delayed neurological sequelae in acute carbon monoxide poisoning patients. *Diagnostics (Basel)*. 2024; 14(2): 186.

Carbon monoxide (CO) is one of the most common causes of intoxication. Delayed neurologic sequelae (DNS) have a major impact on prognosis of CO poisoning patients. Hyperbaric oxygen therapy (HBOT) is widely used to treat DNS. However, there is no consensus regarding the optimal timing of HBOT. This prospective study enrolled patients who visited the hospital from November 2019 to October 2022. The cutoff value for the latency to HBOT after CO exposure was determined, and the area under the receiver operating characteristic curve (AUC) was estimated. In total, 167 patients were divided into non-DNS and DNS groups. The initial Glasgow Coma Scale (GCS) score, CO exposure time, latency to HBOT after CO exposure, median length of hospital stay ($p < 0.001$) and creatine kinase ($p = 0.016$) showed significant differences. A GCS score ≤ 9 had an odds ratio (OR) of 5.059 (95% confidence interval [CI]: 1.602-15.976, $p = 0.006$), and latency to HBOT after CO exposure ≥ 200 min had an OR of 18.971 (95% CI: 4.310-83.508, $p < 0.001$). The AUC was 0.8235 (95% CI: 0.7504-0.8966). A GCS score ≤ 9 and latency to HBOT ≥ 200 min may be significant risk factors for DNS.

Heck T, Lohana D, Mallela D, Mandil O, Sun L, Saxena P, Decker AM, Wang HL. Hyperbaric oxygen therapy as an adjunct treatment of periodontitis, MRONJ, and ONJ: a systematic literature review. *Clin Oral Investig*. 2024 Jan 5;28(1):77. doi: 10.1007/s00784-023-05410-7.

Objective: To review the available prospective literature on hyperbaric oxygen (HBO) therapy for periodontal conditions. Materials and methods: A comprehensive electronic and manual search was performed to identify clinical studies on adult patients who underwent hyperbaric oxygen therapy for periodontal treatments. A systematic literature search was conducted in PubMed, Cochrane, and Dentistry Oral Sciences Source databases. Results: Fourteen articles were included in the final literature review, of which five were RCTs and 11 were prospective clinical studies. Four studies discussed HBO as an adjunct to nonsurgical treatment of periodontitis, eight reported on HBO and osteoradionecrosis, and one examined HBO in bisphosphonate-related necrosis of the jaws. Conclusions: HBO has shown superior efficacy compared to antibiotics as a prophylactic measure in preventing osteoradionecrosis (ORN) in patients with a history of high mandibular irradiation. Clinicians should consider referring such patients for HBO therapy before and after tooth extractions. However, for the surgical excision of existing ORN lesions, HBO therapy does not yield significant benefits but does not negatively impact outcomes either.

Regarding the treatment of periodontitis patients, the variability among studies prevents definitive conclusions. HBO therapy as an adjunct to SRP in periodontitis treatment produces mixed results. Clinical relevance: This study's clinical relevance lies in its exploration of the potential benefits of HBO for periodontal conditions. Also, it provides clinicians with insights into when and how to integrate HBO therapy into their treatment approaches, particularly for patients with a history of irradiation and those undergoing complex dental procedures.

Lee JW, Kim H, Kong SK, Kim J, Choi SW, Oh SJ. The effectiveness of salvage hyperbaric oxygen therapy following combined steroid therapy for refractory sudden sensorineural hearing loss. *Ann Otol Rhinol Laryngol*. 2024 Jan 10:34894231222692.

Objective: Hyperbaric oxygen therapy (HBOT) is an accepted treatment option for sudden sensorineural hearing loss (SSNHL), but it is still recommended in combination with corticosteroids. We investigated the efficacy of salvage HBOT in refractory SSNHL that does not respond to corticosteroid combination therapy. Methods: Eighty-four patients were included, who had unilateral SSNHL with an improvement of pure-tone average (PTA) less than 10 dB after using intratympanic plus systemic corticosteroids (combined therapy) as the initial therapy. The control group ($n = 66$) received no further treatment, and the HBOT group ($n = 18$) received additional treatment with HBOT (10 sessions in total with 2.5 atmospheres absolute for 1 hour). Results: No differences in PTA or WDS were found between the 2 groups. However, the mean hearing gain in the HBOT group (16.8 ± 4.49 dB) was significantly higher than that in the control group (4.45 ± 1.03 dB) ($P = 0.015$). The proportion of patients with hearing recovery (hearing gain of 10 dB or more) after treatment was significantly higher in HBOT group (38.9%) than in the control group (10.6%). Conclusions: In patients with refractory SSNHL after steroid combined therapy, salvage HBOT showed a significant effect on hearing gain and recovery rate.

Micun Z, Dobrzyńska W, Sieškiewicz M, Zawadzka I, Dmuchowska DA, Wojewodzka-Zeleznikowicz M, Konopińska J. Hyperbaric oxygen therapy in ophthalmology: a narrative review. *J Clin Med*. 2023; 13(1): 29. doi: 10.3390/jcm13010029.

Hyperbaric oxygen therapy (HBOT) has been used for the past 50 years for conditions such as decompression disease and wound healing. It has promising effects in the treatment of vision-threatening diseases, such as retinal artery occlusion, retinal vein occlusion, diabetic macular edema, and acute optic neuropathy; however, HBOT has not been approved for use in these conditions by regulatory authorities. This paper provides an overview of the theoretical effectiveness and most recent indications for HBOT in ophthalmology. The fundamental aspects of the

physiology of choroidal circulation and metabolism are provided together with the clinical aspects that should be accounted for when selecting patients for this therapy. The paper also presents case reports of when HBOT was successfully implemented. The goals of this review were to explore the indications and benefits of HBOT and to evaluate the effectiveness of HBOT as an intervention in treating ophthalmology disorders. Lastly, the paper details the side-effects and discusses the safety issues of HBOT.

Tuominen LJ, Tuohinen S, Lundell RV, Räisänen-Sokolowski AK, Wuorimaa T. The effect of a single closed-circuit rebreather decompression dive in extremely cold water to cardiac function. Eur J Appl Physiol. 2024 Jan 8. doi: 10.1007/s00421-023-05392-0.

Purpose: Dive-induced cardiac and hemodynamic changes are caused by various mechanisms, and they are aggravated by cold water. Therefore, aging divers with pre-existing cardiovascular conditions may be at risk of acute myocardial infarction, heart failure, or arrhythmias while diving. The aim of this study was to assess the effect of a single decompression CCR dive in arctic cold water on cardiac function in Finnish technical divers. **Methods:** Thirty-nine divers performed one identical 45 mfw CCR dive in 2-4 °C water. Hydration and cardiac functions were assessed before and after the dive. Detection of venous gas embolization was performed within 120 min after the dive. **Results:** The divers were affected by both cold-water-induced hemodynamic changes and immersion-related fluid loss. Both systolic and diastolic functions were impaired after the dive although the changes in cardiac functions were subtle. Venous inert gas bubbles were detected in all divers except for one. Venous gas embolism did not affect systolic or diastolic function. **Conclusion:** A single trimix CCR dive in arctic cold water seemed to debilitate both systolic and diastolic function. Although the changes were subtle, they appeared parallel over several parameters. This indicates a real post-dive deterioration in cardiac function instead of only volume-dependent changes. These changes are without a clinical significance in healthy divers. However, in a population with pre-existing or underlying heart problems, such changes may provoke symptomatic problems during or after the dive.

Vargas-Figueroa VM, Cáceres-Chacón M, Labat EJ. Scuba diving-induced inner-ear pathology: imaging findings of superior semicircular canal and tegmen tympani dehiscence. Am J Case Rep. 2024 Jan 2;25:e941558. doi: 10.12659/AJCR.941558.

BACKGROUND: Superior semicircular canal dehiscence is an inner-ear pathology which presents with vertigo, disequilibrium, and hearing loss. Although the exact etiology of superior semicircular canal dehiscence is unknown, it is thought that an increase in middle-ear pressure disrupts a thin overlying temporal bone. Superior semicircular canal dehiscence is frequently seen in

association with dehiscence of the tegmen tympani, which overlies the middle ear. Here, we present a case report of a 52-year-old Puerto Rican man with vertigo, dizziness, vomiting, and mild hearing loss associated with superior semicircular canal and tegmen tympani dehiscence after performing improper scuba diving techniques. **CASE REPORT:** A 52-year-old Puerto Rican man presented to the emergency department with vertigo, dizziness, vomiting, and mild hearing loss in the right ear. The symptoms began shortly after scuba diving with inadequate decompression techniques on ascent. He was treated with recompression therapy with mild but incomplete improvement in symptoms. Bilateral temporal magnetic resonance imaging was suggestive of segmental dehiscence of the right superior semicircular canal and tegmen tympani. High-resolution computed tomography of the temporal bone confirmed right superior semicircular canal and tegmen tympani dehiscence with an intact left inner ear. **CONCLUSIONS:** The increased inner-ear pressure that occurs during scuba diving can lead to dehiscence of the superior semicircular canal and tegmen tympani, causing vertigo and hearing loss. Performance of improper diving techniques can further increase the risk of dehiscence. Therefore, appropriate radiologic evaluation of the inner ear should be performed in such patients.

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, AIM 3T1
info@cuhma.ca <https://cuhma.ca>

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

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