SPUMS

South Pacific Underwater Medicine Society

SPUMS 2023 ASM

Conference Proceedings

CRYSTALBROOK COLLECTION'S RILEY HOTEL CAIRNS
AND THE GREAT BARRIER REEF

Theme:

Diver health and ocean health amid the storm clouds of climate change.

SPUMS

South Pacific Underwater Medicine Society

Diveplanit Travel
Your personal dive travel agency

SUNDAY JUNE 4 TO
FRIDAY JUNE 9, 2023

ANNUAL SCIENTIFIC MEETING JUNE 4TH- 9TH 2023

CONFERENCE STREAMS AND PRESENTATIONS

Keynote speakers Prof Ove Hoegh-Guldberg and Craig Johnson are internationally recognised as experts in marine science

Prof Jamie Seymour is a world expert in jelly fish envenomation

Global effects of climate change on ocean health - coral reefs and temperate environments

Medical consequences of climate change

Novel solutions to the impacts of climate change on the ocean environment

Australian diving and marine medicine experts will present on:

Marine Food poisons and their hazards to health

Marine Envenomation

Venomous Marine Animals

Dangerous Marine Animals

Spread of venomous creatures and tropical diseases

Conference Workshop

Children and Diving – creating a generation of environmental advocates

SPUMS Position statement on Paediatric Diving

Free Papers

Synergies between marine science and underwater medicine

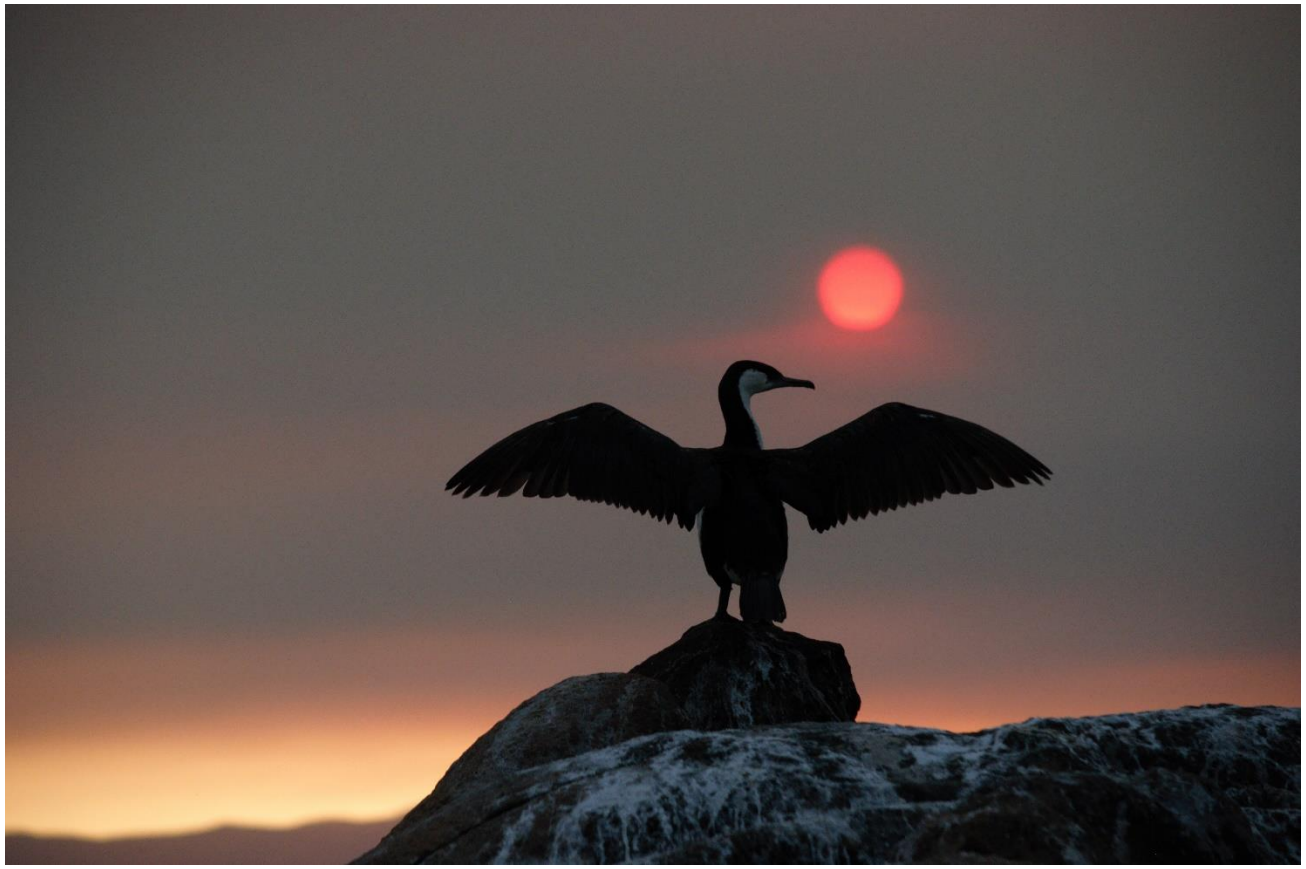
Free paper streams – diver health issues and safety

THURSDAY 8TH JUNE
WORLD
OCEANS DAY
SPUMS
OCEAN HEALTH = OUR FUTURE

SPUMS

South Pacific Underwater Medicine Society

Acknowledgement of Country



SPUMS acknowledges the Traditional Custodians of Country throughout Australia and their connections to land, sea and community. We recognise their continuing connection to the land and waters, and thank them for protecting this coastline, reef and its ecosystems since time immemorial.

The Gimuy-waluburra yidi are the traditional custodians of the Cairns and surrounding district.

We pay respect to their Elders past, present and emerging and extend that respect to all Aboriginal and Torres Strait Islander peoples today.

Keynote Speaker

Professor Ove Hoegh-Guldberg FAA, University of Queensland

Ove Hoegh-Guldberg is Professor of Marine Studies at The University of Queensland and is internationally recognised for his work on the impacts of climate change, especially those that affect complex ocean ecosystems such as coral reefs. The implications of his work have led to his involvement as coordinating lead author of the Intergovernmental Panel on Climate Change (IPCC), which is the peak UN body for understanding and responding to climate change. In addition to providing critical evidence, Ove has helped build the international consensus on the importance of restraining global warming to 1.5°C above the pre-industrial period, with a particular interest in the roles that the Ocean can play in mitigation of greenhouse gas emissions. He has been a Fellow of the Australian Academy of Science since 2013, receiving the Prince Albert II Award for Climate Change in 2014, and the International Award from the Banksia Foundation in 2016. He has been recognised as a Highly Cited Researcher in 2001, 2014, 2018 and 2019 (top 1% of his field) and was recently listed among the 100 most influential people in Climate Policy globally. While painting a worrying science-based picture, Ove will also outline the opportunities for reducing climate change and its impacts, albeit with a marine focus. While the on-going challenges are Herculean, all is not lost, with the next decade promising to be among the most enthralling in human history.

http://www.coralreefecosystems.org/professor-ove-hoegh-guldberg/

Keynote Speaker

Professor Craig Johnson, Institute of Marine and Antarctic Science, university of Tasmania

Craig completed his PhD at Dalhousie University in Nova Scotia on the stability of kelp beds, and subsequently worked at the Bedford Institute of Oceanography in Canada, University of Cape Town, Australian Institute of Marine Science, Griffith University, and University of Queensland before moving to take up the Chair in Zoology at the University of Tasmania in 1997. He moved to the Institute of Marine and Antarctic Science (IMAS) when it was first established in 2010, and was Associate Director of IMAS and Head of the Ecology & Biodiversity Centre for 10 years. He was then appointed as the inaugural Executive Director of Innovation & Enterprise at the University of Tasmania, although recently returned to IMAS to continue research.

His research is broadly concerned with the space-time dynamics of marine ecosystems, and with predicting the distribution of biodiversity. In both areas the impacts of climate change and possible management responses dominate his recent work. He studies interactions among suites of organisms spanning bacteria, algae, invertebrates and fish. The focus has largely been on temperate and coral reefs, but has also included seafloor communities in deeper waters of the continental shelf and pelagic systems in the Southern Ocean. His research is equally divided between field work conducting experiments underwater, building computer models of marine system dynamics and spatial variation in biodiversity, and work to develop marine-based industries. His research is published in over 200 peer-reviewed publications including several edited books, and has been cited over 13,000 times (H-Index 60).

Professor Johnson chaired the Marine National Facility Steering Committee 2004-14, and maintains a strong interest in ensuring open access to publicly funded scientific data through initiatives such as *Seamap Australia*. He has played leading roles in a range of national and international initiatives including the Partnership for Observation of the Global Oceans, Global Ocean Observing System, Australian Integrated Marine Observing System (IMOS) and eMII (its data management facility), Australian National Data Service, National Environmental Science Program Marine Biodiversity Hub, the Modeling and Decision Support Working Group of the World Bank Coral Reef Targeted Research Program, and development of Australia's Marine Science and Technology Plan.

Invited Speaker

Professor Jamie Seymour

Professor Jamie Seymour or the “Jelly Dude from Nemo land” has been researching and working with venomous and dangerous animals for over 20 years, with his present interest being “Why do animals have venom?” Based in Cairns, in Northern Australia, an area that has an over-abundance of venomous animals, he is uniquely placed to study the ecology and biology of Australia’s venomous species. He teaches at all levels at James Cook University, one of the top 5% of research universities in the world with his favourite subject being “Venomous Australian Animals”, a subject designed and taught by this effervescent academic.

He has been successfully involved in programs designed to decrease the envenoming of humans by jellyfish, namely in Australia, Timor Leste (for the United Nations), Thailand and Hawaii. His research has been directly responsible for changes in the present treatment protocol for Australian jellyfish stings. He established and is the director of the Tropical Australian Venom Research Unit (TASRU) which is now recognised as one of the premier research groups in the world for the studies of the ecology and biology of box jellyfish and research into medical treatment of box jellyfish envenoming.

https://research.jcu.edu.au/portfolio/jamie.seymour/

Thank You to all SPUMS member speakers and non-member speakers

Professor David Smart AM

Dr Neil Banham

Dr John Lippmann OAM

Dr Sarah Lockley

Dr Susannah Sherlock

Ms Niamh Reid

Dr Jeremy Mason

Dr Darren Meehan

Dr Graham Stevens

Dr San Clarke

Dr Tobias Cibis

Dr Catherine Meehan

Dr Sarah Crawford

Dr Martin Sayer

Dr Nick Bennett

Dr Jenny Sisson

Dr Ian Gawthrope

Dr Lizzie Elliott

Dr John Parker

Dr Matias Nochetto

Dr Judi Lowe

Ms Charlotte Barbosa

Ms Rachel Adlard

Dr Adam Barnett

CONFERENCE SUPPORTERS – SPUMS thanks the following organisations and groups for their support of this conference

Diveplanit – official travel partner

Crystal Brook Riley Hotel Cairns – Official Conference Venue

Cairns Plaza Hotel

Cairns Aquarium and Function Centre

Wharf One Cairns

PADI Australia – conference satchels

Australasian Diving Safety Foundation – SPUMS DipDHM Scholarships

Reef Magic – full day Dreamtime Expedition

Passions of Paradise– practical diving days

Divers Den Aquaquest– practical diving days

All contributing Scientists and Indigenous interpreters

Gimuy-walubarra yidi traditional custodians of the region

Spirit of Freedom Post conference trip

Ocean Quest – minke trip

Prodive Cairns – minke trip

We could not have produced this conference without:

Nicky Telles – SPUMS ASM Assistant – website creation, ASM database, financial links and extensive administrative support

MEET THE CONVENERS

Clinical Professor David Smart, AM

Immediate past-president SPUMS and SPUMS Executive committee member

BMedSci, MBBS(Hons-1), MD(UTas), FACEM, FIFEM, FAICD, FACTM, FUHM, Dip DHM, ANZCA Dip Adv DHM

Tasmanian born, David has logged over 3500 hours underwater since scuba training in 1981. He recently retired after nearly 4 decades of medical practice and has always been active in Diving and Hyperbaric medicine He completed his Dip DHM in 1989 and FACEM in Emergency Medicine in 1991. After time in SA and WA, he returned to Hobart, was Director of Emergency Medicine at RHH 1994 – 1998. In 1998, he became Director of Diving and Hyperbaric Medicine at RHH. He completed his MD with UTas in 2005 studying carbon monoxide poisoning. David has been medical consultant to various professional diving industry organisations; Chair of the ANZCA Exam Committee in Diving and Hyperbaric Medicine; including being a DHM examiner (now lead examiner) with ANZCA since 2003, Chair of the ANZHMG; SPUMS Education Officer and President; SPUMS Australian Standards representative. He has taught at all of Australia's short courses in Diving and Hyperbaric medicine. He has published over 150 peer reviewed papers and abstracts, and received multiple national and international awards. In 2019 he was awarded Member of the Order of Australia (AM) for his services to Diving and Hyperbaric Medicine and Professional Organisations.

Dr Catherine Meehan

SPUMS Executive committee member

MBBS; Post Grad Dip Med Science; DipDHM

Catherine is a GP in Cairns, Far North Queensland, Australia. She has a special interest in diving medicine, and has the South Pacific Underwater Medicine Society (SPUMS) diploma in Diving and Hyperbaric Medicine, as well as the Auckland University Post Graduate Diploma in Medical Science- Diving and Hyperbaric Medicine.

Catherine was secretary of SPUMS from 1993 to 2005. She is now back on the committee as a committee member as well as heading the Future Annual Scientific Meetings committee. Catherine has convened several SPUMS Annual Scientific Meetings and is a consistent attender of the meetings, since 1992.

Catherine is an active recreational diver. She is a Dive Master, and a qualified deep cavern diver. She continues to do further training in recreational technical diving.

SPUMS ASM PROGRAM 2023 AT A GLANCE (FINAL)

Sat June 3	Sun June 4	Mon June 5	Tue June 6	Wed June 7	Thu June 8	Fri June 9
Delegate Travel and arrival Cairns SPUMS ExCom Meeting 0900-1200	08:30 AM Registration 9:00–12:30 Keynotes Conference opening Sessions 1 & 2	08:30 AM Registration 9:00–12:45 Keynotes + Marine Hazards Sessions 5 & 6	07:15 AM Interpretive science and Dreamtime Expedition to GBR Experience.co pontoon **Included for all delegates with full registration/guest registration B** All day field trip Workshop Medicine, Marine Science and Shared Vision (Snorkeling included) Practical scuba diving workshops***	07:15 AM Interpretive science expeditions and practical scuba diving workshops*** All day field trip	9:00–12:00 Workshop: SPUMS position statement SPUMS: Children and diving Sessions 9 & 10	07 :15 AM Interpretive science expeditions and practical scuba diving Workshops*** All day field trip
					12:00 SPUMS AGM	
LUNCH 1230-1330	LUNCH 1230-1330	LUNCH 1245-1345			LUNCH 1300-1400	
1400-1700 Conference Registration at Crystal Brook Riley Hotel	13:30– 17:30 Free paper Conference Sessions 3 & 4	13:45– 17:20 Marine Hazards and Free Papers Sessions 7 & 8			1400-1600 SPUMS Past Present and Future Session 11 2024 ASM Presentation Conference Session 6	
1900-2200 Welcome Cocktail Party Cairns Aquarium Delegates and Guest registration B Dress smart casual	**Free Evening**	**1830 Sunset function for Delegates and Guest registration B Dress smart casual . Wharf One Cairns**	**Free Evening**	**Free Evening**	**1830-2300 Conference Gala Dinner Tropical Riley Hotel Delegates and Guest registration B Dress smart casual**	**Conference Close Free evening**

Scientific Program Saturday 3rd and Sunday June 4th 2023

Saturday June 3rd 1400-1700	**Conference Registration (Crystal Brook Riley Hotel)**	
Saturday June 3rd 1900-2200	**CONFERENCE OPENING COCKTAIL PARTY CAIRNS AQUARIUM Dress: Smart Casual**	
Sunday June 4th 0830	**REGISTRATION AND COFFEE**	
SESSIONS 1 AND 2	**THEME - OCEAN IMPACTS OF CLIMATE CHANGE**	
Time	**Speaker**	**Presentation Title**
0845 – 0900	David Smart	Introduction and welcome
0900 – 1000 Includes 10 minutes for questions	Prof Ove Hoegh-Guldberg KEYNOTE ADDRESS	Climate change and the ocean: past, present, and future.
1000-1030	**MORNING TEA**	
1030-1130 Includes 10 minutes for questions	Prof Craig Johnson KEYNOTE ADDRESS	Climate change impacts on Australia's Great Southern Reef (GSR)
1130-1200	Sarah Lockley	Medical Consequences of climate change – an overview
1200-1230	Susannah Sherlock and Niamh Reid	Reef Resilience – who is responsible?
1230-1330	**LUNCH**	
SESSION 3	**FREE PAPERS**	
1330-1400	Martin Sayer	Can monitoring divers' decompression inform changes in ocean health?
1400-1420	Jeremy Mason SPUMS DipDHM Project (ADSF Scholarship)	A retrospective review of divers treated for inner ear decompression sickness at Fiona Stanley Hospital Hyperbaric Medicine Unit 2014–2020
1420-1440	Darren Meehan SPUMS DipDHM Project (ADSF Scholarship)	Determining best practice for technical assessment of hookah surface supply diving equipment during diving fatality investigation
1440-1500	Graham Stevens SPUMS DipDHM Project (ADSF Scholarship)	The influence of wet suit thickness (7mm and over) on lung function in scuba divers.
1500-1520	David Smart	How to undertake Diving and Hyperbaric Medicine training in Australia and New Zealand
1520-1550	**AFTERNOON TEA**	
SESSION 4	**FREE PAPERS**	
1550-1610	Tobias Cibis	Computational Simulation of Vascular Volume Changes during Scuba Diving
1610-1630	San Clarke	Pulmonary oedema in snorkelers – four recent cases
1630-1650	Sarah Crawford	Dive Team Investigations: A Quality Improvement Project on Emergent Management of Diving Injuries
1650-1710	Martin Sayer	Seeing is believing: from heat damaged coral reefs to problem wounds
1710-1730	Adam Barnett	Negative human-shark interactions
1730	**CLOSE**	
EVENING	**FREE NIGHT**	

Scientific Program Monday June 5th 2023

Time	Speaker	Presentation Title
0800	**REGISTRATION AND COFFEE**	
SESSION 5	**THEME – PRACTICAL SOLUTIONS TO CLIMATE CHANGE EFFECTS**	
0830 - 0915	Prof Ove Hoegh Guldberg	Solving climate change: Does the ocean always have to be the victim?
0915-1000	Prof Craig Johnson	Responding to impacts of climate change impacts on Australia's Great Southern Reef (GSR)
1000-1030	**MORNING TEA**	
SESSION 6	**THEME – MARINE HAZARDS 1**	
1030-1115	Prof Jamie Seymour	Marine Envenomation – an overview
1115-1145	David Smart	Marine Food toxins – an overview
1145-1245	Panel Discussion re challenges for the future Include Sarah Lockley and David Smart	Is the ocean becoming a more dangerous place?
1245-1345	**LUNCH**	
SESSION 7	**THEME – MARINE HAZARDS 2**	
1345-1430	Prof Jamie Seymour	Spread of dangerous marine species in changing times
1430-1450	Nick Bennett	Reef medical retrievals
1450-1520	John Lippmann	Diving Deaths in Queensland
1520-1550	**AFTERNOON TEA**	
SESSION 8	**FREE PAPERS**	
1550-1620	Jenny Sisson	Preparation to reduce health risks when travelling to remote dive locations
1620-1640	Judi Lowe	Dive tourism and the role of recognising traditional marine tenure and providing livelihoods in decreasing destructive fishing
1640-1700	Tobias Cibis	Biomedical Underwater Data Analytics in a Controllable Underwater Environment
1700-1720	Neil Banham	A prospective single-blind randomised clinical trial comparing two treatment tables for the initial management of mild decompression sickness
1720	**CLOSE**	
1830	**Social Function**	**Wharf One Cairns - Sunset Function for all delegates and Guest Registration B Dress Smart Casual**

Scientific Program Detail: Thursday June 8th 2023 – WORLD Oceans Day

Time	Speaker	Presentation Title
0800	**REGISTRATION AND COFFEE**	
SESSION 9 TARGETED WORKSHOP	**LIZZIE ELLIOTT CHAIR**	**THE PAEDIATRIC DIVER**
0830-0850	Lizzie Elliott	Why have a workshop on the paediatric diver, what is needed in a SPUMS position statement?
0850-0910	Ian Gawthrope	How do we define a paediatric diver and are there health risk issues?
0910-0920	Cathy Meehan	Summary of other medical societies' position statements on paediatric diving
0920-0930	John Lippmann	Childrens diving emergencies and deaths reported to the Diver Emergency Service
0930-0950	John Parker	Approach to the Paediatric Diving medical
0950 - 1020	Matias Nochetto	A review of 149 DAN emergency call records involving diving minors
1020-1040	Charlotte Barbosa and Rachel Adlard (PADI)	What is current industry practice in paediatric diver training?
1040-1100	**MORNING TEA**	
SESSION 11	**SPUMS POSITION STATEMENTS ON PAEDIATRIC DIVING**	
1100-1200	Lizzie Elliott, CHAIR	WORKSHOP: Member participation SPUMS POSITION STATEMENTS ON PAEDIATRIC DIVING
1200-1300	**SPUMS ANNUAL GENERAL MEETING and Election of Office Bearers 2023-2026**	Dr Neil Banham, SPUMS President
1300-1400	**LUNCH**	
FINAL SESSION	**SPUMS PAST PRESENT AND FUTURE – Chair Cathy Meehan**	
1400-1420	Sarah Lockley	Balloon dilatation of the Eustachian Tube – a procedure for the future
1420-1450	David Smart	Reflection on a fortunate life and career
1450-1520	David Smart and Deborah Dickson Smith	Presentation re 2024 SPUMS ASM Fiji
1520-1530	Conveners wrap up	David Smart and Cathy Meehan
1530-1630	**Neil Banham**	**Tribute to Professor Mike Bennett, AM**
1630	**CLOSE**	
1830-2300	**CONFERENCE GALA DINNER**	**TROPICAL THEME – Dress Marine / Tropical Dinner Speaker Prof Jamie Seymour – *Confessions of a Jelly Dude***

Field Trips Tuesday 6th June, Wednesday 7th June and Friday 9th June

TUESDAY JUNE 6th 2023	**DREAMTIME FULL DAY PRACTICAL AND SCIENTIFIC REEF EXPEDITION FOR ALL DELEGATES AND GUESTS**
0715 DEPARTURE	**PICKUP FROM RILEY HOTEL**
WEDNESDAY JUNE 7th 2023	**PRACTICAL DIVING WORKSHOPS ALL DAY FIELD EXPEDITIONS**
0715 DEPARTURE	**ALL PARTICIPANTS BUS/COACH PICKUP FROM RILEY HOTEL**
TO: Passions of Paradise	**SEPARATE DETAILS PROVIDED AT CONFERENCE**
TO: Reef Quest	**SEPARATE DETAILS PROVIDED AT CONFERENCE**
FRIDAY JUNE 9th 2023	**PRACTICAL DIVING WORKSHOPS ALL DAY FIELD EXPEDITIONS**
0715 DEPARTURE	**ALL PARTICIPANTS BUS/COACH PICKUP FROM RILEY HOTEL**
TO: Passions of Paradise	**SEPARATE DETAILS PROVIDED AT CONFERENCE**
TO: Reef Quest	**SEPARATE DETAILS PROVIDED AT CONFERENCE**

ALL FIELD TRIPS FOR DREAMTIME AND PRACTICAL WORKSHOPS DETART FROM THE CRYSTAL BROOK RILEY HOTEL

For all field trips, delegates and guests must be at the Crystal Brook Riley Hotel pick-up site 15 minutes before departure time.

Delegates and guests who are not staying at the Riley Hotel or Cairns Plaza, must be at the Riley Hotel for their pick up to be taken to the expedition boat

Late arrivals will not be accommodated due to the significant distance of travel to the Great Barrier Reef.

No refunds will be provided for missed expeditions.

Programme Tuesday June 6th 2023

Dreamtime full day Scientific Expedition to the Great Barrier Reef

TUESDAY JUNE 6, 2023, 8AM TO 530PM

(Included for all full registrants + all Guest B registrations)

Join us for a day of discovery on the Reef Magic Pontoon, where you will learn about the various marine conservation scientific programs managed by GBR Biology and listen to Dreamtime stories of the Reef told by local indigenous rangers. The day includes snorkelling sessions, transfers from your hotel, and are fully catered: morning and afternoon teas, and generous buffet lunch.

Located at Moore Reef, the Reef Magic pontoon caters for all activity levels. Snorkel in the sheltered coral lagoon, join a marine biologist on a Guided Snorkel Safari, go for a dive* or try Sea Trek Helmet Diving and visit the floating laboratory.

NOTE: Certified scuba diving is also available and can be purchased by delegates and guests for an additional fee: 1st dive $89, 2nd dive $59; Diving must be pre-booked through conference travel provider Diveplanit.

Programme Wednesday June 7th 2023 and Friday June 9th 2023

PRACTICAL WORKSHOPS

Full Day In-Water Scientific Sessions

In addition to the Dreamtime Great Barrier Reef day trip that is included as part of your delegate package, two unique full-day scientific practical in-water workshops are on offer on Wednesday and Friday. Both options are offered to certified divers and snorkelers, and include two dives, or snorkelling sessions, transfers from your hotel, and are fully catered: morning and afternoon teas, and generous buffet lunch.

Passions of Paradise Practical Day

Join one of the Great Barrier Reef's most sustainable and multi-award-winning tour operators for a snorkel or double dive and learn about the Coral Nurture Program and enjoy a hot and cold buffet lunch, morning and afternoon tea.

Passions of Paradise has licences to visit over 24 reef systems - including magnificent sites such as Flynn & Milln Reefs. Snorkelers and certified divers have an option to join a Master Reef Guide and become a Marine Biologist for a Day, participating in the Eye on the Reef Rapid Monitoring program.

Divers Den Practical Day

Board AquaQuest for a day-trip to the outer reef for a snorkel or double dive on Norman, Hastings or Saxon reefs. ReefQuest is a purpose-built dive vessel, with a spacious dive deck and state of the art diving equipment.

While on board, enjoy large sun decks and air conditioned indoor spaces. Fuel up between dives with delicious food and beverage options, including a tasty and filling tropical buffet lunch.

Cairns Day Trips

DELEGATES AND GUESTS ARE ENCOURAGED TO EXPLORE TROPICAL NORTH QUEENSLAND ON DAYS WHEN NOT ATTENDING THE CONFERENCE, OR DIVING. THE FOLLOWING EXPERIENCES CAN BE ACCESSED, WITH A 5% DISCOUNT APPLICABLE WHERE THERE IS A PROMO CODE.

Islands

Green Island Reef Cruises - Experience Co – Promocode SPUMS23

Green Island is a tropical island paradise on the Great Barrier Reef and approx 45 minutes off the coast of Cairns. Cruise to Green Island in comfort aboard our modern air-conditioned catamarans. Big Cat Green Island Reef Cruises offer full and half day cruises departing daily from Cairns at 9am, 11am & 1pm. Morning and afternoon tours are ideal for half day leisure options. Available activities include snorkelling, semi-submarine, and glass-bottom boat coral viewing tours as well as a full buffet lunch, relaxing on the white sandy beach and exploring the walking tracks that lead through the National Park.

A range of optional extras are available such as Guided Snorkel Experience Tour and Guided Snorkel Safari Tour.

- +61 07 4051 0444
- greenisland.com.au

Frankland Island Reef Cruises – Entrada

The Frankland Islands are an uninhabited pristine archipelago located 10 kilometres offshore and surrounded by healthy fringing reefs and marine life. While camping is allowed on one island, Frankland Islands Reef Cruises is the only company to hold a permit to visit Normanby Island, making the tour an exclusive day option. Your delegates are collected from their hotels or CBD point for a 45-minute air-conditioned transfer before boarding the cruise that follows the Mulgrave River spilling out into the Coral Sea and crossing to Frankland Islands. Island activities are available, including snorkel, scuba,
semi-sub, paddleboards, clear kayaks and Sea-Doo scooter.

- +61 07 4046 7333
- www.franklandislands.com.au

Fitzroy Island Adventures – Experience Co – Promocode SPUMS23

This spectacular island is easily accessible from Cairns and features an array of beautiful natural features – such as an immense range of marine life and coral species – that make visiting a dream. Unlike smaller coral cays or sandy islands on the Great Barrier Reef, Fitzroy was once part of mainland Australia. The island is largely untouched and protected as Fitzroy Island National Park, with walking tracks through the rainforest, heathland and open forest to Nudey Beach and the Summit.

- +61 7 4030 7990
- http://fitzroyislandadventures.com/

Rainforest

River Drift Snorkelling

An amazing eco-immersion adventure that's different every time! It's swimming, snorkelling, floating and a rainforest walk. All combined into the best rainforest experiences in the region. Step into the cool, crystal-clear water and drift with the current as you explore life under the water's surface. Watch fish dart in and around the river stones and keep your eyes out for the occasional turtle.

As you explore one of the cleanest rivers in Australia, keep an eye out for some of the friendly inhabitants: freshwater turtles, over 30 species of fish, water dragons, colourful birds, electric blue butterflies, elusive platypus.

- +61 7 4099 3677
- https://backcountrybliss.com.au/tours/

Daintree Tours– Experience Co– Promocode SPUMS23

Explore the magnificent and untouched World Heritage-listed Daintree Rainforest, the oldest living rainforest in the world at 160 million years. Enjoy interesting and entertaining commentary from our passionate Daintree Tours' guides throughout the day, stroll along the Kulki Boardwalk, explore Cape Tribulation, enjoy lunch at a secluded site with an opportunity to swim in a fresh rainforest creek, and finish the adventure with an estuarine crocodile and wildlife river cruise exploring the Cooper Creek waterway.

- +61 7 4099 6999
- http://daintreetours.com/

Mossman Gorge Adventure Day

Beginning the day at a secret location on the Mossman River for our one of a kind River Drift Snorkelling tour; searching for turtles, water dragons and the elusive platypus.

After a well-earned lunch, enjoy a traditional Kuku Yalanji smoking ceremony at the Mossman Gorge; where you'll be cleansed of bad spirits and have traditional rainforest body paint applied.

Exploring the Daintree National Park at an easy pace, this interpretive 1.5hr walk, will leave you with a deeper understanding of this breath-taking rainforest.

- +61 7 4099 3677
- https://backcountrybliss.com.au/tours/daintree-adventure-day/

Mossman Gorge Cultural Centre - Voyages

Explore the beauty of the pristine rainforest, cool streams, towering mountains and the dramatic gorge with guided knowledge from the local KuKu Yalanji people. The Centre offers guided or self-guided walks, half-day tours and the Dreamtime Walk, where your delegates will be treated to a traditional 'smoking' ceremony, ancient knowledge of plant uses, bush food sources and ochre painting and get to see the magnificent Mossman Gorge, finished of with a treat of traditional bush tea and Indigenous damper.

- conferences@voyages.com.au
- +61 7 4099 7000
- www.mossmangorge.com.au

Skyrail Rainforest Cableway

Embark on a fascinating journey of discovery over and deep into Queensland's Wet Tropics World Heritage Area – home of the world's oldest continually surviving tropical rainforest – with Skyrail Rainforest Cableway.

Located only 15 minutes from Cairns CBD, the iconic Skyrail experience is a must do Cairns attraction that provides a truly unique perspective of Australia's World Heritage listed tropical rainforest.

Guests are immersed in the sights, sounds, smells, and tranquillity of one of the most botanically fascinating areas on Earth via a comprehensive combination of a multi-lingual interpretive app and audio guide; rainforest boardwalk loops at Red Peak and Barron Falls; ranger guided boardwalk tours; the Rainforest Discovery Zone; The Edge lookout; and the CSIRO Rainforest Interpretation Centre.

- groups@skyrail.com.au
- +61 7 4038 5555
- http://skyrail.com.au/plan/business-events

Adventure

Raging Thunder Adventures Rafting

Raging Thunder has over 30 years of experience in white water rafting through World's heritage-listed rainforest, with half or full-day options available. The Barron River offers a half-day afternoon trip which is a great introduction to white water rafting as you negotiate your way through grade 2-3 rapids including the infamous Rooster Tail.

The Tully River is a full day and is regarded as Australia's premier rafting river and will see you conquering grade 3-4 rapids plunging through World Heritage Rainforest, with up to 5 hours of adrenalin pumping action! Prepare for plenty of thrills and excitement with big water and big drops. Step outside your comfort zone and push personal boundaries with a rafting experience you'll remember forever!

- peta@cairnsadventuregroup.com.au
- +61 07 4031 3460
- ragingthunder.com.au

Abstracts Day 1 Sunday June 4th 2023

Keynote Address – Prof Ove Hoegh-Guldberg

University of Queensland

Climate change and the ocean: past, present, and future.

Climate change is one of the most challenging issues facing the world today, with an increasing risk of devastating impacts on people and ecosystems. Here, I would like to update the science of climate change as it relates to marine ecosystems and to many other talks here at SPUMS 2023. As they say, climate change is no joke. Some of the most serious impacts are already occurring to ecosystems and people. Rapid changes in sea temperature are driving big shifts in the frequency of other variables such as marine heatwaves, rising sea levels, changing currents, intensifying storms, ocean acidification, ecosystem shifts, and disease (among many others). The impacts are also multifaceted and complex, leading to a wide range of interactive effects of great concern. For example, warmer temperatures are leading to increased mass coral bleaching and mortality, which is seriously affecting the health of key ecosystems such as coral reefs, mangroves, and seagrass with some largely disappearing by 2040. Losing these 'habitat forming' species is not just about the future of these three organisms but also has implications for hundreds of thousands of other species that depend on them for habitat. These impacts can also drive far-reaching effects on the food webs that support marine ecosystems – which ultimately impact the livelihoods of coastal human communities that rely on fishing, tourism, and other ocean-based industries for their existence. Overall, the impact of climate change on the world's oceans and coastal systems is significant and wide-ranging, with the potential to cause significant harm to both the natural environment and the human communities that rely on it. Addressing these challenges will require a concerted effort from governments, communities, and individuals around the world, with the dive industry being a loud voice for action. Hopefully, these elements will stimulate thinking around finding solutions before this crisis plays out.

Reference: Hoegh-Guldberg, Ove, Daniela Jacob, M. Bindi, S. Brown, I. Camilloni, A. Diedhiou, R. Djalante et al. 2019, The human imperative of stabilizing global climate change at 1.5°C (Science, DOI: 10.1126/science.aaw6974)

Keynote address – Prof Craig Johnson

University of Tasmania, Institute of Marine and Antarctic Studies

Climate change impacts on Australia's Great Southern Reef (GSR)

The Great Southern Reef (GSR) of temperate Australia is a system of thousands of reefs connected by two boundary currents. Kelp is the principal habitat forming species in shallower waters of the GSR, grading to sponge-dominated communities in deeper water. The GSR is characterized by very high biodiversity and levels of endemism, and has already been considerably affected by climate change, including ocean warming, ocean heatwaves, and changes in nutrient profile as a result of climate-driven shifts in oceanography.

This talk will summarise the impacts of climate change on these communities in general, and point to specific examples where effects on ecologies have been large and long-lasting. Heatwaves have decimated kelp communities in WA, and tropicalisation of reef fishes through southward migration has impacted kelp forests in NSW. In Tasmania, ocean warming has underpinned the demise of giant kelp forests, which became the first marine community in Australia to be listed as an 'endangered marine community type' through the EPBC Act. Climate-driven southward range extension of the long-spined sea urchin, previously restricted to NSW, has caused massive loss of kelp forests in eastern Victoria and Tasmania. Ocean warming has also impacted genetic diversity of kelps at the range margins, likely affecting their susceptibility to ongoing stressors, including ongoing warming.

I will discuss the problem of the 'geographic climate trap' facing southern species, i.e. the absence of cool water reefs further south that can provide refuge from ocean warming.

A key message from modelling of deeper meso-photic reefs in eastern Australia shows that, because different functional groups of organisms are responding to ocean warming in different ways, entire communities will not shift southwards uniformly, and thus future communities will have a fundamentally different structure, and different functioning, to existing communities.

Dr Sarah Lockley

Private General Practice, Hobart Tasmania

Medical consequences of Climate change

INTRODUCTION

The human population health impacts of global warming and climate change, has been postulated and widely researched over years and health indicators have also been used more recently, to track these. This overview will provide a non-expert analysis of the general predictions and concerns raised by experts, working within or independent from, international health and scientific organisations; with regard to the medical consequences of climate change.

AIMS

To provide an outline of the direct and indirect impacts of climate change, on the health of human populations, including safety of drinking water, rising sea levels, atmospheric changes, food security, disease, natural disasters, secure shelter and marine contamination and acidification. To stimulate the planned panel discussion around these predictions, observations and research, between health professionals and climate scientists.

METHOD

There is now a large number of resources available to medical and health professionals to assist our understanding of the impact of climate change and the possible pathways to disease and public health problems that are expected with global warming and through climate change. These will be utilised to provide not only information about key resources and an oversight on what population health issues are anticipated with climate change predictions, but also how these may be tracked.

CONCLUSIONS

Climate change is not a religion nor a “belief system”. It is an observable, scientific phenomenon, largely driven by human activity, that has been extensively researched and validated over many years. Medical experts worldwide hold grave concerns for the health of human populations across the globe, in the short and medium term, if climate change is not addressed, with urgency.

KEY WORDS

Climate Change, public health, consequences

Dr Susannah Sherlock and Ms Niamh Reid

Wesley Hyperbaric, Auchenflower, Queensland

Reef Resilience; who is responsible?

INTRODUCTION

This is a talk given by a senior (over 50…) hyperbaric physician and her daughter. The theme of the talk is to challenge thought on communication between generations to enable changes for the benefit of the next and those which follow.

AIMS

To create discussion between generations in the household to effect change to benefit the ocean.

METHODS

Internet search, interviews with scientists and background reading on ways to consider saving the reef by addressing climate effects on the oceans. International news regarding climate change topics.

RESULTS

We found that this problem is due to all mankind and not just baby boomers' excessive lifestyle. There are promising new ways to promote reef health. Personal behavioural choices are key to ensuring change.

CONCLUSIONS

To address change everyone needs to consider the problem and encourage policy change by voting. Lifestyle changes are the single most effective way to start the conversation. We should have considered driving to Cairns.

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Dr Martin Sayer

Tritonia Scientific, Oban Scotalnd

(Marlowe C, Sayer JD, Azzopardi E, Sayer MDJ)

Can Monitoring diver's decompression inform changes in ocean health?

Long term observations of ocean temperature are essential for our understanding of natural variations and trends caused by climate change but there is a shortage of depth-resolved temperature data, especially in coastal areas. Determining temporal and spatial variation via remote sensing in coastal areas is challenging. Satellite products are commonly used to measure sea surface temperature (SST) but are affected in coastal areas by proximity of land or aerosol interference. In addition, satellite SST records only the skin or sub-skin temperature at the sea surface and measurements have been found to differ from in situ records.
Most modern diving decompression computers record profiles of temperature as a function of depth and time, with some older models recording a single minimum temperature for a dive. With as many as 10 million SCUBA divers world-wide, most wearing one or more dive computers, there is clear potential for divers to gather depth-resolved information that is difficult or expensive to collect by traditional means.

Dive computers do not measure temperature directly but, instead, derive this information from the requirement to thermally compensate the enclosed pressure sensor and this causes errors in how the temperature data are measured and presented.

A recent series of studies has determined methods that can correct for these recording errors in some models of dive computers, increasing the possibility of these data contributing to future oceanographic monitoring. These adjustments have been validated on large datasets of downloaded dive computer records but it is considered that the 'citizen science' potential of recreational diving can be further exploited through the development of autonomous cost-effective recording instruments based on smart technologies.

Key Words

Dive computers, seawater temperature, climate change

Dr Jeremy Mason

(Jeremy S Mason, Peter Buzzacott, Ian C Gawthrope, Neil D Banham)

Hyperbaric Medicine Unit, Fiona Stanley Hospital, Murdoch, WA

A retrospective review of divers treated for inner ear decompression sickness at Fiona Stanley Hospital Hyperbaric Medicine Unit 2014-2020

INTRODUCTION

Inner ear decompression sickness (IEDCS) is increasingly recognised in recreational diving, with the inner ear particularly vulnerable to decompression sickness in patients with a right-to-left shunt, such as is possible through a persistent (patent) foramen ovale (PFO).

AIMS

A review of patients treated for IEDCS at Fiona Stanley Hospital Hyperbaric Medicine Unit (FSH HMU) in Western Australia was performed to examine the epidemiology, risk factors for developing this condition, the treatment administered and the outcomes of this patient population.

METHODS

A retrospective review of all divers treated for IEDCS from the opening of the FSH HMU on 17th November 2014 to 31st December 2020 was performed. Patients were included if presenting with vestibular or cochlear dysfunction within 24 hours of surfacing from a dive, and excluded if demonstrating features of inner ear barotrauma.

RESULTS

There were a total of 23 IEDCS patients and 24 cases of IEDCS included for analysis, with 88% experiencing vestibular manifestations and 38% cochlear. Median dive time was 40 minutes and median maximum depth was 24.5 metres. The median time from surfacing to hyperbaric oxygen treatment (HBOT) was 22 hours. Vestibulocochlear symptoms fully resolved in 67% and complete symptom recovery was achieved in 58%. A PFO was found in 60% of patients that subsequently underwent investigation with bubble contrast echocardiography upon follow-up.

CONCLUSIONS

IEDCS occurred predominantly after non-technical repetitive air dives and ongoing symptoms and signs were often observed after HBOT. Appropriate follow-up is required given the high prevalence of PFO in these patients.

KEYWORDS:

Diving medicine; Persistent (patent) foramen ovale; Right-to-left shunt

Dr Darren Meehan

(Meehan, D, Smart DR, Lippmann J)

Department of Diving and Hyperbaric Medicine Royal Hobart Hospital, Tasmania

Determining best practice for technical assessment of hookah surface supply diving equipment during diving fatality investigation

AIMS:

This study aimed to develop a standard process and checklist for technical investigation of hookah diving equipment and apply it to Tasmanian hookah fatality investigations from the last 25 years.

METHODS:

A literature search was undertaken to identify technical reports and equipment investigations associated with diving accidents. The information was assimilated to create a process and checklist for specifically assessing the hookah apparatus. The checklist was then applied in a gap analysis of Tasmanian hookah diving fatality technical reports from 1995 to 2019.

RESULTS:

As no papers specifically describing hookah equipment technical evaluation were identified, references evaluating scuba equipment were used to create a hookah technical assessment process incorporating unique features of the hookah. Features included: owner responsibility for air quality, maintenance and function, exhaust proximity to air intake, reservoir volume, output non-return valves, line pressure, sufficiency of supply, entanglement, hose severance risk, gas supply failure and hosing attachment to the diver. Seven hookah diving deaths occurred in Tasmania (1995-2019), three had documented technical assessment. Gap analysis identified inconsistent structure between reports with variability in the case descriptors. Missing technical data included: overview of the hookah systems, accessories, weights and how the apparatus was worn by the diver, compressor suitability, assessment of hookah function, output and exhaust position relative to air intake.

CONCLUSION:

The study demonstrated a need to standardise technical reporting of hookah equipment after diving accidents. The checklist generated may serve as a resource for future hookah assessments and inform strategies for preventing future hookah accidents.

KEYWORDS:

Diving equipment, surface supply breathing apparatus, hookah compressors, diving deaths, investigations.

Dr Graham Stevens

(Stevens G, Smart D, Cox M)

Department of Diving and Hyperbaric Medicine Royal Hobart Hospital, Tasmania

The influence of wetsuit thickness (7mm and over) on lung function in scuba divers.

Tasmanian divers undertake their activities in temperate/cold waters in wetsuits ≥7mm thickness. A detrimental effect of tropical thickness wetsuits on lung function in fit 'active' divers has previously been demonstrated. The negative effect of thicker wet suits used in colder waters had not been previously studied.

AIMS:

The aim of this study was to investigate whether (≥ 7mm) wetsuits worn by Tasmanian divers affected lung function, primarily the forced vital capacity (FVC) and forced expiratory volume, one second (FEV1). Secondary aims were to assess the influence of body mass index (BMI), age, sex, and recreational versus occupational status of the diver on lung function.

METHODS: Volunteer active divers were recruited from recreational dive clubs and the occupational diving industry. After confirming fitness and that divers were currently active, lung function testing was performed with and without the divers' usual wet suits, in a controlled dry environment. Suits were of varying thickness, but all were ≥7mm thickness.

RESULTS:

All divers had significantly reduced lung function when wearing ≥7mm wetsuits, for all wetsuit thicknesses (mean thickness 10.6mm (females), 11.9mm (males), range 7-18mm). Recreational divers had greater decrements in lung function (-7% FVC and -5% FEV1), compared to occupational divers (-3% FVC, -3% FEV1). Males' lung function declined (-4% FVC and -4% FEV1), whereas females declined (-7% FVC and – 6% FEV1). Female recreational divers had greatest negative impact from thicker wetsuits (up to 15% decline in FVC), and this group also demonstrated an inverse relationship between increasing wetsuit thickness and declining lung function.

CONCLUSIONS:

Wearing thicker wet suits aids in thermal control of temperate water diving but this study suggests it has negative effects on respiratory function. The thicker wetsuits used in Tasmania have greater negative effects on lung function than demonstrated in previous studies of recreational divers.

KEY WORDS: Lung function, fitness to dive, pulmonary function

Table: Mean reductions of FVC and FEV_1 according to diver group

Diver Group	*Mean reduction FVC*			*Mean Reduction FEV_1*		
	litres	*%*	*P value*	*litres*	*%*	*P value*
All	0.251	5	<0.0001	0.161	4	<0.0001
Occupational	0.140	3	0.0044	0.101	3	0.0068
Recreational	0.345	7	0.0017	0.206	5	0.0004
Male	0.245	4	0.0019	0.158	4	0.0004
Female	0.258	7	0.0126	0.165	6	0.0052

Prof David Smart

How to undertake diving and hyperbaric medicine training in Australia and New Zealand

INTRODUCTION

Diving and hyperbaric medicine is a niche medical discipline that overlaps multiple acute medical specialities including general practice and occupational medicine. When the author graduated as a doctor in the early 1980's, there was no career path for the for the field. There were however, multiple short courses in the field available for doctors. The South Pacific Underwater Medicine Society (SPUMS) was the glue which bonded doctors who were interested in the field. SPUMS members have been active in supporting, developing, educating and researching the filed for over 50 years, and the Diploma of Diving and Hyperbaric Medicine (DipDHM, established by SPUMS in 1974), is one of the oldest qualifications of its type in Australia and New Zealand. Despite the existence of the SPUMS DipDHM, until recently, a clear path for speciality practice in Diving and Hyperbaric Medicine has been lacking.

DISCUSSION

There are multiple needs for provision of medical services in the field of diving and hyperbaric medicine (the following list is by no means complete):

(1) Diver medical health risk assessments and health monitoring for recreational and occupational divers
(2) Emergency treatment and retrieval of injured divers
(3) Recompression treatment for decompression sickness and arterial gas embolism
(4) Provision of medical treatment of patients who benefit from hyperbaric oxygen treatment
(5) Leadership of clinical teams in teaching hospital comprehensive hyperbaric facilities
(6) Education and running of courses to teach doctors the fundamentals of diver medical risk assessments
(7) Educated input into policy regarding diver health and ANZ Standards
(8) Educated input into evidence-based indications for hyperbaric medical treatment
(9) Research in the fields of Diving and Hyperbaric Medicine

As it currently stands, the following educational opportunities exist in the field in Australia and New Zealand. For diving medical health risk assessments, there are two, two-week courses available that have input by SPUMS members. The Australian and New Zealand Hyperbaric Medicine Group (ANZHMG) introductory course in diving and hyperbaric medicine, run annually in February (currently hosted by Fiona Stanley Hospital, WA), and the Medical Officers underwater Medicine Course (twice yearly in March and October), hosted by the Submarine and Underwater Medicine Unit, HMAS Penguin, NSW). In order to perform occupational diving medicals, SPUMS considers that a two-week course (70 hours) is the minimum level of knowledge required. SPUMS members who have completed these courses can choose to be listed on the SPUMS diving doctor list. Generally both courses would be recommended for doctors who regularly undertake occupational medicals. Most of the hyperbaric facilities in Australia and New Zealand also have 6- and 12-month clinical attachments for registrars to gain additional experience in the field.

More advance training in the field is now overseen by the Australian and New Zealand college of Anaesthetists, through their Diploma of Advanced Diving and Hyperbaric Medicine, which also incorporates the SPUMS DipDHM as an interim qualification. This training can be accessed by any doctor who is within 12 months of their fellowship (any college), or already has their speciality fellowship.

The pathway for the ANZCA DipAdvDHM is summarised below IN TABLE 1.

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TABLE 1

	Entry	6 months	12 months
Qualification: Basic medical degree +	Advanced trainee FANZCA FACEM FRACGP Other fellowship	SPUMS DipDHM (Fellowship not a requirement for SPUMS DipDHM)	ANZCA DipAdvDHM Must be in Fellowship year or post fellowship. Cannot receive award unless fellowship completed
Course work	Two-week course diving medicine or hyperbaric medicine	Either two-week course Diving and or Hyperbaric Medicine accepted by SPUMS/ANZCA, preferably early in term	Attend reciprocal two-week course eg Diving or Hyperbaric Medicine
Additional requirements	Prospective registration with ANZCA and SPUMS Current ALS	Complete research project. (marked by peer review)	Completion of ANZCA Training and documentation requirements (accepts SPUMS DipDHM research) Pass ANZCA written and viva exams
Practical experience		Six months total at accredited hyperbaric facility	12 Months total at accredited hyperbaric facility

Dr Tobias Cibis

Joint Research Centre in AI for Health and Wellness, Faculty of Engineering and IT, University of Technology Sydney
Joint Research Centre in AI for Health and Wellness, Faculty of Business and IT,OntarioTech University, Oshawa, Canada
(Tobias Cibis, Michael Bennett, Glen Hawkins, Douglas Falconer, Rebecca Byrne, Carolyn McGregor, Paul Kennedy)

Computational simulation of vascular volume changes during scuba diving.

One predominant physiological adjustment to scuba diving exposure is the blood volume redistribution from peripheral regions to the body centre. Although the volume shifts are observable, the causing dynamics remain unclear. Mathematical modelling can be used to quantitatively describe the interactions between the physiology and underwater environment. This enables the simulation and prediction of physiological volume changes.

AIMS

Development of a mathematical model to analyse the dynamic interactions between vascular blood volume shifts and increased ambient pressure exposure during scuba diving. We are expecting to generate new knowledge and implications to improve future diving safety

METHODS

The mathematical model is based on the concept of lumped-compartment dynamics describing vascular blood flow, pressure and volume. Underwater environmental forces, ambient pressure and buoyancy are added to the physiologic system. All dynamics are formulated as ordinary differential equations to describe the evolution of the system over time. The overall model now simulates the physiologic changes due to changes in environmental forces.
Subject study collected data including blood pressure, total peripheral vascular resistance, and ECG, is used to evaluate the simulated outcomes of the mathematical model.

RESULTS

The model simulates the interactions between physiology and environments and predicts vascular volume changes in a reasonable physiologic range matching theoretical and observable settings.

CONCLUSIONS

The mathematical model can be used to study different theories and scenarios of environmental forces, impacting the physiologic dynamics of peripheral vascular volume shifts. The model can be extended to include further physiological dynamics such as central nervous system tonus and others.

KEYWORDS

Scuba diving, computer simulation, vascular physiology

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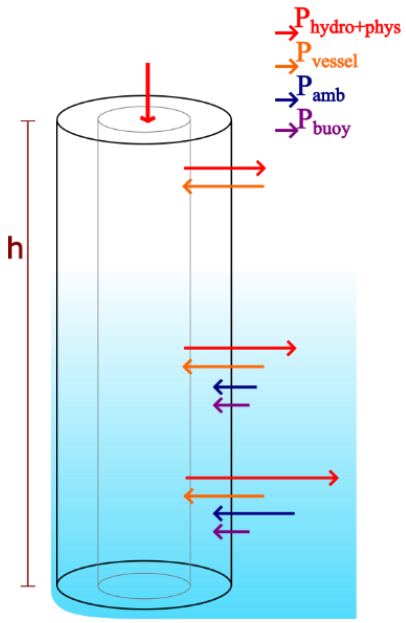

Figure 1. Depiction of the model concept. The vascular vessel (black) is exposed to the combination of multiple pressure components consisting of physiological and environmental pressures. Submersion (blue shaded background) added environmental ambient pressure and buoyancy effects to the physiologic system.

Dr San Clarke

Gower Wilson Memorial Hospital/Lord Howe Island Family Practice

Pulmonary oedema in snorkellers – four recent cases

INTRODUCTION

Lord Howe Island has seen 4 cases of acute pulmonary oedema in snorkelers in the past 10 months.

The presentation will begin with a brief description of the health service here and the demographics of the general population and, specifically, the typical snorkelling community.

METHODS

This presentation will outline the history, examination, and management of each case with diagnostic data used, outcomes, and follow-up details. I will reflect on the evolution of my practice as a result of these presentations.

DISCUSSION

A short discussion on the observed commonalities in the presented cases, and how they compare with the existing body of data, will hopefully provide a useful base for considering the apparent over-representation of this pathology in a small tourist population, and how our medical community involved in the care of those in the water can be shaped and improved by this knowledge.

KEY WORDS

Pulmonary oedema; subtropical water; snorkelling

Dr Sarah Crawford

HCA Healthcare/USF Morsani College of Medicine GME Programs, Florida USA

Dive team investigations: A quality improvement project on emergent management of diving injuries.

INTRODUCTION

There are approximately 3 million people who engage in scuba diving in the US each year, and more than 9 million people who identify themselves as recreational scuba divers. Divers Alert Network identifies approximately 1000 diving-related injuries annually, with 10% of those being fatal.

AIMS/METHODS

This QI project will discuss the emergent management of an unresponsive diver along with common causes of scuba diving injuries and their treatment. Through the development of an injured scuba diver medical alert form, efforts to expedite medical care of injured divers and decrease diving casualties will be addressed. Goals of this project include educating more divers and medical personnel on emergent management of diving injuries and prevention of scuba-related injuries and fatalities.

RESULTS

An injured scuba diver medical alert form may enable divers to relay important information regarding the incident to EMS. This information will ultimately make its way into the hands of the medical facility in which the diver is transported. The ultimate goal is to expedite medical care of injured divers.

CONCLUSIONS

The injured scuba diver medical alert form was designed with the idea that most scuba divers have a rescue certification and basic medical knowledge. It is ideal that one stabilize the patient, obtain vitals, and note important physical exam findings for EMS. Afterwards they can collect the timeline of events, medical history, check equipment, and obtain the diving profile. Given the nature of scuba diving related injuries, suggested lab/imaging studies and DAN's contact information are provided.

PUBLIC HEALTH IMPLICATIONS

It is with hope that by keeping the injured scuba diver medical alert form handy while scuba diving, more diving-relating injuries can be properly treated in a time-efficient manner. By educating more divers, emergency responders, and physicians about emergent management of diving injuries, divers may experience expedited transport to the proper medical facility capable of hyperbaric treatment.

KEY WORDS

Scuba diving, diving injuries, prevention

Dr Martin Sayer

Tritonia Scientific, Oban Scotalnd

(Dawson K, Mogg AOM, Sayer MDJ)

Seeing is believing: from heat damaged coral reefs to problem wounds

3D photogrammetry, is a computer-based technique that generates highly detailed three-dimensional point-cloud models using standard photo- or videographic source material obtained relatively simply and quickly. It is a technique that is used in many forms of surveying and monitoring mainly because of rapid collation of data related to highly complex structures, and its cost-effectiveness.

The technique is employed widely underwater and our recent studies on coral reefs have used photogrammetry to measure physical structure of damaged and healthy systems, and monitor coral recovery and movement.

When using hyperbaric oxygen for the treatment of chronic wounds, measurement of the wound is important when monitoring progress and/or predicting outcome. Getting good quantitative data can be difficult because of the uneven and three-dimensional complexity of many wounds. A range of methodologies are used to measure wounds but many have variable accuracy and some rely on expensive hard- and softwares. The present study assessed the potential for employing standard photogrammetry techniques in wound care.

Three artificial wounds were photographed and videoed using a digital camera and the camera-phone on a standard smart-phone. Six members of staff, who were blinded from any of the results, were given the same set of basic methodology instructions, and received no training; a seventh was unblinded and acted as the reference. The wounds were photographed using two different angle and pattern techniques. The videos replicated both photography methods but as continuous streams.

3D computer models of the wounds were generated using the programme Agisoft MetaShape and the following measurements of the wounds were made: surface area (planar); surface area (3D); perimeter length; volume; and maximum depth.

Comparisons were made between the metrics generated between hardware (camera v smartphone), method type (photo v video), and image angle (90° v 45°). Precision within the staff collating the imagery was also analysed.

KEY WORDS

3D photogrammetry, coral reefs, HBOT problem wounds

Dr Adam Barnett

Negative human-shark interactions

SUMMARY

Negative Human-shark interactions include both direct interactions (e.g., animals biting people) and indirect interactions, e.g., Depredation, where a shark partially or completely consumes a fish caught in fishing gear, before it can be retrieved to the fishing vessel. Shark depredation occurs in many fisheries, leading to economic, social and biological impacts. Since 2018, Adam/Biopixel Oceans Foundation has been commissioned by the Queensland Government to investigate the prevalence and behaviour of sharks at locations where shark bites occurred and undertake research to quantify depredation rates and identify the species of sharks responsible for depredation in Queensland. This talk will focus on the research to date.

KEYWORDS

Sharks, shark bites, depredation

Monday 5th June 2023 - Day 2 Abstracts

Prof Ove Hoegh-Guldberg

University of Queensland

Solving climate change: Does the ocean always have to be the victim?

Climate change represent one of the greatest challenges facing natural and human systems. While recognising the scientifically evidence is important, it can lead to increased apathy and inaction. In the case of the ocean, it is often assumed that it is the victim and never the solution. But this does not have to be the situation. Here, an ocean expert group was asked to develop a “no-regrets to-do list” of ocean-based climate solutions that could be implemented today. The answer was very encouraging with five areas of ocean solution being identified: (1) renewable energy; (2) shipping and transport; (3) protection and restoration of coastal and marine ecosystems; (4) fisheries, aquaculture, and shifting diets; and (5) carbon storage in the seabed. While these actions are ambitious, we argue that they are vitally important for closing the emissions gap and achieving other co-benefits. The paper highlights the required research, technology, and policy developments for each area of action and emphasizes the urgency of setting these actions in motion. In terms of providing the solution, renewable energy from the ocean has the greatest potential for closing the gap between current emission cuts and those required to restrict global temperatures to no-more than 1.5°C above the pre-industrial period. The shipping industry was also impactful with ready-to-go measures such as energy efficiency improvements and shifting to low-carbon fuels (e.g., hydrogen). The other options were also likely to be effective included protecting and restoring coastal and marine ecosystems can sequester carbon and shifting towards sustainable fisheries, aquaculture, and diets can reduce emissions and support food security. Finally, carbon storage in the seabed has significant potential but requires further research and policy development given our relatively poor understanding of the deep ocean impacts.

Reference: Hoegh-Guldberg, Ove, Daniela Jacob, M. Bindi, S. Brown, I. Camilloni, A. Diedhiou, R. Djalante et al. 2019, The human imperative of stabilizing global climate change at 1.5°C (Science, DOI: 10.1126/science.aaw6974)

KEYWORDS

Climate Change, solutions, renewable energy

Prof Craig Johnson

University of Tasmania, Institute of Marine and Antarctic Studies

Responding to impacts of climate change on Australia's great Southern Reef (GSR)

Given the global scale of climate change and the need for a global response to dramatically and quickly reduce greenhouse gas emissions, many people – particularly young people – report feeling helpless to respond meaningfully to help mitigate the environmental impacts climate change. However, research is developing meaningful responses to ameliorate the effects of climate change on the Great Southern Reef.

In this talk I will introduce recent (and ongoing) research on kelp bed restoration in Australia, including selective breeding of family lines that show tolerance of warm water.

One example is the response to extensive loss of productive kelp-bed habitat in eastern Victoria and Tasmania as a result of destructive overgrazing by the range-extending long-spined sea urchin, which forms urchin 'barrens' habitat largely devoid of seaweeds. The formation of urchin barrens is a particularly difficult problem because, once formed, it is necessary to remove virtually all urchins from barrens to enable recovery of kelp and other seaweeds. However, tactical culling of urchins in Victoria and development of an urchin fishery in Tasmania have led to successful restoration of kelp in some areas. Use of 'smart' autonomous robots to identify and kill urchins is emerging as a promising means to remove (i.e. kill) urchins in deeper water where restricted dive times greatly limit the efficacy of manual clearing or collecting by divers.

Arguably the greatest impediment to kelp bed restoration is the challenge of scale. I will briefly outline a current research project that is investigating the possibility of conservation 'spinoffs' from commercial kelp mariculture that may assist restoration of giant kelp at meaningful scales in Tasmania. An emerging focus on natural capital as a commercial commodity, including means of natural capital accounting and trading systems that value natural capital, means that commercial support for these kinds of efforts is increasing.

KEY WORDS

Great Southern Reef, climate change, ocean warming

Prof Jamie Seymour

Marine Envenomation – an overview

Within the marine environment, there is a plethora of venomous animals ranging from small inconspicuous plankton, brightly coloured corals, highly conspicuous jellyfish to larger uniquely camouflaged fish. Hand in hand with this variation is a similar spectrum of what first aid should be used for which type of envenoming, many with little or no evidence to back up the technique. I will outline the more common venomous organisms that humans come in contact with in the marine environment, what the toxins in these organisms are used for and what effects they have on an envenomed victim. For each species, we will discuss the first aid presently prescribed for the patient and then dissect those protocols to see if they are correct or if there are better ways to treat victims, based on evidence-based medicine rather than preconceived ideas.

Prof David Smart

Marine Food toxins – an overview

INTRODUCTION

Marine food toxins are increasingly recognised following consumption of fish. There have been more than 100 toxins identified, which fall into four major groups. The clinical syndromes they produce can mimic food allergies, infections and gastroenteritis, and misdiagnosis is common.

AIMS

To provide a review of marine food toxins, clinical toxicity syndromes and management.

DISCUSSION

Marine toxins fall into 4 major groups; ciguatoxin, paralytic shellfish toxins, tetrodotoxin and scombrotoxin. The sources of the toxins are fascinating; including bacteria, diatoms and dinoflagellates, which may become prominent during harmful algal blooms (HAB's), and also from partial spoilage of fish (scombrotoxins). Paralytic shellfish toxins have five subgroups; paralytic, neurotoxic, diarrhetic, encephalopathic and azaspiracid poisoning. The toxins are heat stable and not removed by cooking. There is considerable overlap between the clinical syndromes produced after toxin consumption, which is summarised in table 1. The key factor in diagnosis is consumption of fish. Outbreaks among multiple people may point to a toxic causation, and measurement of toxins in left-over fish provides corroborating evidence. Management of poisoning is usually supportive, but may require full critical acre management and ventilation.

CONCLUSIONS

Marine food toxins are found throughout the world. They usually originate from micro-organisms such as dinoflagellates and bacteria. They are not destroyed by cooking. Poisoning should be suspected when unusual neurological symptoms occur after consuming fish. Multiple casualties provide a clue to food as the source of the illness event. Treatment is mainly supportive but may require intensive care.

TABLE 1 – CLINICAL FEATURES OF MARINE FOOD POISONING

CLINICAL FEATURE	Ciguatera	Paralytic Shellfish Poisoning	Neurotoxic Shellfish Poisoning	Diarrhetic Shellfish Poisoning	Encephalo-pathic shellfish poisoining	Tetrodotoxin	Scombroid
GIT Upset	++	+	+	+++	++	++	+++
Neurologic	++	++	+++	No	+++	Yes	No
Paralysis	No	++	No	No	No	Yes	No
Cognitive	Late +	Headache	Headache	No	+++	No	Headache
Other – skin/resp CVS	CVS	No	Brady cardia	CVS shock	Seizures	No	Yes +++

NOTES

Ciguatera has propensity for reversal of hot/cold sensation and recurrence with alcohol

Prof Ove Hoegh-Guldberg

Prof Craig Johnson

Prof David Smart

Dr Sarah Lockley

Panel Discussion – Is the Ocean becoming a more dangerous place?

The ocean has been a constant force for millennia, shaping the planet's climate and providing a home for countless species of marine life. However, in recent years, the ocean has been changing rapidly due to human activities, and this raises the question of whether it is becoming a more dangerous place to visit. One of the most visible effects of climate change on the ocean is sea level rise, which is caused by the melting of glaciers and ice caps. This can lead to flooding in coastal areas and damage to infrastructure, including buildings and roads. Additionally, as sea levels rise, storm surges can become more severe, leading to more destructive storms that can threaten the lives of both people and marine life. In addition to sea level rise, ocean currents are becoming more intense due to changes in global weather patterns. This can cause changes in temperature, salinity, and nutrient levels, which can have serious ramifications for marine life, including introduced species such as the lionfish in the Caribbean, which can disrupt local ecosystems. Moreover, harmful algal blooms are becoming more frequent and widespread, posing a risk to both marine life and human health. These blooms can lead to fish kills, shellfish poisoning, and even respiratory problems in humans who encounter the affected water. All of these factors combined suggest that the ocean is indeed becoming a more dangerous place to visit. For scuba divers and other visitors, it is important to be aware of these risks and take appropriate precautions to stay safe. Additionally, it is crucial that we take steps to mitigate climate change and reduce our impact on the ocean to ensure that it remains a healthy and vibrant ecosystem for generations to come.

KEY WORDS

Danger, ocean, changes

Prof Jamie Seymour

Spread of dangerous marine species in changing times

Global Warming, resulting in increasing water temperatures worldwide is a fact of life. We are all well aware that increased sea temperatures have placed coral reefs globally under enormous pressure resulting in bleaching events and often in mass coral die offs. However, these increased water temperatures have not had negative effects on all marine organisms. In this talk, we will discuss the positive effects that increased sea temperatures have had on the distribution and seasonality of certain types of box jellyfish, specifically irukandji jellyfish and the big box jellyfish, *Chironex fleckeri*. I will then outline what effects this is liable to have on the way in which people use the marine waters for entertainment and tourism.

KEYWORDS

Climate change, ocean warming, jellyfish distribution

Dr Nickolas Bennett

Emergency Department, Cairns Hospital, Royal Flying Doctor Service (Queensland Section), LifeFlight Retrieval Medicine

From ship to shore: a narrative review of aeromedical retrievals from the northern Great Barrier Reef, Queensland, Australia

INTRODUCTION

The Great Barrier Reef (GBR) stretches approximately 2,300 km along the coast of Queensland, Australia. The world's largest coral ecosystem attracts millions of visitors a year, many of whom participate in diving and snorkelling. Much of this occurs on the GBR's northern sections offshore and north of Cairns.1

Although diving and snorkelling on the GBR are relatively safe, the volume of activity results in a significant number of associated fatalities.2 While the deaths have been examined in the medical literature, little has been published on the morbidity connected with diving, snorkelling and other recreational activity on the GBR and the current practice of medical evacuation.

AIMS

To describe the nature and logistics of medical evacuations resulting from recreational activity on the northern GBR, with an emphasis on the aeromedical retrieval of divers and snorkellers.

METHODS

This review is based on relevant medical and grey literature and the experiences of retrieval personnel including the author. Several cases are used to highlight selected issues and challenges.

RESULTS

Snorkellers require medical evacuation from the northern GBR more often than divers, generally for non-fatal drowning, though immersion pulmonary oedema is underdiagnosed. Suspected decompression illness is uncommon and most divers are retrieved to Cairns, where there is no hyperbaric chamber, rather than Townsville. Other reasons for retrieval include trauma, marine envenomation and unrelated medical conditions.

Medical evacuation from the northern GBR almost invariably involves aeromedical retrieval by helicopter. Although these cases account for a small proportion of all retrievals, they are nevertheless regular occurrences and usually require the winching of aeromedical personnel and patients.

CONCLUSIONS

Diving and snorkelling are generally safe activities on the GBR but aeromedical retrieval is occasionally required for associated or incidental conditions. This usually involves helicopter winching which poses risks and challenges, some of which are unique to the environment.

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KEYWORDS

Aeromedical retrieval, Great Barrier Reef, snorkelling

Dr John Lippmann

Diving Deaths in Queensland

INTRODUCTION

This study examined all known diving-related fatalities in Queensland from 2000 to 2019 to determine likely causes and potential countermeasures.

METHODS

Data were extracted from the Australasian Diving Safety Foundation fatality database, including previously published reports. The National Coronial Information System was searched to identify diving-related deaths in Queensland for 2014–2019 and data were extracted, analysed, and combined with previously published data covering the period 2000-2013. Descriptive statistics and parametric and non-parametric tests were used to analyse these data.

RESULTS

There were 166 snorkelling and 41 scuba victims identified with median ages of 59 and 49 years, respectively, and 83% of snorkel and 64% of scuba victims being males. One quarter of snorkel and 40% of scuba victims were obese. Two-thirds of the snorkellers and three quarters of scuba divers were overseas tourists. Contributory predisposing health conditions were identified in 61% of snorkel and 50% of scuba victims. Nine scuba victims died on their first dive.

CONCLUSIONS

The increase in snorkelling deaths likely reflects increased participation, higher age, and poorer health. The main disabling condition in both cohorts was cardiac-related. Pre-existing health conditions, poor skills, inexperience, poor planning, supervision shortcomings and lack of effective buddy systems featured in both cohorts, and apnoeic hypoxia in breath-hold divers. Suggested countermeasures include improved education on the importance of health and fitness for safe diving and snorkelling, increased emphasis on an honest and accurate pre-activity health declaration and subsequent implementation of appropriate risk mitigation strategies, improved supervision, better buddy pairing, and on-going education on the hazards of extended apnoea.

KEY WORDS

Diving Deaths, causation, prevention

Dr Jenny Sisson

CMO Travel Doctor TMVC Canberra 2600

Travelling to Dive at one of the Premier Diving Locations in the World? Preparation to Reduce Health Risks.

INTRODUCTION

Many travel on diving holidays annually but many may not consider the health risk of these locations and what can be done before leaving to reduce risk.

AIMS

Consider information required from an individual prior to a travel consultation.
Describe the division of travel vaccines into routine, recommended and required.
Understand which vaccinations may be recommended for common diving destinations.
Be aware of other risks such as food and water borne and insect borne disease and how to prevent these issues and consideration of kit requirements for management of common issues.

METHODS

The presentation is a synopsis of considerations in terms of travel medicine if our audience members are seeing patients heading off to visit common dive sites around the world. I have considered 10 different dive sites from the Pacific, Eastern Med, central and South America, as an example. I have worked through the information required from an individual to fully assess the risk of the travel. I have guided through vaccines from routine (highlighting measles in the Pacific, polio in Egypt), recommended (Hep A, typhoid in most destinations) and required (YF Tobago and Galapagos). Consideration is given to food and water borne disease (Mexico and most others) and insect borne disease (Philippines and many others).

RESULTS

Following the presentation the participants should have a good overview of risk of disease when assessing such travellers and be confident in recommendations for reducing risk of food and water borne and insect borne disease as well as vaccinations that should be considered.

CONCLUSIONS

Participants should take away the message that if they are consulting individuals travelling to international dive sites that they need to think about other risks to the individual in addition to preparation for the diving itself.

KEY WORDS

Travel medicine, diving

Dr Judi Lowe

Southern Cross University, Lismore, New South Wales 2480, Australia

ABSTRACT

Dive tourism co-locates with marine protected area (MPAs) in the tropics and is often cited for its capacity to create livelihoods. However, dive operators can fail to recognise the traditional marine tenure of local fishers and their communities, restricting access to the coral reef resources upon which livelihoods are based. Conflict arises, making local fishers and communities enemies of conservation and increases destructive fishing around dive sites. Currently, it is not known where dive operators recognise tenure, if there is a relationship between recognising tenure and providing livelihoods, or if improved livelihoods have any effect on decreasing destructive fishing. To test this I did a quantitative survey of dive operators from 100 less developed countries. I measured associations between conflict and recognising tenure, recognising tenure and providing livelihoods, and providing livelihoods and decreases in 12 types of destructive fishing. Results show that dive operators recognise tenure only where there is conflict with fishers. When they recognise tenure, dive operators provide livelihoods that decrease nine types of destructive fishing; killing turtles, poaching in MPAs and no-take zones, taking live reef fish and lobster, shark fishing, killing whale sharks, shark finning, the use of fine gauge nets, the taking of aquarium fish, and spear fishing. The strongest decreases occur when dive operators have a high percentage of staff who are local fishers, frequently provide health and school community benefit programs, frequently train and employ local certified dive professionals, frequently employ locals in high skilled roles, and frequently lease coastal land from local communities. There is no association between employing locals in low skilled roles and decreasing destructive fishing. Understanding the relationships between tenure, livelihoods and destructive fishing provides valuable information to dive operators, MPA managers, governments and dive tourists in conserving coral reef resources. Dive operators are encouraged to take the novel approach of first recognising traditional marine tenure and improving livelihoods. This will decrease destructive fishing around dive sites and increase both economic and environmental sustainability.

KEY WORDS

Dive tourism; coral reefs; livelihoods; conflict; traditional marine tenure; destructive fishing

Dr Tobias Cibis

Biomedical Underwater data analytics in a controllable underwater environment

INTRODUCTION

As commercial diving operations become more sophisticated and can allow divers to be immersed for long periods while working in a physically demanding environment, so does the need to be able to identify physiological signs of stress outside the 'normal' parameters becomes more acute. This project explores methods to acquire biomedical data from an immersed diver to allow evaluation of physiological changes as a result to underwater exposure.

AIMS

Collection and evaluation of biomedical parameters during underwater exposure to determine the change in physiology due to scuba diving.

The study helps to generate knowledge about physiological mechanisms associated with underwater exposure focusing on hemodynamic cardiovascular effects. It contributes to improve diving safety for future divers.

METHODS

The study comprises data acquisition of physiological parameters, the design of a wet-chamber, and study protocol.

Divers equipped with an electrocardiogram, intra-arterial blood pressure canula, respiration belt, thermometer, and dive computer. The wet-chamber laboratory consists of a pool placed inside a hyperbaric vessel at the Department of Diving and Hyperbaric Medicine, Prince of Wales Hospital Sydney.

Study protocol consisting of a baseline phase, diving phase, and recovery phase. While the baseline and recovery phase are used to obtain physiological measures at rest, the diving phase contains measurements at diving activity and slight exercise.

Descriptive statistics are used to analyse the change in parameter values during the different study phases.

RESULTS

The constructed wet-chamber laboratory is the state-of-the-art laboratory for diving medicine and technology research. The study protocol and related biomedical monitoring technologies are appropriate for the type of research in underwater physiologic data collection. The full study has received ethics approval (2022/ETH02748).

CONCLUSIONS

The proposed study has the potential to improve our understanding of the effects of physiological diving responses and to develop innovative experimental designs to investigate physiological and technological research in adverse conditions.

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KEY WORDS

Scuba diving, physiology, monitoring

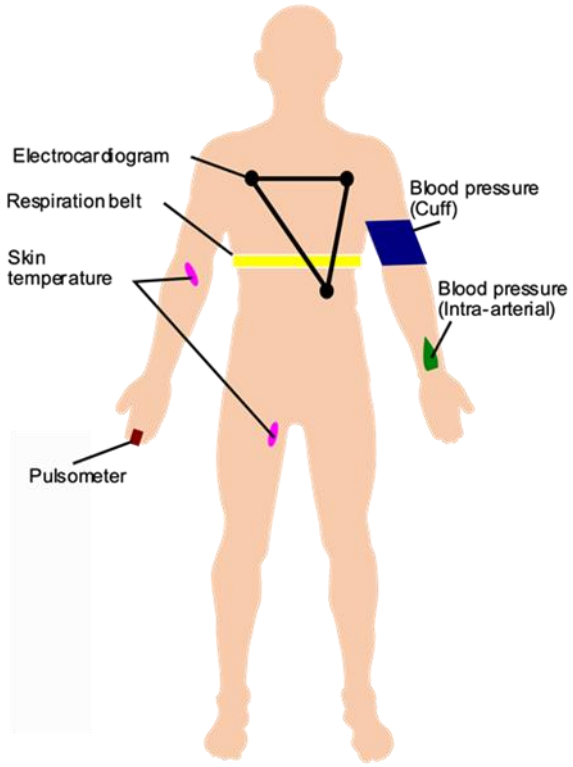

Figure 1. Physiological monitoring equipment attached to the diver. ECG (black) for analysis of HR, HRV, QRS-topology, IABP (green) for beat-to-beat BP measurement, respiration belt (yellow) to measure respiration rate, and body skin temperature (pink).

Dr Neil Banham

A prospective single-blind randomised clinical trial comparing two treatment tables for the initial management of mild decompression sickness

(Philippa Hawkings, Ian Gawthrope)

INTRODUCTION

Limited evidence suggests that shorter recompression schedules may be as efficacious as the US Navy Treatment Table 6 (USN TT6) for treatment of milder presentations of decompression sickness (DCS). This study aimed to determine if divers with mild DCS could be effectively treated with a shorter chamber treatment table.

METHODS

All patients presenting to the Fremantle Hospital Hyperbaric Medicine Unit with suspected DCS were assessed to be included in the trial. Participants with mild DCS were randomly allocated to receive recompression in a monoplace chamber via either a modified USN TT6 (TT6m) or a shorter, custom treatment table (FH01). The objective of this study was to compare FH01 with TT6m for the initial treatment of mild DCS, with the primary outcome being the number of treatments required until resolution or no further improvement (plateau).

RESULTS

There were 41 cases of DCS included in the study, 21 TT6m and 20 FH01. Two patients allocated to FH01 were moved to TT6m mid-treatment due to worsening symptoms (as per protocol), and two TT6m required extensions. There was no difference between treatment arms in patient age or sex. The median total number of treatments till symptom resolution was 1 (IQR 1-1) for FH01 and 2 (IQR 1-2) for TT6m (P = 0.01). More patients in the FH01 arm (n = 17/20, 85%) showed complete symptom resolution after the initial treatment, versus 8/21 (38%) for TT6m (P = 0.003). Both FH01 and TT6m had similar overall outcomes, with 19/20 and 20/21 respectively asymptomatic at the completion of their final treatment (P = 0.97). In all cases where two-week follow-up contact was made, (n = 14 FH01 and n = 12 TT6m), patients reported maintaining full symptom resolution.

CONCLUSION

Compared with TT6m, the median total number of treatments till symptom resolution was meaningfully fewer with FH01 and the shorter oxygen treatment table more frequently resulted in complete symptom resolution after the initial treatment. There were similar patient outcomes by the time of treatment completion, and at follow-up. We conclude that FH01 appears superior to TT6m for the treatment of mild decompression sickness.

KEYWORDS

Randomised controlled trial, decompression sickness, treatment

Thursday 8th June 2023, Day 3 Abstracts

Dr Matias Nochetto

(Elizabeth Helfrich, Camilo Saraiva, James Chimiak) Divers Alert Network (DAN) Durham, NC, USA

A review of 149 DAN emergency call records involving diving minors

- **INTRODUCTION**

Minors have been scuba diving for decades, and while the initial concerns about potential long-term complications related to bone development appear to be unfounded, the incidence of scuba diving injuries among them has been poorly studied.

- **AIMS**

We aim to describe the type of injuries involving minor divers received by the Divers Alert Network Emergency hotline.

- **METHODS**

We reviewed 10,159 cases recorded in the DAN Medical Services Call Center database (MSCC) from 2014 through 2016 and identified 149 cases of injured divers younger than 18.
Records were analysed for case categorisation on the most common dive injuries.
Information about demographics, level of training, risk factors, and relevant behavioural aspects were collected when available.

- **RESULTS**

While the most common reason for the call was to rule out decompression sickness (DCS), the majority of cases pertained to ears and sinus issues. However, 15% of the dive-related
injuries involving minors had a final diagnosis of pulmonary barotrauma (PBT). While no reliable data is available on the incidence of PBT in adult divers, the authors' impression based on personal experience suggests that the number of cases of PBT in minors trends higher than in the general diving population. The narratives on some of those records often describe unmanageable levels of anxiety leading to panic.

CONCLUSIONS

Based on the results and narratives on these cases, we concluded that it is reasonable to infer that psychological immaturity, suboptimal management of adverse situations, and inadequate supervision might have led to severe injuries among these minor divers.

KEY WORDS

Pulmonary barotrauma, scuba diving, children

	Reason for call		Final Dx		
	Number of cases	% of all calls	Number of cases	% of all calls	% of diving Dx
DCS	56	38%	9	6%	9%
Respiratory (unspecified)	12	8%	-	-	-
PBT (without AGE)	-	-	13	9%	13%
PBT and AGE	6	4%	2	1%	2%
Anxiety	1	1%	3	2%	3%
ENT	39	26%	47	32%	47%
HMLI	12	8%	12	8%	12%
IPE	1	1%	0	0%	0%
Other dive related	5	3%	14	9%	14%
Caller uncertain	17	11%	-	-	-
Sub-total diving	**149**	**100%**	**100**	**68%**	**100%**
GI issues	-		18	12%	-
Musculoskeletal	-		23	15%	-
Other non-diving	-		8	5%	-
Sub-total non-diving	**-**		**49**	**32%**	**-**
Total:	**-**		**149**	**100%**	**-**

Table 3: Reason for Call vs. Final diagnosis category

SPUMS POSTION STATEMENT ON PAEDIATRIC DIVERS

Selected Source Documents for Paediatric Diver Workshop

(Recognising that there are few high-level studies on the topic)

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Dr Sarah Lockley

Balloon dilatation of the Eustacian tube – a procedure for the future

INTRODUCTION

Eustachian tube dysfunction is a common problem encountered by diving medical professionals, impacting both novice and more experienced divers. It can often lead to middle ear barotrauma and in a commercial dive setting may impact capacity to dive and diving operations, if middle or inner ear, injury results. Balloon dilatation of the Eustachian tube is a relatively new procedure, and a number of case series, in divers and aviators, have demonstrated improvement in Eustachian tube function, in appropriately selected candidates, following this procedure.

AIMS

To provide an outline of diagnosis and assessment of Eustachian tube dysfunction and current treatment options, and outcomes. In addition, to present a personal and recent experience of Eustachian tube dilatation, by the author, who suffered mild but significant Eustachian tube dysfunction, resulting in persistent diving difficulties over a number of years. An up-to-date overview of the current available evidence with regard to changes in Eustachian tube function, following Eustachian tube balloon dilatation

METHOD

Provide an overview of current literature (largely case-series), outline Eustachian tube functional assessment, and the procedure balloon dilatation of the Eustachian tube, discussing how candidate selection may impact successful outcomes.

CONCLUSIONS

A number of recent case series involving groups of divers or aviators, have demonstrated significant improvement in Eustachian tube function following the procedure of Balloon dilatation of the Eustachian tube, in appropriately selected candidates. This is a relatively low risk, minimally invasive procedure that appears to offer a curative treatment, for a previously difficult (and even impossible) problem to treat in a select group of divers.

KEYWORDS

Balloon dilatation Eustachian tube; Eustachian tube dysfunction

Prof David Smart AM (Immediate past-president, SPUMS)

A reflection on a fortunate life and career

The author has practiced Emergency Medicine, Diving and Hyperbaric Medicine in Australia since the 1980's and had the privilege of pioneering two previously non-existent medical specialties. This presentation is an opportunity to reflect on achievements, compare past and present and to document successful career and life survival strategies including planning for and actioning retirement.

A Tribute to Professor Mike Bennett AM

This session will provide a tribute to Professor Mike Bennett, following his sudden death in April. SPUMS members and colleagues in the global diving and hyperbaric medicine community are devastated. Mike was a giant in the field world-wide and his early death has left a gaping hole in our hearts. A life-member of SPUMS, Mike contributed enormously to SPUMS, teaching and the science of Diving and Hyperbaric Medicine, and its credibility as a speciality. His incisive mind, commitment, loyalty, teaching research, sociability and sense of humour will be sadly missed.

The following is Professor Bennett's Life Membership citation from SPUMS:

Professor Michael H Bennett, MBBS(UNSW), DA(Lond),
MM (Clin Epi) (Syd), FFARCSI(Dublin), FANZCA, MD(UNSW), ANZCA DipAdvDHM

Mike was the Academic Head of the Department of Anaesthesia and a Senior Staff Specialist in diving and hyperbaric medicine at the Prince of Wales Hospital (POWH) and Conjoint Professor in the Faculty of Medicine, University of New South Wales in Sydney, Australia. He graduated from the University of New South Wales (UNSW) in 1979 and spent his early post-graduate training at the Prince Henry/Prince of Wales hospitals before undertaking training in anaesthesia in the UK (and no doubt drank a pint or two of Guinness whilst sitting his Irish anaesthesia fellowship!). He returned to Sydney in 1990 as a retrieval specialist on the Lifesaving Helicopter and here developed an interest in both diving and hyperbaric medicine (DHM). He also had a strong interest in clinical epidemiology and was an experienced clinician. Mike mentored numerous registrars in hyperbaric medicine, supervising many SPUMS Diploma projects in the POWH unit.

Since 2004 he was highly involved in the teaching of evidence-based medicine within the Medical Faculty at UNSW and in 2005 was appointed co-director of the Quality Medical Practice Program there. Mike was the convenor of the Australia and New Zealand Hyperbaric Medicine Group (ANZHMG) Introductory Course in DHM from its inception in 1999 to 2014. He contributed to most DHM short courses conducted in Australia. Mike was Chair of the Australian and New Zealand College of Anaesthetists (ANZCA) DHM subcommittee, a senior examiner for the ANZCA Diploma of Advanced DHM and Chair of the ANZCA Scholar Role subcommittee. In 2002 he was the recipient of the Behnke Award for outstanding scientific achievement from the Undersea and Hyperbaric Medical Society (USA) and was a past Vice-President of the UHMS.

With respect to research, Mike contributed to a number of textbooks, most importantly co-writing the chapter on DHM in *Harrison's Principles of Internal Medicine*. He had about 200 published papers, the majority in the peer-reviewed literature. His MD thesis, *the evidence basis of diving and hyperbaric medicine – a synthesis of the high-level clinical evidence with meta-analysis*, was accepted by the UNSW in 2006. Perhaps his most important contribution to DHM was his involvement as co-author of a series of *Cochrane Reviews* on the role of hyperbaric oxygen treatment in 14 conditions, both acute and chronic. Mike summarised his broad research areas as clinical research, epidemiology, evidence-based medicine and biostatistics.

Where SPUMS is concerned, Mike was a member of the Executive Committee since 2001, as President from 2008 to 2014 and then Past President, retiring from this post in 2019. He facilitated SPUMS and EUBS coming together as joint publishers of *Diving and Hyperbaric Medicine (DHM)*. Mike chaired the ANZHMG, a sub-committee of SPUMS, for a number of years and the SPUMS/EUBS Journal Governance Committee, set up in 2015 to help guide the policies and management of the societies' journal. Mike's academic support of our journal, spanning a quarter century, was outstanding, with over 50 published articles on a wide range of topics. As Editor of *DHM* from 2002 to 2018, I frequently sought his advice and support – always willingly given and invariably constructive. Mike's first SPUMS ASM was in Rabaul in 1994 and he attended most until 2019. He also acted as the Scientific Convenor of 6 SPUMS ASMs, including as Chair of the Tricon Scientific Committee in 2015 and 2018.

Mike was an international giant in diving and hyperbaric medicine. I know of no member of SPUMS more deserving than Michael H Bennett to receive Life Membership and I heartily commend him to the meeting.

Citation author: Michael Davis, Life Member SPUMS, formerly Editor *DHM* Journal

2023 ANZHMG COURSE FREMANTLE WESTERN AUSTRALIA

CLASSICAL MIKE – DRESSED AS A PIRATE AT THE SPUMS ASM IN GUAM

Thank you and farewell to Steve Goble

SPUMS Administrator from 1999 to 2023

Steve is retiring this year, and it is fitting that SPUMS provides him with our sincere appreciation for his outstanding service in the role as SPUMS Administrator. He has monitored SPUMS inquiries, managed the diving doctors list and provided terrific administrative support to the Executive Committee for 24 years. Steve has also assisted the conveners at most of the SPUMS ASM's during that time, particularly with the registrations and coordinating audio-visuals (which in the early days in the tropics had very marginal technology). Steve's wife Sue has accompanied him to many of the SPUMS conferences.

Steve has had a distinguished career as a deep-sea diver and later as a leading hyperbaric technician, at Royal Adelaide Hospital and around the Asia Pacific Region. Steve is a founding member of the Hyperbaric Technicians and Nurses Association. He is recognised as a national and world authority on Hyperbaric systems and safety. He has published widely in the field of Diving and Hyperbaric Medicine, including many articles in Diving and Hyperbaric Medicine Journal.

Enjoy your well-deserved retirement with Sue, Steve!

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INTO PURPOSE
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SAVE THE OCEAN.℠
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South Pacific Underwater Medicine Society

SPUMS 2024 ANNUAL SCIENTIFIC MEETING 12-18 May 2024

The Pearl Resort, Pacific Harbour Fiji

THEME: A plunge into recreational diving and diver health

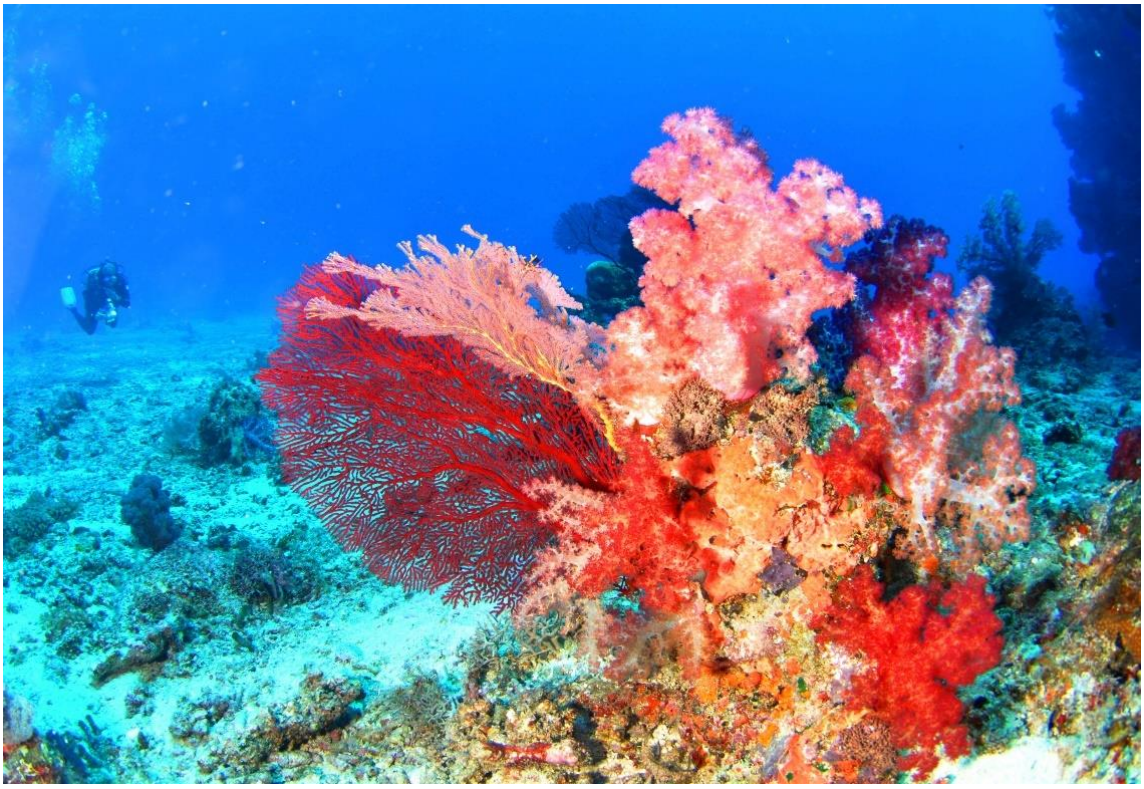
KEYNOTE SPEAKER:

Dr Peter Wilmshurst – UK Cardiologist

World authority on cardiovascular pathophysiology and diving

CONVENER David Smart and SCIENTIFIC CONVENER Neil Banham

Presentation by David Smart and Deb Dickson Smith



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Dr Peter Wilmshurst

Peter Wilmshurst and colleagues first reported paradoxical gas embolism in a diver with an atrial septal defect in 1986. That led to the recognition of the association between PFO and DCS, which was described almost simultaneously by Richard Moon and his colleagues from Duke University and Peter and his colleagues in 1989. Peter has demonstrated the link between shunt size and risk of DCS and he postulated the role of peripheral amplification of bubble emboli in aetiology of different manifestations of DCS. Peter and colleagues were the first to report PFO closure to prevent recurrence of DCS. They published the first descriptions of immersion pulmonary oedema in divers in 1981 and in surface swimmers in 1989.

Peter graduated from Manchester University in 1974. He received post-graduate training in medicine, cardiology and intensive care in Manchester, Oxford and London, leading to MRCP 1976 and FRCP 1996. His first consultant appointment was at St Thomas' Hospital, London in 1987, later moving to Yorkshire before joint appointments in Shrewsbury and Stoke-on-Trent as a consultant cardiologist. Simultaneously he was senior lecturer in medicine at the University of Keele. Following retirement, he returned to work part-time in Stoke.

Peter has been a scuba diver since 1971. He was doctor/diver on expeditions to survey the Gulf of Eilat in the 1970s and the barrier reef of Belize in the 1980s. He has been a member of the BSAC Medical Committee since 1977, including 10 years as Chair and, at the same time, a member of the BSAC National Diving Committee. Other roles include: Treasurer of the UK Sport Diving Medical Committee and previously Chair for five years; adviser to the Health and Safety Executive on cardiology standards for diving since 1994; member of the British Thoracic Society Fitness to Dive Subcommittee 2001; consultant to NASA in 1999 (Johnson Space Center, Houston, Texas) to advise on risk of PFO during sub-atmospheric DCS.

Peter has more than 200 peer-reviewed publications and book chapters. Less than half are on diving medicine. Topics include the association between migraine with aura and right-to-left shunts, the role of hypercholesterolaemia in aortic stenosis, inheritance of congenital heart disease and cardiomyopathies, cardiac arrhythmias, and management of coronary artery disease and cardiac failure. He also has over 200 articles in diving magazines on diving illnesses and water safety and has contributed to several UK television and radio programmes on diving.

His postgraduate awards related to diving medicine are Houlder Award from the Society of Underwater Technology 1989; Jacques Yves Cousteau Award 1990; Duke of Edinburgh Prize for Sports Medicine 1991 (first recipient); Gold Medal of the Huddersfield Medical Society 1994; Sir Robert Atkins Award from the Institute of Sports Medicine 2000; Fellowship of the Institute of Sport Medicine 2001; Foundation Fellowship of the Faculty of Sport and Exercise Medicine 2006; Colin McLeod Award from the British Sub-Aqua Club Jubilee Trust 2010 and Excellence in Diving Medicine Award from the Undersea and Hyperbaric Medical Society 2020.

Peter has investigated research misconduct in UK and abroad. He has given evidence before Parliament’s Health Committee and Science and Technology Committee. He has also received awards for his contribution to research integrity: Health Watch Annual Award 2003; BMJ Editor's Award 2012 (first recipient) and Guardian of Truth and Integrity from the Brain Health Alliance 2022 (first recipient).

THURSDAY 8TH JUNE
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