Dive into physiology and medicine: the DAN Europe Internship

Every diver has been exposed to the fascinating concepts of diving physiology and medicine, through their training. In this regard, DAN Europe is advancing our knowledge by conducting cutting-edge scientific research, while promoting safety culture through a variety of ongoing initiatives involving the community, and inspiring the new role models and ambassadors.

The 2022 DAN Europe internship program has been a sensational success from this standpoint. This year's interns included divers with a broad array of backgrounds ranging from biology, conservation, medicine, engineering, nursing, biotechnology and neuroscience. In addition, cooperation with the students from the Bachelor in Diving and Safety Management program, and accessibility to the recent advancements in diver telemonitoring technology, helped make the program even better.

The internship program was held at the Institute of Tourism Studies on the islands of Gozo and Malta, and spread out over two-weeks with lectures, conferences and practical training.

The first week started with an overview of DAN Europe departments and organisation, past and upcoming projects with a particular focus on the Hazard Identification and Risk Assessment (HIRA) program. Interns were also given the DAN Basic Life Support & Defibrillation (BLS-D) training. This was followed by a series of talks on applied diving physics, the fundamentals of pathophysiology, saturation diving, ergonomic diving, underwater analogue space missions, nitrogen narcosis and telemedicine in diving.

During the second week the group was trained on subclavian (O'Dive device) and precordial Doppler monitoring. This latter was used both on surface and underwater during the organised diving research

sessions as a means to detect bubbles in the blood flow after the dive. We also collected data on urine specific gravity using a portable refractometer, and a body composition estimate derived from a bioelectrical impedance analysis. All of the data was uploaded to the Diver Safety Guardian website together with the dive profiles. The portal is able to provide divers with feedback of their dive risk analysis, whereas the rest of the medical data are used by DAN Europe personnel for further research.

The newly developed divers' telemedicine prototype was also deployed and tested. The system is composed of a smart T-shirt to be worn under a dry suit, which is able to monitor heart rate and diver position underwater; a specifically designed device that is attached to the diver and linked to the shirt via Bluetooth, an acoustic modem enabling the device to communicate with a surface buoy, which in turn connects to a smartphone, that can view the data, and upload it to the Internet.

This solution engaged DAN researchers and the candidates in captivating discussions, especially around its possible introduction in the near future. Of particular interest was the seismocardiogram (SCG), which measures heart mechanics and its being studied for use on divers by a research group led by Professor Caiani at Politecnico di Milano. The device is particularly interesting as statistics show that about one-third of all diving accidents are due to an acute cardiac event.

At the end of the program, participants continued to collect Doppler recordings on their own personal dives, thus enriching DAN Europe diving database.

The 2022 DAN Europe internship exceeded expectations, and significantly contributed to helping the community prepare for an era of innovations, which diving has never seen before. Divers turned into data collectors, personalised decompression, and diving telemedicine are only some of the coming innovations. Stay tuned!

ABOUT THE AUTHOR

Giuseppe is an Aerospace Engineer and a near-graduate in Biomedical Engineering, who is passionate about physiology in extreme environments, specifically in diving. He is also a PADI Master Scuba Diver Trainer, EFR and DDI Instructor.

Follow him on Instagram!

- https://www.instagram.com/the_marianatrench/

Photos by: Arkadiusz Srebnik