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Belgische Vereniging voor Overdruk- en OnderwaterGeneeskunde vzw

Position of the Belgian Society for Diving and Hyperbaric Medicine (SBMHS-BVOOG) on Diving after COVID-19 pulmonary infection

April 12th, 2020

The COVID-19 pandemic has had a major impact on recreational and professional diving activities, with an almost complete cessation of this activity during many weeks/months. These measures were a logical consequence of Government and Public Health Care recommendations to limit unnecessary commuting but also because it is virtually impossible to observe the regulations of “social distancing” and avoiding the possible sharing of divers’ breathing equipment. Lastly, there is a real possibility that emergency first aid teams may be overwhelmed by cases related to COVID-19 or the logistics involved (decontamination procedures), and not be able to respond in a timely and efficient manner.

When the precautionary measures to combat the pandemic will be relaxed, it is important to resume normal recreational and professional diving activities as soon as reasonably possible, both for the social, physical and mental welfare of the diving population. The question has been raised, whether having suffered and recovered from COVID-19 has any influence on the medical fitness to dive or the risk of diving accidents.

Novel Corona Virus (SARS-CoV-2) infection (COVID-19) can manifest itself with various clinical syndromes, ranging from no symptoms, over a flu-like syndrome, to severe pulmonary compromise (ARDS – Acute Respiratory Distress Syndrome) and cardiac symptoms (cardiomyopathy). Factors that determine the severity of COVID-19 symptoms are but incompletely known: older persons, suffering from other medical conditions, are an obvious group at risk; also, heavy smokers and obese persons seem to have more risk of complications; however, there are numerous cases reported of young, previously healthy persons in whom the disease has had a sudden and dramatic evolution. In general, if the symptoms were mild and improve within a week to complete resolution, the risk for permanent damage to heart or lungs is very low.

The Board of the SBMHS-BVOOG, after examining the relevant and available literature and discussion with several experts, recommends:

1. Risk of spreading COVID-19: a person who has had symptomatic COVID-19 can, just as someone who was infected but did not have symptoms, spread viral particles in nasal or oral secretions for a certain period after recovery, and thus, still be contagious to others. The exact period during which this is possible is not known and probably variable, but has been reported to be up to 37 days or longer. This is an important consideration for the possible sharing of breathing regulators (buddy-breathing) but also for rescue actions in case of a diving accident.

Therefore, it is recommended:

- a. *That divers who have had symptomatic COVID-19, wait a minimum of TWO months, preferable three, before resuming their diving activity.*
 - b. *That divers who have tested positive for COVID-19 but have remained completely asymptomatic, wait ONE month before resuming diving.*
 - c. *Divers who have never had symptoms and have not been tested (who either have not been infected or have had the infection completely asymptomatic) may not have developed immunity against the disease (currently, serological tests are not widely available and do not confirm with 100% certainty a sufficient level of immunity). Therefore, they may still be infected by other divers and would need to observe a waiting period after the release of the confinement period. The duration of this waiting period may be variable depending on the local situation (type of diving, location and local organisation).*
 - d. *Divers and dive centres should observe strictly the guidelines for disinfection of diving gear (as issued by the diving Federations and DAN Europe).*
2. Risk for pulmonary overpressure syndrome (lung barotrauma): a person who has had COVID-19 infection with severe pulmonary symptoms may suffer from prolonged or even permanent pulmonary damage, even if the lung function seems to have returned to (near) normal. This damage may give a higher risk for lung barotrauma, even after dives without a rapid or uncontrolled ascent.
- Therefore, it is recommended that a diver who has been hospitalised with or because of pulmonary symptoms in relation to COVID-19, should, after the three-month waiting period (as indicated above), undergo complete pulmonary function testing as well as a high-resolution CT scanning of the lungs.*
- Pulmonary function testing should include FVC, FEV1, PEF25-50-75, RV and FEV1/FVC), and the CT scan should show a return to normal, before resuming diving. It is important that these tests should be interpreted and validated by a medical officer with specific knowledge of diving medicine.
- If major pulmonary symptoms have been present, even if not requiring hospitalisation, pulmonary damage may have occurred and a pulmonary function testing and CT-scan are useful tests.
3. Risk for cardiac events: in the context of general illness and severe pulmonary infection, a COVID-19 cardiomyopathy may not a prominent symptom and may even go unnoticed during the acute phase of the disease. This however may be the cause of heart muscle damage and subsequent scarring. Cardiomyopathy or cardiac scar tissue may be an important factor in the occurrence of sudden cardiac failure and sudden death during diving immersion.
- Therefore, it is recommended that a diver who has been hospitalised with or because of cardiac or pulmonary symptoms in relation to COVID-19, should, after the three-month waiting period (as indicated above), undergo cardiac evaluation with echocardiography and exercise test (exercise electrocardiography) to ascertain normal cardiac function.*
- If major pulmonary symptoms or extreme fatigue/exhaustion have been present, even if not requiring hospitalisation, this may indicate a possible cardiomyopathy and cardiac testing is useful.

4. Pulmonary oxygen toxicity: at this time, there is very little known as to a possible increased sensitivity of the pulmonary tissue to the toxic effects of oxygen; *therefore, a prudent attitude would be that technical diving (with prolonged breathing of hyperoxic gas, with a pO₂ of 1.3 ATA or higher) should be avoided.* Simple “nitrox” diving (whereby a maximum pO₂ of 1.4 ATA is only breathed for short periods, at the deepest part of the dive) should not present any problem.
5. Decompression sickness: even less is known about the possible alteration of the “bubble filter” function of the lung after COVID-19 pulmonary infection. This may imply that the risk for decompression sickness could increase significantly. It has been shown that after deeper recreational dives (close to the No-Decompression-Limit – NDL – of the dive computer, or with mandatory decompression stops), in 70-90% of cases, inert gas bubbles can be detected. These bubbles circulate in the venous blood, and are filtered out by the pulmonary capillary circulation and thus usually do not cause decompression sickness. If the lung “bubble filter” would become less efficient, these bubbles could pass into the arterial circulation (“arterialise”), comparably to divers with a Patent Foramen Ovale, and cause cerebral, vestibular or other types of decompression sickness. *Therefore, a prudent attitude would be that divers who have suffered from pulmonary symptoms of COVID-19, limit their dives temporarily (or definitively) to well within the NDL of their computer (so that at no moment during the dive, the computer indicates mandatory decompression stops).*

These recommendations are made on the basis of scientific data available on April 12th, 2020. It is likely that these will evolve if and when new data or insights become available.

For the Board of SBMHS-BVOOG:

(signed)

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(signed)

Dr Peter Germonpre
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