

Diving or commuting?

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Underwater diving became a practical reality in the first half of the nineteenth century with improved air pumping technology and the development of a watertight diving dress. The reason for these developments was to allow men to go to work underwater. Nevertheless, the potentially drastic consequences of returning to the surface, the intricacies of human physiology in adapting to the underwater environment and, more recently, the high-pressure environment, have led us, as physicians, somewhat to forget that the diver is there, first and foremost, to do a job of work and not to just dive. This attitude has been fostered by the nature of surface-orientated diving where a relatively brief sojourn underwater is followed by the dangers of decompression and a risk of decompression illness that is repeated for each dive performed. In other words, the risks of the dive have been greater than the risk of the job undertaken.

The same consideration has also been true for compressed air workers but arguably to a lesser degree, perhaps because the shift spent at work is so much longer than is usual for a surface-orientated diver. Indeed, in one of the early medical narratives of caisson work, regarding the construction of the Forth Rail Bridge in Scotland, the first problem faced

by the site doctor was a case of enteric fever caused by digging out a shoal of rotting fish trapped by the immersion of a caisson.¹

For commercial diving, as decompression procedures have improved and with the realization of the importance of limiting the duration of exposure to depth in air diving,² decompression illness has become an infrequent and generally mild event for commercial divers in UK waters and elsewhere. As the risk of the dive itself decreases, perhaps we, as physicians, need to consider more the risks associated with the underwater tasks that divers undertake. While a survey of UK divers in 2002 detected a reported career-long prevalence of decompression illness of 37%, 47% of the same work-force reported having had one or more industrial accidents leading to time off work, 13% had been subject to underwater explosion, 35% had been exposed to contaminated breathing gas and 19% reported one or more drilling-mud burns.³ Underwater explosions in diving were most commonly caused by blowback from the ignition of pockets of hydrogen and oxygen during underwater oxy-electric arc cutting and this technique has fallen into disuse after some fatal accidents.

Drilling-mud burns are a form of occupational dermatitis caused by contact with petrochemicals and their presence is an indicator of dermal contact with and, very probably, dermal uptake of the same petrochemicals.⁴ These data are a reminder that oilfield divers, while diving in a contaminated environment, do not use a diving dress that reliably protects them from toxic exposure. Approximately 15% of divers had worked as a welder under pressure and more than 90% of these welders had sustained one or more episodes of major electric shock, burn, metal fume fever or eye damage. In addition, hyperbaric welding and grinding generates a potential exposure to high levels of a nanoparticulate fume with a mean aerodynamic diameter of 20–30 nm.⁵

About 50% of a random sample from this population showed some signs of noise-induced hearing loss on audiometry. A further indication that factors other than diving were important was the observation that subjective health perception in oilfield divers may be open to psychosocial influences.⁶ This has implications for the overall long-term health of these workers and the management of any future health surveillance package as it is important that divers have an accurate and undistorted perception of the occupational risks that they run.

As a consequence of the questionnaire study in 2002, and the recognition by the diving industry that health surveillance might be improved, a health surveillance questionnaire is being developed for oil industry divers. In the work up for the questionnaire, six oilfield saturation divers were interviewed by an exposure scientist and a hyperbaric physician.⁷ These divers annually spent 60–140 days in saturation. All divers performed shift work and were exposed to vibrating hand tools to a level that would trigger a statutory requirement for a formal health surveillance programme in the UK. One diver had recently experienced hand arm vibration syndrome. All divers reported a period of fatigue after each saturation dive that was suggestive of a shift work effect. Five divers reported regular exposure to a level of noise that impeded conversation. Four divers reported smelling petrochemicals at work and for two of these it was a significant exposure incident. Chlorine and hydrogen sulphide exposures were also reported. All divers reported mud inside their diving suit after diving and one had suffered a drilling-mud burn. All divers did underwater construction and inspection and three were hyperbaric welders.

These observations confirmed those of the year 2000 study and the health surveillance questionnaire under development will include sections on vibration, noise, chemical exposure and dermatitis in addition to just diving. Identification of problems should lead to the application of appropriate occupational hygiene measures and will improve the divers' working environment and safety. Although these observations and the health surveillance questionnaire are confined to oilfield divers, a number of these issues, such as diving in contaminated water and exposure to noise and

vibration, are undoubtedly areas of concern also for the coastal and inshore diver.

For the professional diver, diving has always been just another way to go to work. In the past, the act of diving has been so dangerous as to distract from the risks and hazards of the underwater job. The use of increasingly safe diving techniques and, in the oil industry, the switch to saturation diving perhaps now mean that the hyperbaric physician can and should pay more attention to the health consequences of the divers' underwater tasks. Failure to do so would evoke the analogy of an occupational physician whose only interest is the commute to work.

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