

The Complement System and Diving

Considerable research over the past 10 years has been directed toward elucidation of the complement system and its effect on the body in association with bubbles. Reviewed nicely in 1997 by Andrea Zaferes in the magazine 'Immersed', the complicated but important field of how bubbles cause damage is slowly but clearly being brought to light.

<http://www.immersed.com/Articles/PDFs/hit.pdf>

Long thought to be a simple process of blockage of vessels and infarction, it has now been shown that there is a tripping of the complement system and the immune system (T- and B-leucocytes) when bubbles form from decompression. This immune response has a domino effect on blood chemistry that leads to marked changes in the tissues long after the bubbles are gone.

Work has also been done that shows the importance of early treatment. The longer the period of waiting after a decompression incident, the more blood chemistry changes occur and the greater the damage done, emphasizing the importance of early recompression in the treatment of decompression illness.

Very interesting studies have also shown that activation of the complement system may acclimate you to the effects of a decompression accident. This might be a 'using up' process of multiple shallow dives with sub clinical bubbling causing complement activation and having little or none present when a subsequent deeper dive is done. This same process might be the explanation of the excessive fatigue that many divers describe after diving - the fatigue actually being the complement activation damage that is known to occur distant from local bubble sites and the hemoconcentration that occurs.

Individuals who have greater sensitivity to complement activation may be at greater risk for DCS manifestation and more severe DCS injury. Conversely, those with chronically 'used up' complement may be a lesser risk, as in the chronic asthmatic or the atopic patient.

Finally, there might be individual variation in the sensitivity to DCS. Divers who are complement sensitive have a higher rate of DCS. Sensitivity is defined by the level of C5a increase following plasma incubation with bubbles in vitro. However, Lundgren and associates were unable to show this effect in their report in 1997.

Interestingly, workers have also found that cobra venom factor ends the manifestations of DCS in rabbits.

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