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Cold Shock

Definition

Cold shock is the body's response to the sudden immersion into cold water. The response to the cold water varies from person to person. Cold shock lasts for 1 - 3 minutes.

Cold Shock Responses

Three response are distinguished:

1. Initial gasp reflex in response to rapid skin cooling. If the head goes under water, the result maybe breathing water into the lungs, which can result in drowning.
2. Hyperventilation, like the gasp reflex, is a natural reaction to the cold. Although this physiological response will subside, panic can cause a psychological continuance. Prolonged hyperventilation can lead to a faint.
3. Vasoconstriction - cardiac related response. Arteries contract as the body reduces blood flow to the extremities in order to minimise heat loss. As a result, the heart has to work harder to pump the same amount of blood through the body. Especially for people with an underlying heart disease, this additional work load can cause the heart to go into cardiac arrest.

Drowning

People can drown from the effects of cold shock through water entering the respiratory tract while gasping for air or hyperventilating.

Suitable **personal protective equipment (PPE)** to prevent cold shock are

- lifejackets, that keep head, mouth and nose above water and keep the face in an angular position with the nose pointing down;
- protective clothing that reduce the sudden exposure to cold water, such as thermal protective clothing according to SOLAS anti-exposure suits or CE constant wear suits (ISO 15027).

Ki-Suit and **Ki-Jacket + Ki-Pants**

are thermal protective clothing according to ISO 15027 that protects against cold shock.

Delayed reaction to cold water exposure

The outer shell of the suit is waterproof. Elasticated arm, leg and hip cuffs (Ki-Jacket), as well as a high, adjustable collar, delay the water ingress. It takes 2 - 3 minutes before the clothing is filled with water. The delayed exposure to the cold water reduces or eliminates cold shock reactions and the related risks.

In-water position - ingress of water in the respiratory tract

The integrated lifejacket inflates within 5 seconds in water. This buoyancy together with the air trapped in the suit will cause the wearer to resurface very quickly. The lifejacket turns the (unconscious) wearer into a stable position on the back with mouth and nose well above water. This minimises the unintentional ingress of water in the respiratory tract.

Comparison - Ki-Suit / Ki-Jacket (wet suit) versus SOLAS anti-exposure suit (dry suit) combined with a lifejacket and Ki-Suit 310.

1. The initial phase - immersion, submersion, re-surfacing, stable in-water position - lasts for approximately 5 seconds for both suits.
2. The SOLAS dry suit limits the amount of water in the suit thereafter to 0.5 litre, provided that all closures were closed at the time of entering the water. Cold shock responses are avoided.
   Ki-Suit and Ki-Jacket are filled with water during the next 2 - 3 minutes. Cold shock reactions are avoided or substantially reduced.

Conclusion

Both suit systems are suitable to protect against the risk of drowning from cold shock.