Why you get cold underwater

Learning Objectives: By the end of this session, you will be able to answer these questions:

1. Why do you get colder in water than you do in, air the same temperature?

2. What eight variables may affect whether you feel cold under-water?

3. What is hypothermia?

4. Why is even mild hypothermia potentially a serious problem for scuba divers?

1. Water and heat.

a) Water has one of the highest heat capacities of all naturally occurring substances.

b) High heat capacity means a substance must absorb a great deal of heat to increase its temperature compared to something with a lower heat capacity. It must also release a lot of heat to decrease its temperature compared to something with a lower heat capacity. Water conducts, or transfers, heat 25 times faster than air because it absorbs so much more heat than air of the same temperature.

c) Unprotected, you lose heat rapidly even in water as "warm" as 27° C/80° F. At this temperature, your body loses heat to the water faster than your body can generate it. At temperatures below 34° C/93' F, you will feel cool even after a short exposure.

d) Exposure suits don't really "keep you warm" so much as they prolong how long it takes before you get cold. In most circumstances, even in relatively warm water given enough time you will chill, but with the ideal exposure suit, you'll finish the dive before you lose enough heat to become uncomfort-able.

2. Eight variables affect whether you feel cold underwater:

a) Water temperature.

b) Length of exposure.

c) The thermal protection provided by your exposure suit and undergarment.

d) Your body's ability to generate heat. Your body's muscle mass and metabolic activity generates heat. People with more muscle mass tend to stay warmer, but your overall metabolism rate and even whether you're hungry will cause your heat gener-ating ability to vary.

e) Body fat composition. Fatty (adipose) tissue acts as a natural insulator and helps the body retain heat.

f) Body surface area to mass ratio. Light/tall divers cool faster than heavy/shorter divers, all things being equal.

g) Acclimatization. You adjust both physically and psychologically to the temperature water you're used to diving in. Example: Cold water divers traveling to the tropics typically consider the water warm and require less thermal protection than local divemasters who are acclimatized to tropical water and consider it cool.

h) Activity. Divers who stay in one place for extended periods tend to get colder than those who are generating heat by moving and exercising.

3. Getting cold underwater.

a) Getting too cold underwater can take the fun out of a dive, but you can prevent getting cold even in very cool water.

b) Beyond comfort, getting cold underwater can be a very real safety problem.

c) Your body functions at a core temperature of ap-proximately 37°C/98.6°F, in a very narrow range of about ±4°C/7°F. To stay comfortable indefinitely,

d) body heat loss must equal body heat production. This may not always be possible, but you can slow heat loss enough to remain comfortable for an extended period.

e) Hypothermia (definition: a drop in body core temperature). Most divers leave the water before severe hypothermia occurs because the diver is uncomfortable before it occurs.

f) However, even mild hypothermia can be danger-ous.

1. Signs and symptoms: uncontrolled shivering, numbness, blueness, sleepiness or drowsiness, general fatigue. Severe hypothermia symptoms and signs include shivering stops, confusion, unconsciousness and eventually death.

2. As hypothermia advances, it can reduce a diver's decision-making ability, strength and endurance, all of which can lead to other accidents.

Q Treat shivering as a warning sign. If you experience uncontrollable shivering, end the dive, exit the water and seek warmth.