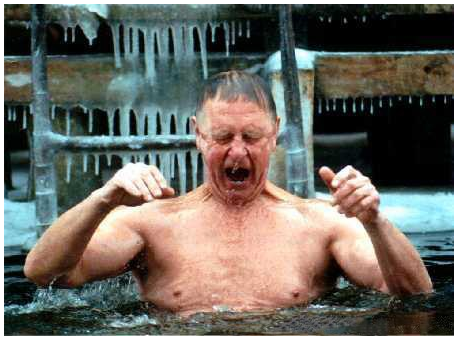
Cold Water Gasp

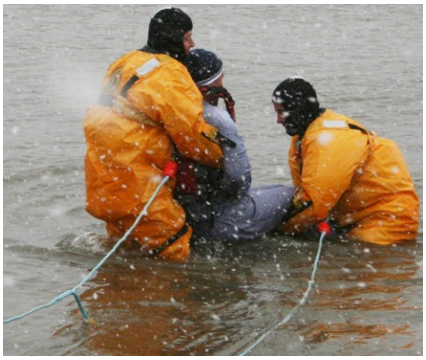


In the photo in the upper right hand corner you can see the gasp by Jimmy Fallon (man in the suit) from 36.5°F cold water hitting his face. Practice helps—triathletes & swimmers who practice getting into cold water, and whitewater kayakers & canoers who roll their boats in cold water, experience the changes the body makes. They know what's coming, they know it will settle out, and they know they can make the adjustments to hold their breath or control their breathing. If you are planning on swimming in cold water, try breast stroking a few times to start the process. When you're ready, put your entire face in knowing that it will take a bit for your body to settle out and adjust.

Cold water gasp, also known as the **gasp reflex**, **torso reflex**, or **cold water inspiratory gasp,** occurs when there is a sudden immersion of a person's face in cold water which causes an automatic gasp to breath in a large volume of air. This is a part of an artifact of human evolution called the *mammalian diving reflex* exhibited in aquatic mammals (seals, otters, dolphins, wales) which optimizes respiration to allow staying underwater for extended periods of times. Diving birds such as penguins and cormorants have a similar diving reflex. Every animal's diving reflex is triggered specifically by cold water contacting the face of a mammal. Water that is warmer than 70ºF does not cause the reflex, and neither does submersion of other body parts.

If this sudden gasp for air happens when you are submerged (boat capsizing or a fall through thin ice) or when you get doused by a large wave of cold water, you will inhale water, not air. This is why wearing a PFD is critical, because if you do inhale some water the PFD will bring you to the surface and keep you on the surface as you are gasping or choking. It only takes an inhalation of about five ounces (150 ml) of water to cause drowning. Drowning is a combination of cardiac arrest and suffocation. Water in the lungs compromises your ability to exchange oxygen, and because respiratory movements may occur for up to five minutes when underwater, water can continue to be drawn into your lungs. Once your brain has been deprived of oxygen for a period of 4-5 minutes you will become unconscious and with continued lack of oxygen the less chance you have of returning to normal function even if the heart keeps beating.

Cold Shock Response



Cold water inspiratory gasp is the initial response to being submersed in cold water. A second component of the **Cold Shock Response** involves *hyperventilation*. Like the gasp reflex, this is a natural reaction to the cold. Although this physiological response will subside, panic can cause a psychological continuance of hyperventilation. Prolonged hyperventilation can lead to fainting, so the key thing is to concentrate on controlling your breathing. Hyperventilation can be exacerbated by panicking. If the body has a staged immersion (gradual immersion to the waist followed by full immersion to neck level), it can attenuate (lessen) the hyperventilation response; therefore, lessen the probability of sudden drowning. If experiencing hyperventilation, the tendency is to want to take deeper breaths. You have to fight this desire as best you can, and slow down your breathing dramatically. Hyperventilation literally translates to "over-breathing". Contrary to popular belief, it is not the act of getting too little air; rather, it's the act of breathing out carbon dioxide too quickly. This changes the chemistry of the blood by raising the pH affecting the central nervous system and chemical functions. The result can be muscle cramps, disorientation, confusion and loss of control. Take breaths that last as long as 12 seconds. Breathe in through your nose slowly for 5 seconds; hold for 3 seconds; breathe out through pursed lips for 7 seconds. Doing this will help your body balance its carbon dioxide levels again and should prevent you from further hyperventilating.

Cold receptors are not in your body or limbs, but in your nasal cavity and other facial areas that relay information to your brain. Once triggered by cold, the automatic nervous system then takes control to make changes in your body. This includes slowing your heart rate down and restricting blood flow to the limbs and organs to conserve oxygen for the heart and brain. One minute in 60°F water will result in the skin turning black on infrared viewing--meaning the skin is cold and surface circulation has been eliminated. See the handout on hypothermia for further details on what cold water leads to even in the absence of inhaling water. The length of time in cold water before a fatal outcome depends on the temperature of the water, protective gear, and the health of the person.

FOUR PHOTOS FROM COLD WATER BOOT CAMP

HANDOUT PREPARED BY GLEN GREEN 2016

CHICAGO'S "POLAR PLUNGE" – HUFFINGTON POST 03-02-2014

CANOE PHOTO FROM AMERICAN CANOE ASSOCIATION 2005

HANDOUT REVIEWED BY ROBERT McNAMARA, MD, FAAEM 2014