



Electric Shock Drowning

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There is an invisible killer in fresh water that most frequently strikes near boat marinas and docks. Since the mid 1980's at least fifty people have died from this invisible killer. Most victims are young because young people are more likely to be frolicking in the water around marinas and docks, and often, the first victim is followed by a second, who jumps in the water to help someone who appears to be drowning.

What is Electric Shock Drowning?

This invisible killer is known as Electric Shock Drowning (ESD) and is the result of the passage of a typically low level AC current through the body while immersed in fresh water. The passage of current through the body results in skeletal muscular paralysis, rendering the victim unable to help him/herself, with drowning the eventual result. ESD has become the catchall phrase that encompasses all in-water shock casualties and fatalities.

It is referred to as electric shock drowning and not electrocution because there is no physical injury. The victims either lose muscle control or suffer ventricular fibrillation (uncoordinated contraction of the cardiac muscle). Because victims typically show no sign of injury,

many electric shock drownings are mislabeled as deaths attributable to alcohol intoxication or heart attack.

Since seawater is 300 times more conductive than fresh water, you would think that more problems would occur in seawater, however, just the opposite is true. Our bodies are saline; about the same conductivity as seawater, so in seawater we're nothing special. In fresh water, however, we are little floating islands of good conductivity in a sea of poor conductivity. A stray current try to get back to its source by the path of least resistance, so it will "jump" through a saline human swimming in fresh water. It only takes a small voltage gradient in the water (as little as 2 volts per foot) to cause cardiac and respiratory paralysis.

Prevention

So how do you prevent ESD? The best defense is to never swim near docks with energized 120 volt AC power. Signs should be posted warning children and parents, "Stay Out Of The Water!". If someone must to go into the water to retrieve something lost overboard, the electricity to the dock should be shut off.

Additionally, The American Boat & Yacht Council (ABYC) E-11 adopted standards in 2010 that requires an Equipment Leakage Circuit Inter-

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Though worn and faded, the owner of this dock has posted a warning about the dangers of swimming near electric outlets on docks.



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rupter (ELCI) be installed on new boats. These standards are however, voluntary, and not all boat manufacturers follow them and there is no requirement to retrofit ELCIs on older boats. There is also no requirement for docks and marinas to install Ground Fault Circuit Interrupters (GFCIs). The use of both types of devices would prevent almost all ESD accidents.

Finally, when as Vessel Examiners or Recreational Boating Safety Program Visitors you talk to marina owners and boaters with power on their docks, encourage them to have an annual check of grounding system integrity. Boat AC electrical circuits and equipment as well as floating docks should be installed, maintained, and inspected by qualified marine electrical personnel. Boaters should only use marine approved appliances and electronics.

What to do

If you are swimming and feel a tingling sensation or muscle paralysis, back up! The voltage gradient radiates from the current leak and increases as you get closer.

Stay upright. Upright, in a treading water position, you cover only a few feet of voltage gradient. By swimming horizontally, you could worsen the situation by covering voltage gradients with the entire length of your body.

Call for help using 911 or VHF Channel 16, as appropriate. Turn off the shore power connection at the meter base. If you don't know how to do this, call the harbormaster.

Get the victim out of the water. Remember to reach, throw, row, but don't go. Never enter the water to rescue someone. Practice retrieving a person from the water. It is a valuable skill and not easy to do.

If trained, perform Cardiopulmonary Resuscitation (CPR) until the Fire Directorate, Coast Guard, or ambulance can arrive. Victims of electrical shock drowning are good candidates for successful CPR efforts.

Electric shock drowning is preventable, and through increased awareness and education, incidents of ESD can be reduced. As responsible boaters and parents, make sure that the area is safe before entering, or allowing anyone to enter the water.

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