

Frequently Asked Question

Breathing Techniques and Over Breathing

A talented young swimmer with dreams of winning gold at the 2012 Olympics died after pushing himself too hard in training.

Luke Jeffrey, 15, drowned after secretly getting back in the pool following his coaching session, an inquest heard. The county-standard swimmer, who was said to be pushing himself to the "absolute limit" to make it to the London Games, is believed to have blacked out while practising underwater lengths.

He was found lying unconscious at the bottom of the pool at the National Fire Service Training College in Morton-in-Marsh, Gloucestershire, by a marshal carrying out a final sweep of the water. His father dived in and brought him to the surface but paramedics were unable to revive him and he was pronounced dead in hospital.

Luke's training partner Christopher Smith told the hearing at Cirencester Magistrates Court that the teenager had blacked out before. "He was desperately trying to get to the Olympics," he said. "Six months before he had tried to swim three lengths underwater, but at the end he just drifted to the side." I was so worried about him that I dived in and pulled him out. He said afterwards that he felt faint and dizzy. We didn't do that exercise again."

On the evening of his death last April, Luke, of Blockley, had already completed between 70 and 80 lengths and stayed underwater for two periods of two minutes. His father, Mark, 39, who runs the local swimming club, said his son had not told him of his previous blackout. "He used to push himself to the absolute limit, but I don't feel that anything out of the ordinary happened to him," said Mr Jeffrey.

However, club member Stephen Waterfield said: "He was a devil for getting in one last length and had to be reprimanded before for staying in after sessions were over." The pool marshal, Benjamin East, added: "He was very determined and talented. He wanted to go the whole way."

Dr Deryk James, a pathologist, said vigorous exercise with prolonged holding of breath was known to be dangerous "because the oxygen level is so low that you lose consciousness before the desire to breathe takes over."

Afterwards, Luke's mother Melanie, 40, said: "It was his dream to go to the Olympics and his coach said that he was likely to have made it. It is such a pity that it will not come true now."

Within the past year there have been several notable cases of death or near death by drowning caused by 'hyperventilation'. Or 'over breathing'.

The Swim England training manuals do not refer to breathing techniques in much detail, perhaps mainly because breathing whilst swimming is still seen as a natural continuous mechanism.

The various techniques of breathing every stroke or every other stroke etc. hardly interfere with the body's natural breathing system other than to regulate and regiment the breathing pattern. Even the extended underwater racing starts and turns do not extend beyond 7-8 seconds of breath holding or trickle exhalation.

Perhaps the only disciplines that requires extended breath holding is synchronised swimming, water polo and the fringe sport of Octopush. So why would anyone want to swim lengths under water as a training exercise and more importantly why would any swimming teacher or coach encourage such an activity?

Hyperventilation or 'over breathing' has long been recognised as a dangerous condition that can be achieved when trying to swim distance under water. Unlike hyperventilation caused by stress or medical conditions over breathing before attempting to swim distances underwater is a dangerous and avoidable practice. This is not a medical information sheet but some basic understanding of the practice is necessary:

The physiology of breath-holding

It is not difficult for a good swimmer to hold his breath and swim underwater for a minute or so. This is possible because there is oxygen available in the lungs and in the blood stream. If the blood oxygen level drops to about half the normal level, the swimmer will lose consciousness without any warning. Then, survival depends on rescue by others.

Fortunately, nature has given us a safety mechanism, which usually prevents this happening. As oxygen is used by the body carbon dioxide is produced. If a swimmer is breath-holding, the carbon dioxide builds up quickly and this produces an inescapable urge to breathe, the so-called "breath-hold breaking point". This happens before the oxygen level drops to dangerous (hypoxic) levels. The swimmer surfaces and breathes. The reduction in oxygen levels is then corrected before loss of consciousness occurs.

What are the dangers of breath-holding?

This safety mechanism can be delayed or by-passed by taking deep breaths (hyperventilating) before breath-holding and submerging. This hyperventilation removes carbon dioxide from the body. Without a build-up of carbon dioxide the safety mechanism is not triggered and the length of time that a swimmer can hold their breath can be extended - but only by the swimmer becoming more hypoxic. Swimmers may simply slow down and lose consciousness. In ensuing breaths water, rather than oxygen, enters the lungs and the swimmer drowns.

Some children test these limits by hyperventilating before breath-hold diving to prolong their underwater endurance or swimming distance. This can often be linked to competitions to see how far or how long they can swim underwater (usually in swimming pools). The depth of water is irrelevant. Usually the children that die this way are the best of swimmers and the technique of hyperventilation is used to extend their time underwater. Hypoxic blackout also accounts for 20% of snorkelling deaths in Australia (all ages) and almost all of the snorkelling deaths in young, fit males.

Having a hyperventilating swimmer standing on the side was a common scenario in RLSS Pool Lifeguard Qualification practical tests to see if the lifeguard could spot it early and prevent an incident, otherwise the test developed into a double incident scenario!

All swimming teachers and coaches should be aware of the dangers of over breathing and should disabuse their swimmers of the necessity to try this practice.