

CONFINED WATER TRAINING



OPEN WATER FREEDIVER +
FOUNDATION FREEDIVER

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CONFINED WATER TRAINING

COURSE REQUIREMENTS

The requirements for completing each level (i.e. Foundation Freediver and Open Water Freediver) are listed below. In order to be awarded either certification, you will need to competently and repeatably demonstrate the skills under each heading. Both certification levels in this course convey the knowledge, skills, and procedures needed to safely explore the underwater world, in the case of Foundation Freediver, up to 5m (16 feet) in depth and for Open Water Freediver up to 20 meters (66 feet) in depth.

FOUNDATION FREEDIVER

The Foundation certification is achieved without a specific depth requirement. It focuses on providing a solid base from which to develop your abilities, and to safely supervise a fellow diver.

CONFINED WATER SKILLS

The confined water skills are common to both the Foundation and Open Water Freediver certification levels. By the end of your confined water session, you should be able to perform the following:

- 1. Swim test**
Swim comfortably for 200m without swimming aids (mask allowed).
- 2. Perform correct breathing for freediving**
Understand and perform safe and appropriate breathing techniques for freediving. These include passive relaxation breathing, a full pre-dive breath, recovery breathing, proper use of the snorkel and avoiding hyperventilation.
- 3. Perform a 15m DYN freedive**
Swim at least 15 meters horizontally underwater, maintaining correct body position, finning technique, and recovery breaths.
- 4. Perform correct buddying for DYN**
Demonstrate consistent and correct buddy protocol for a freediver performing a dynamic swim. Stay no more than 1.5 meters from the diver for at least the last third of their swim and perform the correct protocols at the surface.
- 5. Rescue a freediver suffering a hypoxic fit**
Recognize a hypoxic fit and implement the appropriate recovery protocols. Holding the diver in the correct position so that their airways remain above the surface, removing their mask and snorkel, and coaching them through the resumption of normal breathing.
- 6. Rescue a freediver suffering a black out underwater**
Retrieve and revive a freediver simulating an underwater blackout in shallow water (3 meters/9 feet or less). Secure their airways while underwater and using the blow, tap, talk protocol while supporting them on the surface.
- 7. Demonstrate proper surface entry technique**
Consistently demonstrate correct surface entry (duck dive), including pre-equalization, removing the snorkel, and further equalization as needed. Maintain correct body positioning and movement throughout.

RAID NOTE: when training in confined water, you may need to add weight. We discussed correct weighting and buoyancy in the Rescue manual, to achieve neutral buoyancy around 10m depth. In confined water, we are generally talking about less than 5m depth, so in order to combat buoyancy you may need to add a little weight to your belt in order to remain underwater.

BREATHING FOR FREEDIVING

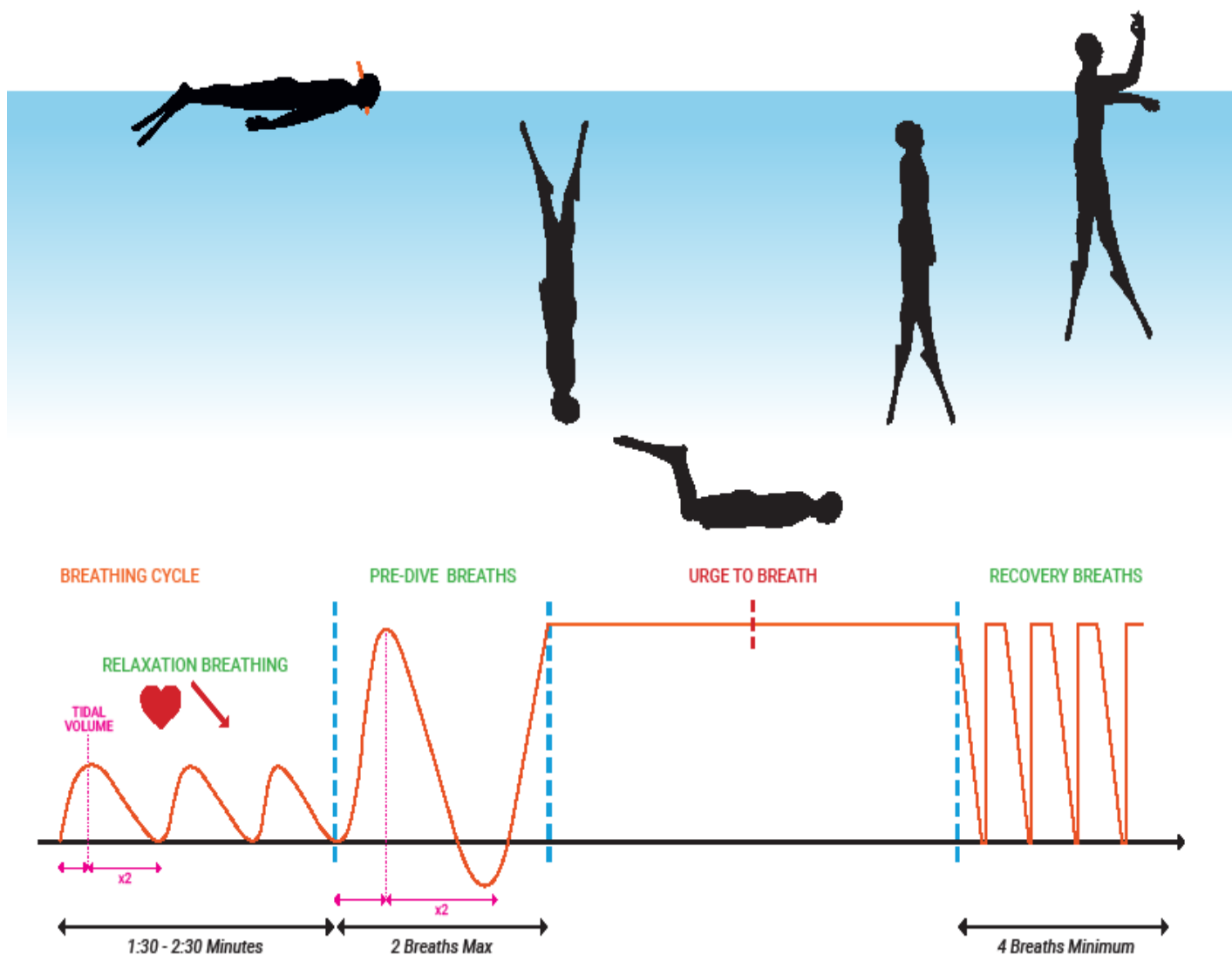
“The Breath-up is the dive...” - William Trubridge (multiple world-record holding freediver)*

The full process of a freedive can be divided into four stages:

1. Relaxation *(Commonly referred to as the 'breathe up' - we use the term 'Relaxation Stage').
2. Pre-dive breath.
3. Breath-hold/dive.
4. Recovery breathing.

The overall quality and experience of a dive is very much a function of preparation. It's helpful to think of each dive as a circle, rather than a linear, goal-oriented line. In this way we can better envision the flow from relaxation stage to dive to recovery and relaxation again. If any part of the process is compromised, the circle is broken, and the experience diminished.

Diagram of 4-stage circle



RELAXATION

Free divers use the relaxation stage to consciously adopt a calming, relaxed, breathing pattern, preparing body and mind for the next dive.

The three goals for the relaxation stage are:

- a) Avoid hyperventilation.
- b) Achieve a deep state of relaxation.
- c) Focus your concentration on the dive ahead.

a) Avoiding Hyperventilation

When we first start paying attention to the breath it's perfectly normal to breathe too much.

Breathing too much, or **Hyperventilation**, greatly increases the risk of **blackout in breath-hold diving**. As freedivers we avoid hyperventilation by consciously adopting a relaxed, natural, breathing pattern during the **Relaxation Stage**.

Later in this section we'll discuss the physiology of hyperventilation and some of the signs that you may have been over-breathing. For now, we'll introduce effective strategies for preventing it.

b) Tidal Volume Breathing

If you are in the water, rest on the surface and let buoyancy support you. Relax your entire body - using only as much effort as needed to keep your snorkel above the surface.

For dry practice, find a comfortable position - use rolled blankets or pillows to support any parts of your body that may need it - such as knees, lower-back, and neck.

Relax your abdomen completely, allowing it to move easily with each breath. Avoid using the middle and upper breathing spaces. After a few minutes of relaxed breathing the amount of air moving through your lungs will naturally settle toward **Tidal Volume***. If you feel the urge to take a deeper breath or sigh, go ahead. Don't suppress or over-control. Remember; our objective is to **avoid breathing too much**.

RAID NOTE: For a reminder on Tidal volume, refer back to the **Physiology** manual.

Once you've established a comfortable rhythm, try extending your exhalations, gradually making them about twice as long as your inhalations. When this becomes easy you can introduce a brief pause after each exhalation to amplify the relaxation effect.

This type of relaxed abdominal breathing stimulates the parasympathetic nervous system (relaxation response). Lengthening exhalation and adding a slight pause enhances the effect and can help restore balance if you find you've been over-breathing.

c) Relaxation

When the breathing pattern has become natural, you may want to let it slip into the background - allowing the body to take control. At this point any of a variety of relaxation techniques can be helpful.

Here are a few examples:

- Focusing on the sensations of floating in water can very effectively quiet the mind. Let your body move passively with the water, and simply attend to any sensations that arise.



PRE-DIVE BREATH

- Body scan - bringing awareness to various parts of your body and consciously relaxing them. In addition to areas of obvious tension, include some you don't normally pay attention to, such as your tongue, eye sockets, ears, etc. The neck in particular tends to hold a lot of tension in freedivers - as we instinctively try to lift our heads out of the water.
- Counting - count slowly - backwards, forwards and/or using intervals - any method that keeps you focused.
- Yoga Nidra - or 'Sleep Yoga' is a comprehensive set of meditation/relaxation techniques that is increasingly popular with freedivers. There are many resources for this practice available online.

RAID NOTE: Plan on spending three minutes, or twice your last dive time in the relaxation stage - whichever is longest*.

*When line diving with others, you can use the time during the other freedivers' dive to start relaxing. Do not move to the line until you feel ready to perform a relaxation stage no longer than 3-5 minutes.

PRE-DIVE BREATH

The pre-dive breath consists of three parts. The first is breathing into the lower breathing space - this includes feeling into the back, front and sides of the abdomen and pelvis. The second is expanding the middle breathing space, including both front and back of the ribcage as well as side-to-side (out into the armpit area.) Third is bringing the last of the inhalation up to the very top of your chest, neck, and shoulder girdle.

The lungs are bigger at the bottom than the top. To ensure that you are fully utilizing this space the full breath should be taken slowly, focussing on the feeling of the air reaching spaces which are not often used in everyday life. Don't fight or force this breath. Release it if it feels unnatural and try again after relaxing a little.

BREATH-HOLD/DIVE

Now that you have taken your Pre-Dive Breath, you can commence your dive - or dry breath-hold. Your instructor will guide you through the process and techniques used during a dive, here we'll focus on the sensations that occur during a breath-hold.

THE URGE TO BREATHE

As CO₂ levels increase, you'll begin to feel the impulse to take a breath. As explained in the **Physiology** manual, it is this increase in CO₂ and NOT the absence of Oxygen that stimulates the urge to breathe. If you've avoided **hyperventilating** during the relaxation stage, you'll have plenty of oxygen remaining at the onset of this urge.

DIAPHRAGMATIC CONTRACTIONS

As your breath holds become longer you may experience what are commonly known as contractions. These involuntary spasms of the diaphragm are your body's way of trying to get you to take a breath, expel CO₂, and bring blood acidity back to normal.

Contractions may feel unpleasant at first, but once you become accustomed to the sensations, you'll learn to relax through them. With training, your tolerance of CO₂ will increase. This, and remaining relaxed, can delay the onset of contractions*.

*(At depths much greater than those covered in this course, it becomes necessary to manage contractions. There are also divers who do not get contractions or get them far into their breath-holds. These topics are covered in the **RAID Advanced** and **Master Freediver** courses.)

Other signs of elevated CO₂ levels include:

- An urge to swallow.
- Tightness or burning around the chest.

RECOVERY BREATHING

- Headaches (after prolonged periods of high CO₂ - usually caused by too short a relaxation stage between multiple dives).
- Strong urge to let air out. (Avoid releasing air during a dive - this will decrease your buoyancy and can contribute to a blackout by lowering the pressure in your lungs).

Breath-hold diving is very much a mental discipline. It's difficult at first but, like any skill, becomes easier and more natural with practice.

The **Breathwork for Freediving** section at the end of this manual contains practical guidance for safely and sustainably developing your breath-holds.

HYPOXIA

Hypoxia is defined as: **“A deficiency in the amount of oxygen reaching the tissues.”**

Hypoxia occurs when you hold your breath long enough to deplete your store of oxygen.

Symptoms can be subtle, here are a few:

- Blue or grey lips.
- Unnaturally pale and/or blotchy skin.
- Disorientation.
- Loss of motor control - ranging from shaking hands to whole body convulsions.
- Blackout.

Hypoxia is far more likely to occur if the normal urge to breathe has been delayed by hyperventilation.

Your instructor, or an experienced dive-buddy, may notice that you are hypoxic before you do. Time, training, and experience are needed to develop your sensitivity.

RAID NOTE: For help recognizing hypoxia in others see the **Rescue** manual.

RECOVERY BREATHING

At the end of a dive or breath-hold, we want to restore oxygen levels as quickly as possible. There are different techniques, but the principle stays the same - to quickly bring fresh oxygen-rich air into your lungs, and to have it absorbed as quickly as possible.

RAID NOTE: In the **Physiology** manual, we looked at the principle of diffusion.

Diffusion is the movement of molecules from an area of high concentration to an area of low concentration.”

The bigger the difference in concentration, the faster molecules will diffuse into an area of lower concentration. Fresh air will have a higher concentration of O₂ than your blood after a breath-hold. Inhaling as quickly as possible and applying moderate compression will increase this concentration and facilitate rapid diffusion.

TECHNIQUE

At the end of a long breath-hold your body wants to forcefully exhale in order to purge CO₂. We want to prevent this for two reasons.

RECOVERY BREATHING

A very brief and shallow exhale allows us to take fresh air in as quickly as possible.

A deep exhalation can abruptly lower the concentration of oxygen in your blood - greatly increasing the likelihood of a blackout or loss of motor control.

Recovery breaths consist of a quick, passive exhale, a strong inhale with a wide open mouth, and a pause with closed lips and glottis. During the pause, the chest and diaphragm are contracted with moderate force - as if holding back a cough - while the breath is held for 1-3 seconds. This pattern is repeated 4 or more times - depending on the intensity of the breath-hold.

Even with this technique it can take a full minute for the oxygen to reach your brain. Once you feel recovered, the final part of every freedive is to make the "OK" sign by putting the thumb and forefinger together and saying, "I am OK", while looking at your buddy.

RAID NOTE: The number one rule of freediving is always dive with a qualified buddy.

You and your buddy act as safety divers for each other. There are different methods of buddying depending on the freediving discipline, but the role is always the same - to be there as a safety diver in case someone is struggling.

To assure complete recovery after a dive, monitor a freshly surfaced diver for a full 45 seconds. In competitions it is not uncommon for a diver to surface, remove his/her mask or nose clip, signal with the OK sign, say "I'm OK" then blackout or lose motor control.

Here is a summary of the steps to recovery breathing:

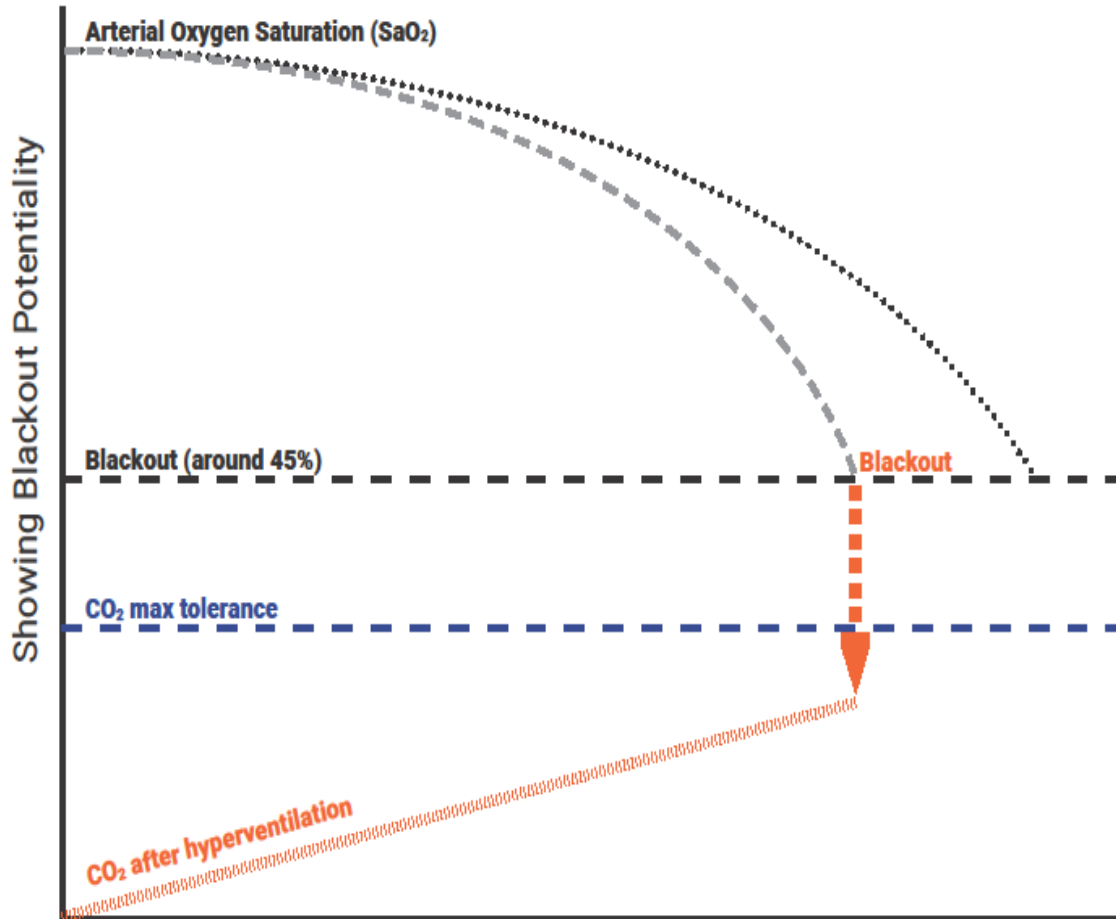
1. Small, passive exhale without activating any breathing muscles.
2. Sharp inhalation with wide open mouth.
3. Pause with closed lips and glottis, bearing down with moderate force to create pressure.
4. Repeat at least four times, or more if needed.
5. Make the "OK" sign and say "I'm OK".

Make a habit of doing recovery breaths after every dive, regardless of its time or depth. Recovery breathing does not come naturally, so it's important to program it through repetition.

Diver's lives have been saved by having this procedure so deeply ingrained that it was performed when they were barely conscious.

That concludes the 4 stages of a freedive. Before practicing the full cycle of a breath-hold, we'll explore the dangers and sensations of hyperventilation.

HYPERVENTILATION GRAPH ONE



HYPERVENTILATION

Hyperventilation is defined as **breathing more than necessary to sustain the current level of metabolic activity**. While it's not uncommon for this to occur during the course of a day, it is extremely dangerous when combined with underwater breath-holding.

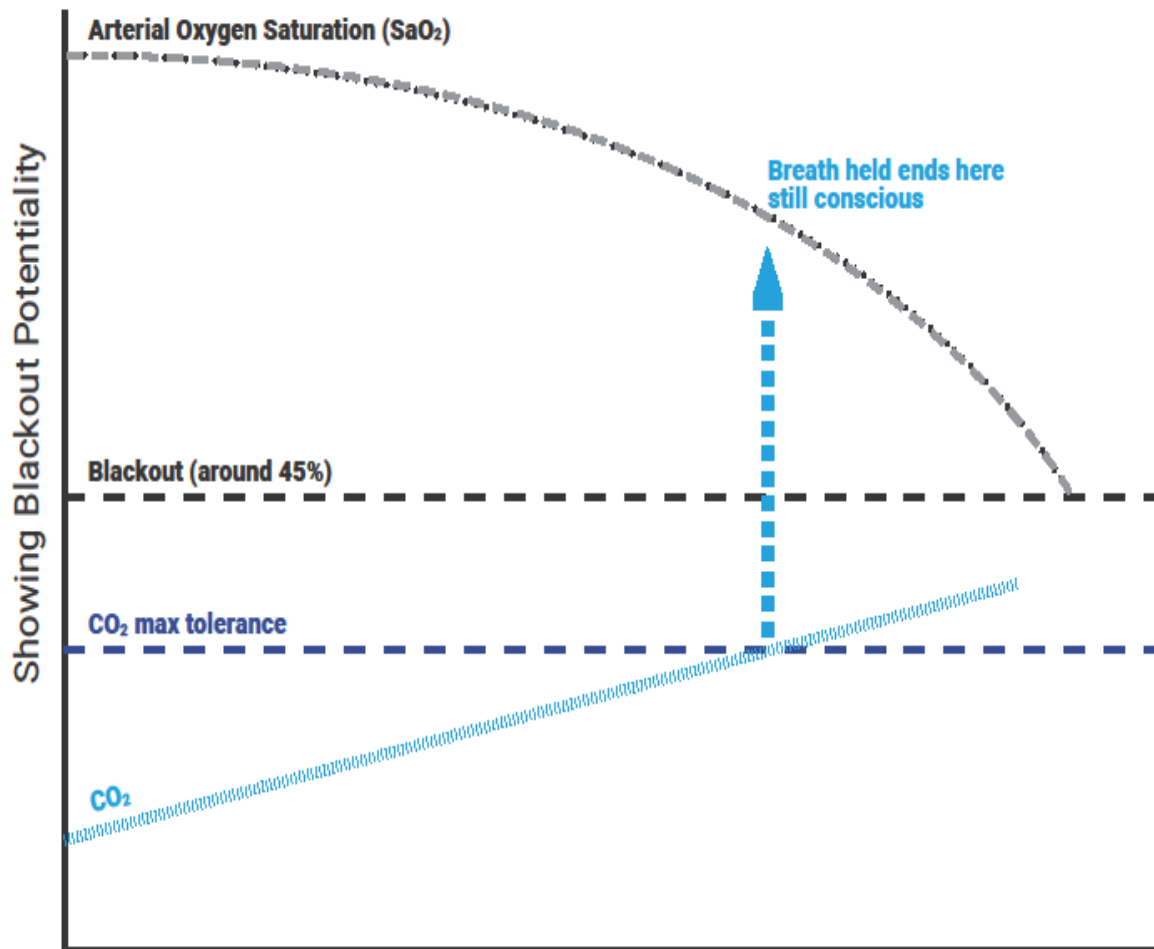
Hyperventilation raises the risk of a hypoxic blackout in the following ways.

- Reduced CO₂ increases blood alkalinity - reducing our ability to absorb oxygen (The Bohr Effect - see below).
- Low CO₂ delays the urge to breathe - further increasing the risk of hypoxia (Low Oxygen).
- Hyperventilation increases oxygen consumption by accelerating the heart-rate and stimulating the fight or flight response (sympathetic nervous system).
- The capillaries in the brain contract (cerebral vasoconstriction), reducing blood supply to the brain and contributing to loss of consciousness.
- Repeated dives with hyperventilation have a cumulative effect - progressively reducing the amount of oxygen available in your blood and tissues.

HYPERVENTILATION

In the below graphs you can see the relationship between CO₂ levels and the urge to breathe.

HYPERVENTILATION GRAPH THREE



THE BOHR EFFECT

The Bohr Effect describes the relationship between blood pH and Hemoglobin's affinity for oxygen. As CO₂ increases our blood becomes more acidic (lower pH), and Hemoglobin's affinity for oxygen decreases - allowing it to deliver its cargo of oxygen to the tissues.

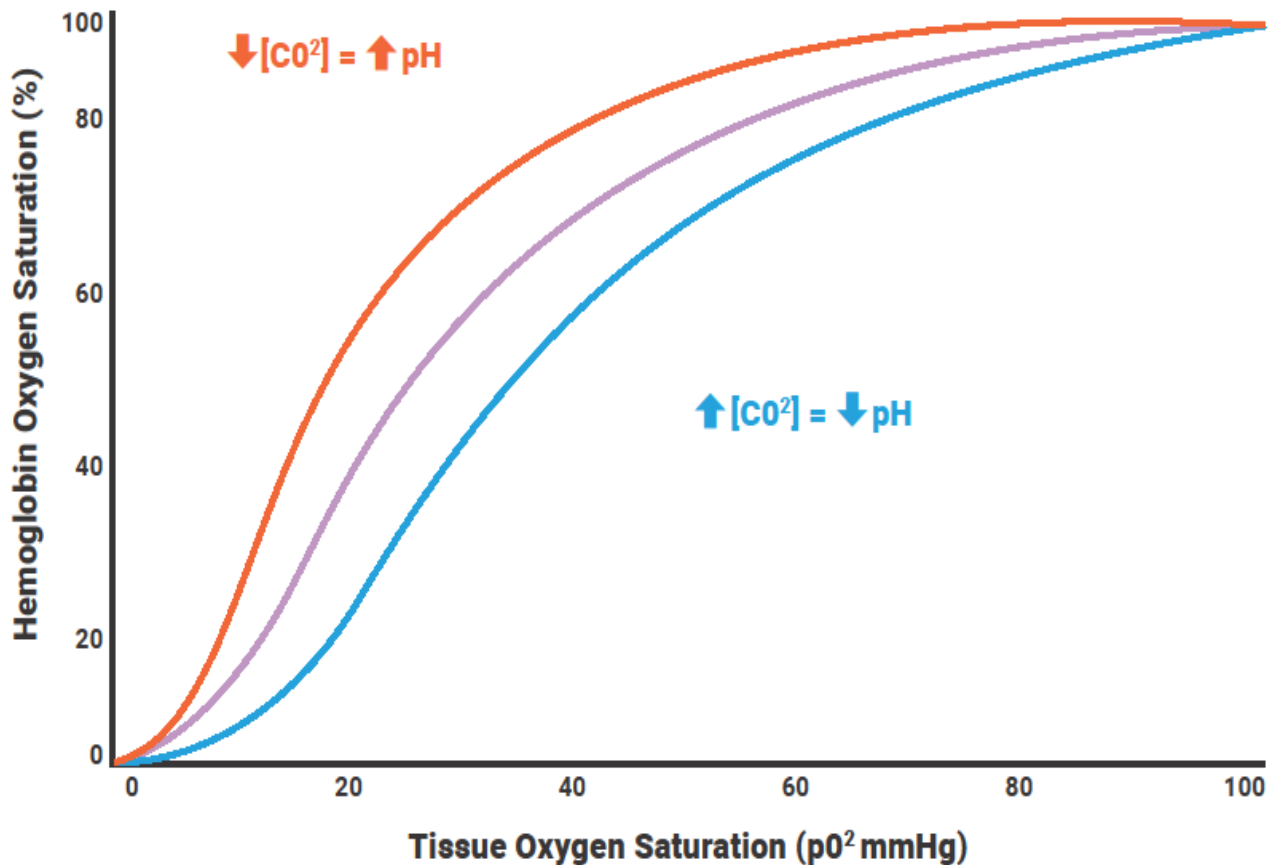
When we hyperventilate the opposite occurs - CO₂ is purged, our blood becomes more alkaline (higher pH) and hemoglobin's affinity for oxygen increases - causing it to withhold its store of oxygen, or to release it slowly, depriving our tissues and greatly increasing the risk of losing consciousness.

Sympathetic nervous system stimulation ('fight or flight response')

Hyperventilation stimulates the 'fight or flight response'. This is precisely the opposite of what we want as freedivers. The Relaxation Stage techniques discussed in this course are designed to stimulate the Parasympathetic Nervous system (Relaxation response).

HYPERVENTILATION

Adrenaline, racing heart, vasoconstriction, and the flood of stress hormones that come with hyperventilation, all contribute to a massive increase in our oxygen usage.



SENSATIONS/SYMPTOMS OF HYPERVENTILATION

The technical term for low CO₂ caused by hyperventilation is Hypocapnia. Developing the ability to feel the more subtle signs of **hypocapnia** takes time and practice. Below is a list to provide some guidance, but not having these symptoms does not necessarily mean you are not **hypocapnic**.

The best prevention is to use the conservative Relaxation Stage breathing pattern described in this manual, and to engage some of the dry practice suggestions that follow, in order to refine your sensitivity and tolerance.

Sensations / Symptoms could include the following:

- 'Light-headedness'/Mild-to-extreme euphoria.
- Dizziness/disorientation.
- Tingling in the extremities and/or all over the body.
- A metallic taste in the mouth.
- A contraction of the muscles in the hands and/or feet - 'carpopedal spasm'.
- Convulsions.

BREATHWORK FOR FREEDIVING

- Unconsciousness.
- An unusual feeling of well-being.
- Sudden extreme hunger.

BREATHWORK FOR FREEDIVING

For the following practices it's a good idea to have a metronome - or metronome app for your phone. A stop-watch is also helpful, but having an audio cue makes it easier to relax while tracking your time.

COHERENT BREATHING

In this practice inhale and exhale are of equal lengths - six seconds each (12 seconds total per breath). As you breathe in and out, feel the abdomen, lower back, and sides below the ribs expand and contract - working toward a natural, easy, and minimal flow of breath.

Focus primarily on the lower breathing space and don't allow the ribs and upper chest to expand - otherwise you may hyperventilate.

With each exhalation, feel your body relax - releasing tension as you notice it.

This practice is beneficial for the entire circulatory system - saturating the capillary bed with fresh blood on every exhale. With time and practice you'll be able to feel this surge of blood to your extremities.

Technique

1. Inhale for 6 seconds - Filling the lower breathing space only (diaphragmatic breathing).
2. Exhale for 6 seconds - Using the abdomen/diaphragm and focusing on the feeling of release/relaxation.
3. Optional - introduce a pause after exhalation. Length of the pause should be no longer than you can sustain repeatedly without altering the breathing pattern.

Adding a pause at the end of exhalation will amplify the relaxation effect of the exhale and enhance circulation even more. A 5 or 10 minute session is good.

CONTROLLED PAUSE

Controlled Pause is a technique developed by a Ukrainian Doctor named Konstantin Buteyko in the 1960s. He created a system for enhancing health and resolving many conditions using very simple breathing techniques.

To begin learning the controlled pause sit comfortably and relax for five or ten minutes (if you've been practicing Coherent breathing or Tidal breathing – this will count as relaxation time).

Take a few normal breaths then exhale passively - like a sigh - and hold your breath until you feel a definite urge to breathe. Between each hold breathe as normally as possible. The first couple of breaths will be deeper than usual, but you should quickly return to normal. **There should be no gasping or heavy breathing.**

Allow yourself a limited and consistent number of breaths between holds. The holds should be sustainable so you can hold for a certain number of seconds, take a certain number of breaths and be able to repeat that pattern indefinitely.

A practice of 9-12 minutes will give the increased CO₂ time to migrate through the blood/brain barrier and reset the respiratory center - at which point you may notice it becoming easier.

Technique

1. Take x number of normal, relaxed breaths.

A NOTE ABOUT BREATHWORK

2. Normal, un-forced exhale (no pushing air out).
3. Pause the breath until you feel a definite urge to breath.
4. Take x number of breaths (no gasping or heavy breaths).
5. Repeat for 9 to 12 minutes.

In the beginning most people average about 15 seconds. Buteyko asserted that a person in excellent health should have a controlled pause of 40 seconds or more. Don't be discouraged if you're on the low end of this at first.

Consistent practice will bring rapid improvements - but don't overdo it. This should not be a strenuous exercise, nor should you over-breathe to make it easier. It is better to practice a little every day, than a lot less often.

DRY STATIC BREATH HOLDS

If you choose to practice dry static breath-holds limit yourself to no more than 3 - 5 per session, following the pattern below.

1. Two to three minute relaxation stage.
2. Pre-dive breath.
3. Breath-hold. Start with up to a minute, then progress as you feel comfortable.
4. Recovery breaths + OK sign.

EXPERIMENTATION DURING DRY PRACTICE

Dry practice is the time to experiment and learn how different breathing patterns affect you. It is a safe place to learn to recognize the more subtle symptoms of hyperventilation.

Feel free to try breathing a little too much and see what you notice - then use controlled pauses to bring CO2 back to normal. Be advised that excessive hyperventilation can result in a blackout - even without a breath hold.

A NOTE ABOUT BREATHWORK

The breath is a powerful tool. Pushing breath-holds carries a number of risks. When assessing the practices above, pay attention to how you feel after practice and throughout the day. You should feel relaxed, at ease and mildly energized after a session. If you find yourself becoming irritable, hyper, euphoric, or fatigued - you are probably pushing too hard. Never train breath-holds obsessively or forcefully. Also be aware that breathwork can release held emotions and memories in the body.

You will progress more quickly and sustainably with an easy and enjoyable practice. Throughout these practices attend to the sensations that arise and relax.

Yogis and competition freedivers who train breath-holds regularly develop sensitivity to the effects gradually over long periods of time and employ a number of interventions to help avoid problems.

Some of these are explored in the RAID Advanced and Master Freediver Courses.

TECHNIQUE

Refining your swimming and surface entry skills will greatly enhance your freediving experience. In time you'll learn to use no more effort than absolutely needed, while remaining hydrodynamically efficient.

In the following sections we'll discuss various aspects of swimming techniques for confined water.

FINNING TECHNIQUE

Freedivers use a modified version of the 'flutter kick' used by swimmers. The movement should come from your hips; toes pointed and knees as straight as possible.

Your kick should be roughly equal front-to-back and unhurried, with minimal knee bend.

Too much knee bend will make your fins slide through rather than against the water, losing efficiency because the blades don't encounter enough resistance to flex.

The amplitude (size) of your kick depends on the material and stiffness of the fin blade. Too much amplitude will result in more drag, while too little will not allow the fin blades time to flex and return, reducing speed and efficiency.

Take some time and feel your way into the best stroke for your fins.

To recap on finning technique:

- Flutter kick.
- Movement comes from the hips.
- Straight knees.
- Wide amplitude (but not so wide as to cause drag).
- Same amplitude kick forwards and backwards.
- Allow the resilience of the blade to finish the stroke.
- The same speed as a relaxed walk.
- Tuned to your fins.



Your instructor will give you tips to improve your finning technique.

RAID NOTE: No-fins and monofin techniques are discussed in the **RAID Advanced and Master Freediver courses.**

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LICENSE AGREEMENT

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ACKNOWLEDGEMENTS

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