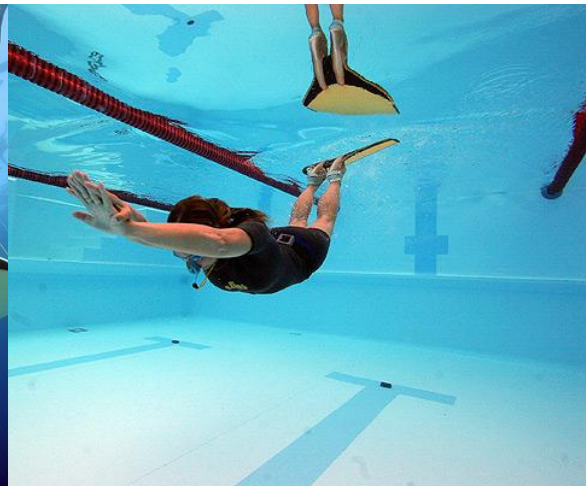
AIDA** FREEDIVER COURSE



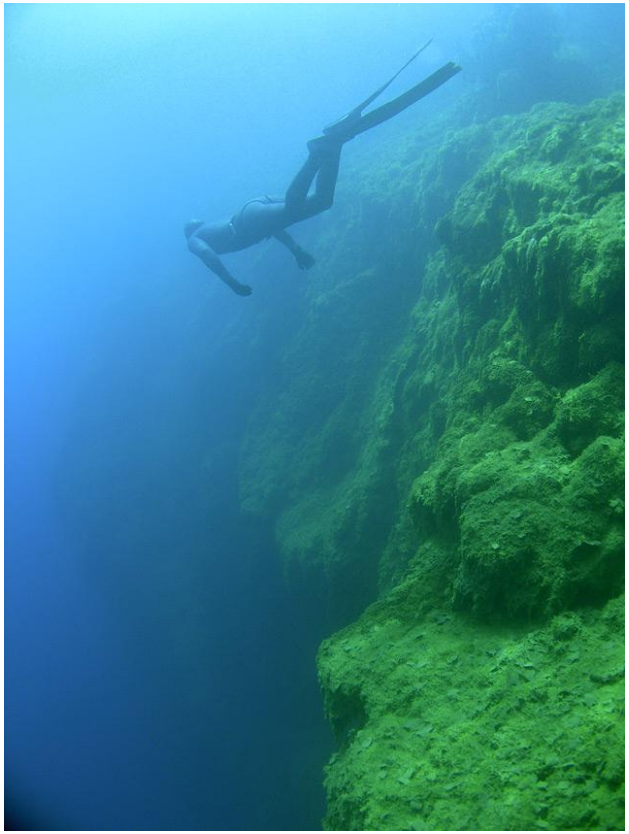



What is AIDA?

- International Association for the Development of Apnea
- Freediving Competitions
- Recognition of Freediving Records
- Freediving Courses
- www.aida-international.org

What is Freediving?

- What does it mean to you?
- Getting to know yourself
- Recreational Freediving
- Underwater Photography
- Spearfishing
- Underwater Hockey and Rugby
- Competitions and records
- Peaceful silence



Course Content

- Theory sessions
  - Physiology
  - Depth and Pressure
  - Equipment
  - Disciplines
  - Safety

Course Structure

- Minimum 2 theory sessions
- Minimum 1 Breathing session on land
- Minimum 1 Static Apnea sessions
- Minimum 1 Dynamic Apnea sessions
- Minimum 3 Open Water sessions

Course structure

Static Apnea

- Breathing techniques
- Relaxation
- Breath holds
- Contractions
- Recovery breathing and position
- Buddy procedures
- Rescue practise

Course structure

Dynamic Apnea

- Proper weighting
- Finning technique and body position
- Recovery breathing
- Safety with other pool users
- Buddy procedures
- Rescue practise

Course structure

Open Water sessions

- Breathing – preparation and recovery
- Relaxation
- Weighting
- Duck diving
- Body positioning
- Finning technique
- Pull-downs - to practice slow movements, body positioning, equalising
- Rescue practise

Theory 1

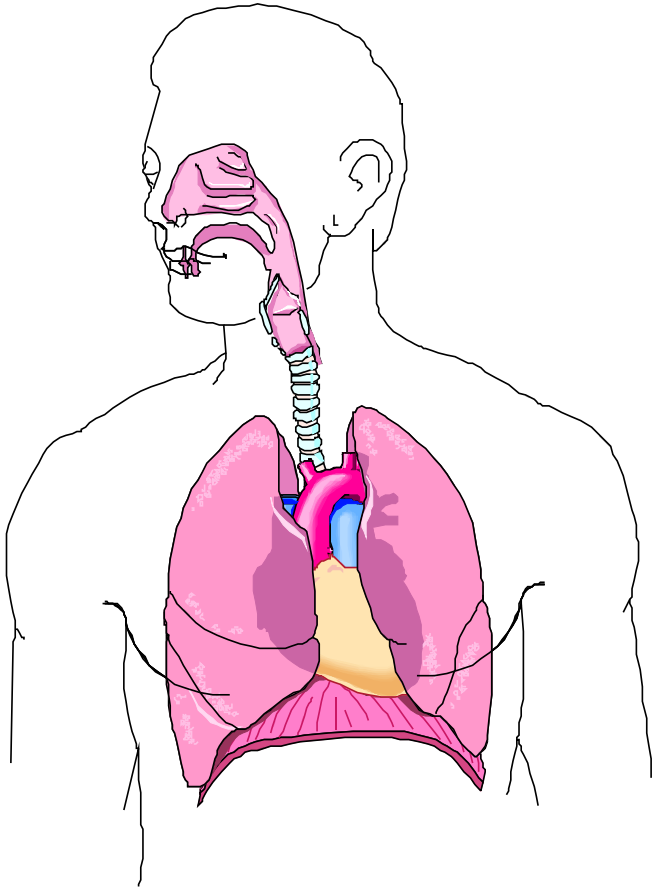
I. Physiology and Breathing for Freediving
II. Depth and Pressure
III. Equipment for Freediving

I. Physiology and Breathing for Freediving

1. The Respiratory System
2. The Circulatory System
3. Mechanics of Breathing
4. How do we know when to breathe?
5. How to breathe before and after breath hold dive?
6. Hyperventilation
7. Breathing exercises

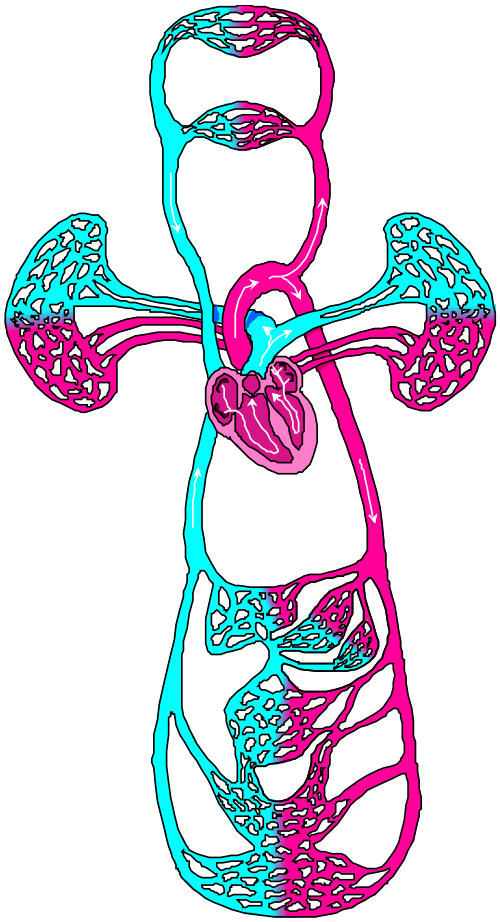
The Respiratory System

- Is made up of the nose, diaphragm, lungs and air passages
- Air travels in through the nose or mouth, to the trachea, bronchi, bronchioles and into the alveoli
- From the alveoli, gas exchange between the lungs and blood takes place



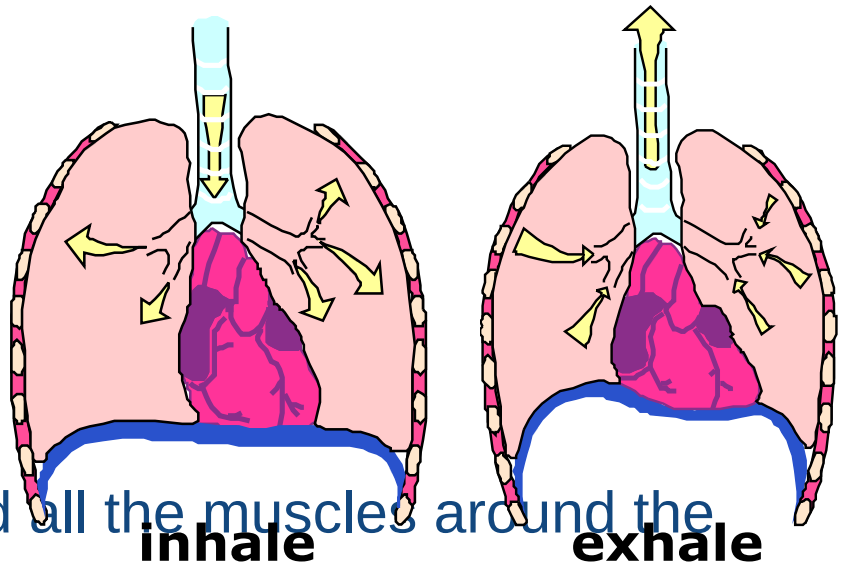
The Circulatory System

- The heart pumps blood around the body and to and from the lungs
- Blood transports oxygen around the body
- Oxygen is carried by the red blood cells, bonded with haemoglobin
- Carbon dioxide is transported back to the lungs carried in blood plasma



Mechanics of Breathing

- Air enters the body when the pressure is lower inside the lungs (inhalation) and leaves when the pressure in the atmosphere around the body is lower (exhalation)
- The main muscle involved in creating these pressure changes is the diaphragm, helped by the intercostal muscles (between the ribs) and all the muscles around the chest area.



How does the body know when to breathe?

- The urge to breathe arises when the CO2 level in the blood increases past a certain level, and not when the O2 level is too low.
- There is always a certain amount of CO2 in the blood, which the body tries to keep stable by regulating the intensity and frequency of our breathing.
- When this level increases, we breathe more (ex. during and after running), and when it decreases we breathe less (ex. during sleep when we produce less CO2, or sulking children after they stop crying!)

How does the body know when to breathe?

- The urge to breathe manifests as a “burning” sensation of the diaphragm, or as contractions.
- When this happens, your body has still O2 available to use, so you can keep holding your breath for some time.
- Use the urge to breathe as an alarm: when it comes slowly get ready to surface.
- With the practice you will be able to extend your ability to hold your breath enduring the urge to breathe/contractions.

Hyperventilation

- Hyperventilation practised in freediving can be described as conscious or subconscious over-breathing
- This doesn’t store more O2, but lowers the level of CO2 in our blood
- This will delay the urge to breathe, until the CO2 will raise above its normal level
- This is why hyperventilation is dangerous: if you don’t have the urge to breathe, you will not know how far you can go

Hyperventilation

- Hyperventilation can accelerate the heart rate and metabolism, reducing breath hold times
- Symptoms of hyperventilation include euphoria, tingling in the extremities, light headedness, dizziness, numbness around the mouth, a metallic taste in the mouth or semi paralysis of the hands
- If you experience any of these symptoms, breathe normally and do not dive until they go away

How to prolong dives without hyperventilation

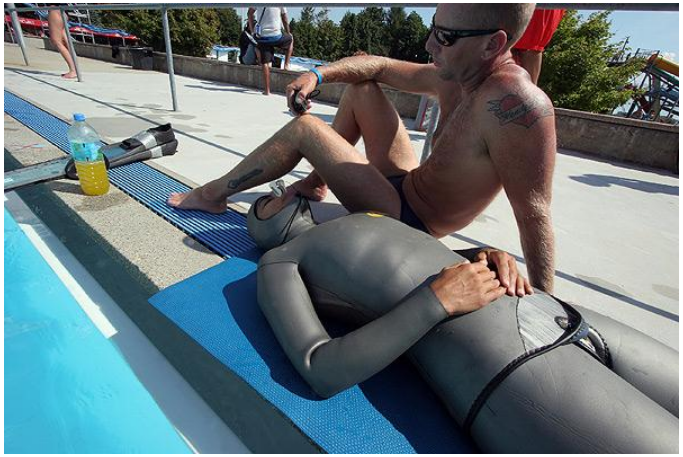
- CO_2 tolerance: training to tolerate higher CO_2 levels will ultimately result in longer, safer breath hold times
- Relaxation of mind and body: during the breathe-up and the dive will minimize CO_2 production delaying the urge to breathe in a safe way

How to breathe before and after a breath-hold dive

- Breathe from the abdomen - belly breathing
- Preparation -relaxed, calm, controlled, conscious of your breathing
- Exhalation longer than inhalation
- Deep and slow
- Ensure your final breath is complete
- Avoid hyperventilation
- Recovery – deep quick full breaths in, relaxed passive exhalations

Breathing exercises

- Abdominal breathing
- Inhale and exhale through the mouth
- Breathe in for a count, out for twice as long
- Feel your heart slowing down



Physiology - Summary

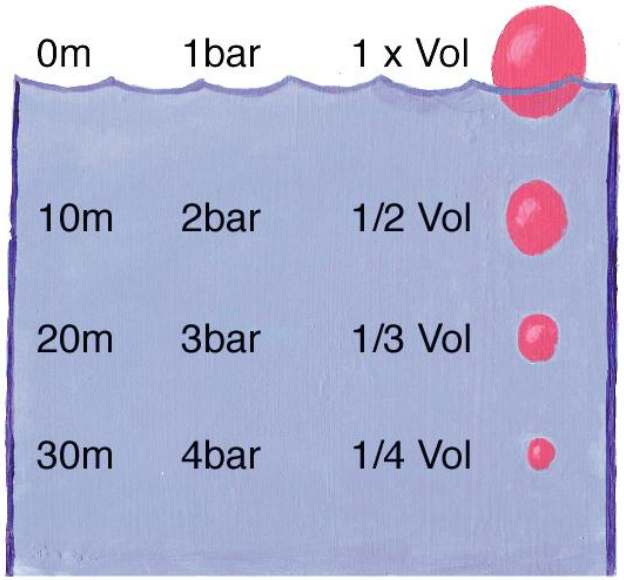
1. The Respiratory System
2. The Circulatory System
3. Mechanics of Breathing
4. How do we know when to breathe?
5. How to breathe before and after a breath-hold dive
6. Hyperventilation
7. Breathing exercises

II. Depth and Pressure

1. Effects of depth and pressure on the body's air spaces
2. Equalisation
3. Techniques of equalisation
4. Avoiding equalisation problems

Depth and Pressure

- Most noticeable effect on the body of a descent into water is pressure
- Pressure increases at approx 1 bar for every 10m of sea water
- Boyle's Law - "if the temperature remains constant, the volume of a gas is inversely proportional to the absolute pressure"



Equalisation

- Your body contains air spaces
- Main air spaces - ears, sinuses, lungs, mask
- You will need to equalise the pressure in the ears, sinuses and mask to descend comfortably
- No need to equalise these air spaces on ascent

Equalisation Techniques

- Ears
  - Valsalva Manoeuvre
  - Frenzel Manoeuvre
- Mask
  - Equalise the mask
  - Exhale into it through the nose
- Sinuses
  - They usually equalise automatically with the ears

Avoiding Equalisation Problems

- Equalise frequently and gently
- Slow your descent if necessary
- Never force an equalisation
- Do not dive with a cold or congestion
- Avoid using decongestants
- Relax while you free dive
- Tuck your chin in and relax your head and neck
- Swallowing - to help clear a “sticky ear”

Depth and pressure - Summary

- Effects of depth and pressure on the body’s air spaces
- Equalisation
- Techniques of equalisation
- Avoiding equalisation problems

III. Freediving equipment

What equipment do we use and how is it different from scuba or snorkelling equipment?

Freedive Masks

- Low volume, smaller than scuba masks - so easier to equalise
- Flexible, so it can be compressed more without being uncomfortable
- Clear lenses enable your buddy to see your eyes more easily

Bi-Fins

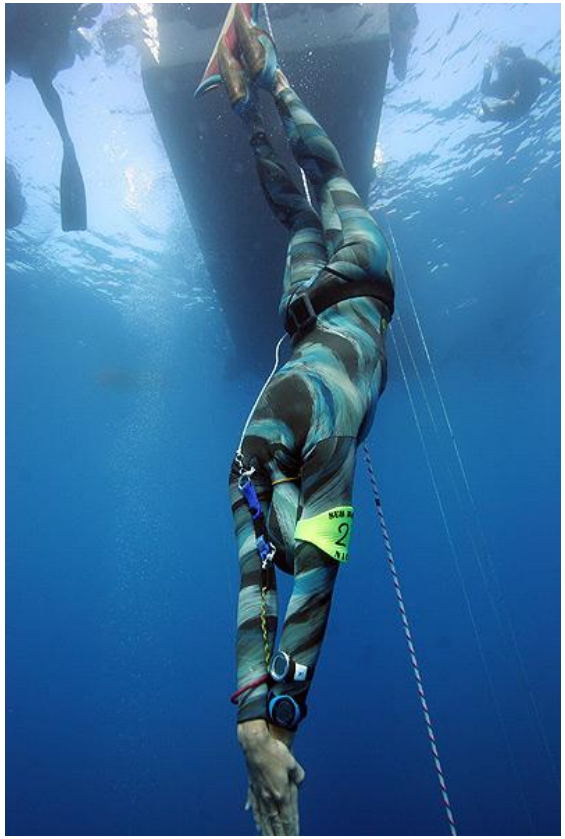
- Longer and more powerful than scuba fins
- Full foot fins
- Different materials: plastic, fibreglass or carbon fibre

Monofins

- Different technique, takes time to learn
- More powerful than bi-fins
- Not as manoeuvrable

Wetsuit

- Ideally made to measure, close fitting
- Integrated hood
- Usually long john or high trousers and separate jacket
- No zips for minimum flush
- Open cell neoprene for warmth and mobility
- Fragile!



Weightbelt and Weights

- Worn on hips rather than waist to help deep breathing
- Rubber, so belt stays on hips when stretched tight
- Small, hydrodynamic weights
- Quick release
- Seals suit

Snorkel

- For breathing on the surface or watching your buddy
- Rigid
- With/without purge valve
- Attach something to it so it can float
- Remove it from your mouth as you descend to help hydrodynamics and protect you in case of black out

Lanyard

- For attaching you to the descent line so you do not lose your bearings
- For rescue purposes where a counterweight is used
- Quick release at wrist and rope end

Buoy and Line

- High buoyancy in buoy
- Handles to hold on to
- Flat for resting
- Line firmly attached to the buoy
- As light bottom weight as possible for safety - consider conditions and purpose of dive
- Bottom plate – white or with lights

Freediving equipment summary

- Mask
- Wetsuit
- Fins/Monofin
- Weightbelt and Weights
- Snorkel
- Lanyard
- Buoys and lines

Theory 2

I. Freediving Disciplines
II. Safety – BO and LMC, what else affects your dives, Freediving and Scuba diving
III. The Environment

I. Freedive Disciplines

- Within AIDA there are:
  - 8 freediving disciplines
  - 6 are competitive disciplines
  - 2 are only for pleasure or records
  - In this course you will try 4 of them

Static Apnea

- Breath hold, face do
  in the pool
- Competition disciplin
- Mind game!
- Good training for oth
  disciplines
- Current world records

Dynamic Apnea

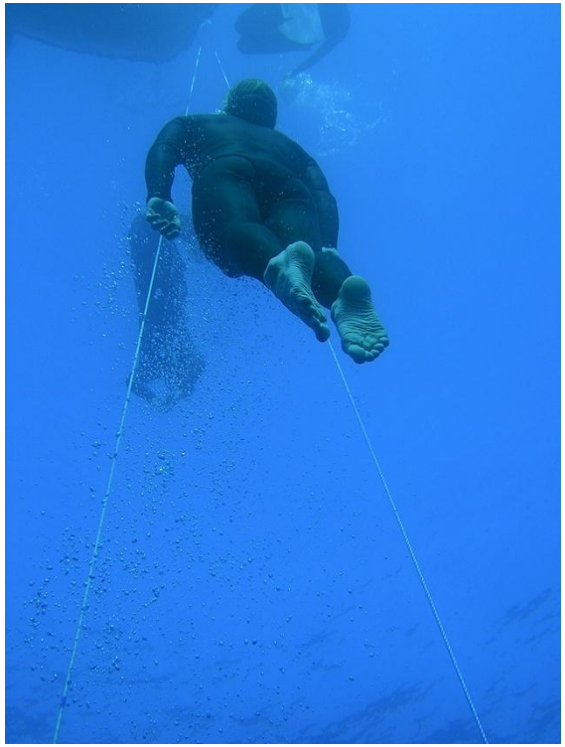
- Distance covered in one breath - horizontally
- With/without fins
- Competition Discipline
- Current world records

Constant Weight

- Swim down and back up using the same amount of weight
- With/without fins
- Grab the rope only to turn
- Competition Discipline
- Current world records

Free Immersion

- Pulling yourself down and back up a line, no fins
- Competition discipline
- Good as a warm up for Constant Weight to save your legs
- Current world records

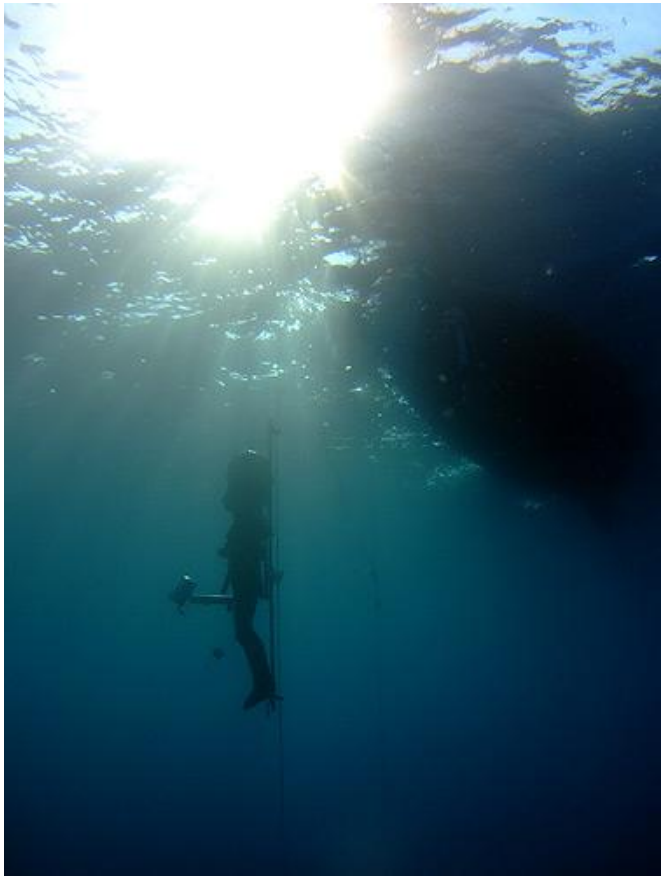


Variable Weight

- Descend with weight or sled
- Ascend without weights
- Ascend swimming and/or pulling on the line
- Current world records

No Limits

- Descend on a weighted sled
- Ascend using an air filled lift bag or other buoyancy device
- Current world records



Freedive disciplines summary

- Static Apnea
- Dynamic Apnea
- Constant Weight
- Free Immersion
- Variable Weight
- No Limits

II. Safety

1. Loss of Motor Control
2. Blackout
3. Preventing BO and LMC
4. Spotting a LMC
5. Helping a freediver with LMC
6. Spotting a BO
7. Rescuing a freediver with BO
8. Reducing the risks of a bad outcome from BO or LMC
9. What else affects your dives
10. Freediving and Scuba diving

Loss of Motor Control

- A loss of motor control (LMC) (also known as a “samba”) is a hypoxic fit triggered by low oxygen levels (hypoxia)
- A LMC occurs on the surface, after a dive or static breath-hold
- The freediver may not be aware of the LMC
- A LMC can be a series of uncontrollable muscle twitches and may be accompanied by confusion and a lack of responsiveness
- A LMC usually lasts only a few seconds and may or may not result in a full blackout

Blackout

- Is the loss of consciousness caused by hypoxia towards the end of a breath hold
- During a dive, O2 is used until the point where there is not enough left for the brain to function normally
- At this point the brain shuts down and the diver falls unconscious
- After recovery from a BO, the freediver may not be aware it has happened

Preventing BO and LMC

- The freediver should gain enough experience so that they can recognise the symptoms of low O2 and end the dive before experiencing a BO
- This requires a slow progression approach, with repetitions before increasing depths and times
- Self awareness and experience are the keys to safe progression!

Preventing BO and LMC

- After hyperventilation, stress is one of the main causes of BO. A stressed freediver will use much more O2 than a relaxed one
- A combination of stress, inexperience, bad technique and recovery are the most common causes of BO/LMC in novice freedivers

Preventing BO and LMC

Other factors to consider:

- Do not hyperventilate before a dive
- Dive within your buddy's limits
- Do not dive if you are tired or unwell
- Keep well hydrated

Spotting a LMC

Typical signs are:

- Loss of posture
- Uncontrollable twitches
- Facial distortion
- Lack of focus in the eyes
- Confusion
- Mumbling
- Trembling
- Reduced responsiveness
- Warning sign of possible close call – Cyanosis (blue lips and face)

Helping a freediver with LMC

1. Gently hold the freediver so his airways are out of the water
2. Remove facial equipment if needed
3. Reassure him
4. Advise him to stop diving for the rest of the day
5. Check for any injuries as a result of the LMC

Spotting a Blackout

Warning Signs

- None!
- Irregular kick
- Unfocused eyes
- Pulling line
- Escaping air
- Anything abnormal
- Speeding up at end of a dive

Warning Symptoms

- None!
- Ear ringing
- Feeling of warmth
- The dive starts to feel easier
- Tunnel vision
- Fuzzy thoughts
- Tingling sensation

Rescuing a freediver with BO

1. Get the diver to the surface
2. Hold him so his airways are out of the water
3. Remove all facial equipment
4. Blow, Tap, Talk
5. If he doesn't start breathing within ten seconds, give up to five rescue breaths
6. If no recovery, remove the diver from the water, commence CPR and seek emergency medical assistance
7. The diver should stop freediving for the day

Reducing the risks if a BO or LMC occurs

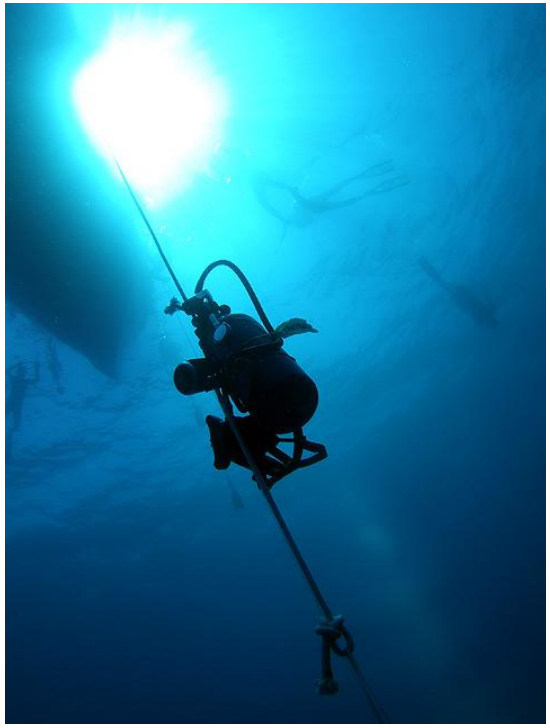
- **Never, ever freedive alone!**
- Weight yourself to float up from at least 10m
- Take the snorkel out of the mouth before you dive
- Have a buddy meet you for the last few metres
- Learn and practise rescue techniques
- Drop your weight belt at the first sign of trouble
- Grab hold of something as soon as you reach the surface
- If you think you should act - ACT!

What else affects your dives?

- Dehydration
- Low Blood Sugar
- Eating
- Smoking
- Decongestants
- Exercise
- Tiredness
- Relaxation/Stress
- Cold

Freediving and Scuba Diving

- If combining, leave at least 12 hours after a scuba dive before freediving to avoid DCS (or 18 hours after multiple dives)
- If using a dive computer, wait until the no-fly time clears
- Do not accept air from a scuba diver underwater



Safety - Summary

1. Loss of Motor Control
2. Blackout
3. Preventing BO and LMC
4. Spotting a LMC
5. Helping a freediver with LMC
6. Spotting a BO
7. Rescuing a freediver with BO
8. Reducing the risks if a BO or LMC occurs
9. What else affects your dives
10. Freediving and Scuba diving

III. Respect for the aquatic environment

- Pay attention to your surroundings
- Do not touch - be careful of long fins
- Do not chase or harass aquatic life
- Do not collect or remove anything
- Make sure the site is left as you found it, or better!

If you remember nothing else, remember this...

Never, ever freedive alone
Never push your limits
Relax and enjoy yourself !

Created by the
AIDA Educational Commission

(photos by Frederic Buyle and Kimmo Lahtinen)
(drawings by Kevin Busscher and Kimmo Lahtinen)