



APNEA **SURVIVAL**

***INTRO SURF APENA TRAINING
PROGRAM***

4 WEEKS

Program Objective:

Improve and static and dynamic breath holds.

Aim:

Improve breath hold durations and respiratory system function to enhance high heart rate breath hold performance

Combining nasal breathing, apnea training and specific exercise is a great way to improve breath hold durations. This is done by using a combination of CO2 threshold, tolerance, respiratory muscle, cardiovascular performance and improving body oxygenation. Initially you may find CO2 tolerance and nasal centric breathing exercises challenging. But please persist with the exercises, as they will become easier with time as your psychophysiology adapts.

The movement exercises prescribed can be and work best when combined with breathing or breath hold drills.

Scale any exertion rates / loading according to your skill level.

Key point to remember throughout this training is our breathing needs to be regulated, appropriate, adaptable, and controlled at all times. Unless we are carrying out breath holds in an aquatic environments or in a high stakes critical or competitive scenario, we need to maintain nasal breathing whenever possible.

Start a training journal and track of your performance whilst undertaking this training program.

- Record all training stats, sleep length and quality, diet - what you eat and drink (everyday), training loads, BOLT, MBT scores etc.
- Emotional response – record how you feel. Before bed each day or whenever you feel you need to unload something significant.

- Uncomfortable thoughts and feelings may surface during apnea training and breathing sessions. Record them in the journal

Program Delivery

The way this program is delivered is by listing options and alternatives for you to integrate into your existing training schedule. EG land based breath hold drills such as Altitude simulation can be combined with current exercise or conditioning training sessions.

Golden rule – If you're fatigued don't train - Rest!

Remember: Breath work is a powerful modality that can have a profound impact on a person's physiology. If you feel dizzy, tingling or any discomfort (greater than 7/10) lay down flat or in a recovery position, and allow your natural nasal breathing rhythm to commence. Stay there until the discomfort abates.

Dailys

To be performed every day

1. BOLT – BODY OXYGEN LEVEL TEST
Take your bolt score as soon as you wake up (every morning). Write the scores in a journal.
2. MBT – MAXIMUM BREATHLESSNESS TEST
Perform directly after the BOLT. Every morning. Write the scores in a journal.
3. AS – BREATHING ASSESSMENT QUESTIONNAIRE
Perform daily upon rising. Or same time every day.

Morning reset routine – Up to 2 x per week

Once you've completed the BOLT, MBT and AS perform the morning reset routine. Exceptions – if you're undertaking a specific apnea training session. In which case replace this routine with the apnea training session.

Note - This session can be used as a static apnea training session.

Evening routine – before bed daily

5 – 10 minutes immediately prior to sleep

THE MORNING RESET

THE PREP (5 minutes)

1. Sit in a comfortable position.
2. Initiate full lung nasal breathing with a natural tidal flow and a slight pause at the top and bottom of the breath. Focus on the breath as it moves in and out of the body remembering the stomach ribs and chest protocol from week one aiming for a 1-3 ratio between the inhale and exhale. (5 minutes)

THE RESET

- Nasal clearing – Nasal inhale for 2 counts sharp nasal exhale for 1 count – 2/0/1/0 (2 min).
- Superventilation (nasal inhale / mouth exhale) – Fast and full nasal inhale followed by full oral exhale (3 counts in 3 counts out). Pursing lips when youre blowing air out. Shifting as much air as possible pumping the diaphragm. Tip - to coordinate the fast pace of the breathing focus on either the inhale or exhale only and allow the other to occur naturally. Use the diaphragm like a pump, pulling the belly button to the spine and sucking the stomach and ribs in on the exhale. Fully inflate (stomch ribs and chest on the inhale, subtly arching back and rolling shoulders and hips back. (1 minute).
- On the last breath exhale passively through the nose, then pinch your nose and hold your breath for as long as possible. When you need to breath take one full inhale through the nose and hold again for as long as possible (If you have an oxipulsemeter wear it during the breath holds and see how low your O2 saturation drops). (AS LONG AS IT TAKES)
- When you need to breath following switch to relaxed, controlled nasal breathing starting with 3-5 counts inhale and a slow controlled exhale 9-15 counts. Pause slightly at top and bottom of the breath. Breathing should not be obvious and as light and relaxed as possible (1 minutes).

Complete five rounds.

Note:

- The nasal clearing protocol will cause material to be ejected from the nasal cavity. Be prepared for this. Use a cloth or towel to catch your ejections.
- Perform up to 2 – 3 mornings weekly (first thing)

EVENING ROUTINE

Daily – Evening (pre sleep) routine. Perform immediately before retiring to bed each evening.

BOLT - Take your bolt score immediately prior to performing the evening reset

EVENING – Full lung resonant frequency breathing

Preparation

1. Lay in a comfortable supine position along a foam roller (so it runs down the centre of your body) or across a bolster (so it runs across your upper thoracic. Allow your arms to hang out in a crucifix manner, scan your body and relax it completely. If you don't have a bolster or foam roller, lay flat on the floor in a fully relaxed dead body to position.
2. Perform 2 – 3 physiological sighs. (A physiological sigh is a deep, reflexive breath taken in through the nose in the form of a large or double inhale followed by a moderately forced long exhale via the mouth. This will recalibrate your body's carbon dioxide levels and oxygenation.
3. Initiate full lung nasal breathing with a natural tidal flow and a slight pause at the top and bottom of the breath. Focus on the breath as it moves in and out of the body remembering the stomach ribs and chest protocol from week one aiming for a 1-3 ratio between the inhale and exhale. (5 minutes)

The Drill

Full Lung Resonant Breathing. Will induce deep relaxation, allay your autonomic nervous system and recalibrate all your body's running systems.

1. Continue laying in a supine position on the floor as per the preparation phase
2. Breathe only through the nose using your natural resting breath cadence.
3. Remember to think of the torso as a 360° cylinder. All sides need to expand during the inhale and then contract during the exhale.
4. Inhale for a count of 3-5 and exhale for a count of 9-15 or whatever you're comfortable with. Note: when exhaling you are releasing the same amount of air as you inhaled, but slower and with more control. If you're not able to perform 5/15 try 2/6 or 3/9. Wherever you fall, try as best you can to maintain the ratio of 1:3 for Inhale : Exhale.
5. Still breathing through the nose only. Draw the air in from low to high combining stomach, ribs and chest into one single movement while inhaling and exhaling. Once you've got the hang of this focus on the timing of your breath. Inhaling for 4-5 counts, slight pause then exhaling gently and controlled for 10-15 counts followed by another pause at the bottom of the exhale then inhale again.

6. Soften and quieten your breathing as you get further into the drill. Try to make it so soft and gentle it is undetectable. Remove the emphasis on the mechanics and inflation of the chest.
7. Gently breathe in and out of the stomach ribs only.
8. Soften and slow your breathing further.
9. Aim to reduce your breathing cadence to 3-5 breath cycles per minute. As breathing is lowered, slowed and lengthened, mechanical movement will also be reduced and breathing should become more and more subtle as your relaxation deepens.
10. Continue for 10 minutes.
11. Go straight to bed following this drill.

Apnea training drills – Land

Group A

1. Altitude simulation training routine

- Perform this as a full session 1 x per week.
- Use any piece of cardio equipment you like Eg Assault bike, spin bike, rowing ergo, treadmill, running, etc (anything that gets your heart rate up quickly).

1. Warm up (5 min)
2. Level 1 (4 min)
3. Level 2 (5 min)
4. Level 3 (5 min)
5. Warm down – Low intensity (50%) Long slow and low nasal breathing. Focus on relaxation (5 min)
6. Relaxation - If time permits – resonant frequency full lung breathing (5 min)

***Note : Do not perform Altitude simulation drills in the water.

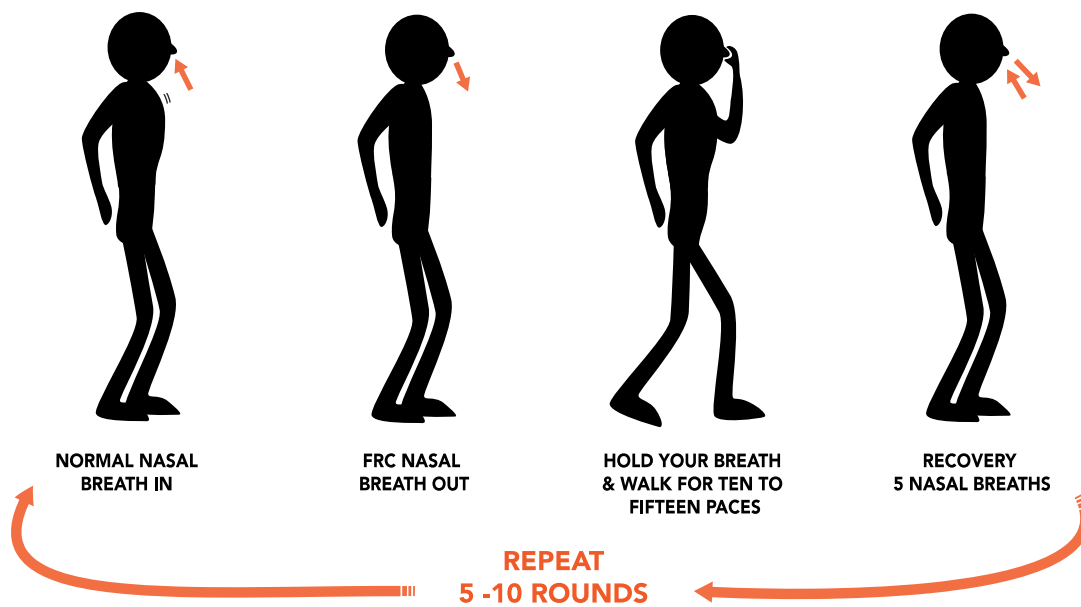
1. Altitude simulation warm up

- Warm up (hypoxia session preparation)
- Warm up objective – Prepare the body for apnea training.

Method – Walking exhale breath holds performed to a tolerable air hunger (60-70% of maximum perceived rate of exertion (PRE))

- a) Breathing only through the nose
- b) Take a normal relaxed breath in and normal relaxed breath out.
- c) Pinch nose and hold the breath.
- d) Whilst holding breath, walk for 10-15 paces.
- e) Stop walking – recover – 5 breaths.

Repeat 5 to 10 rounds.



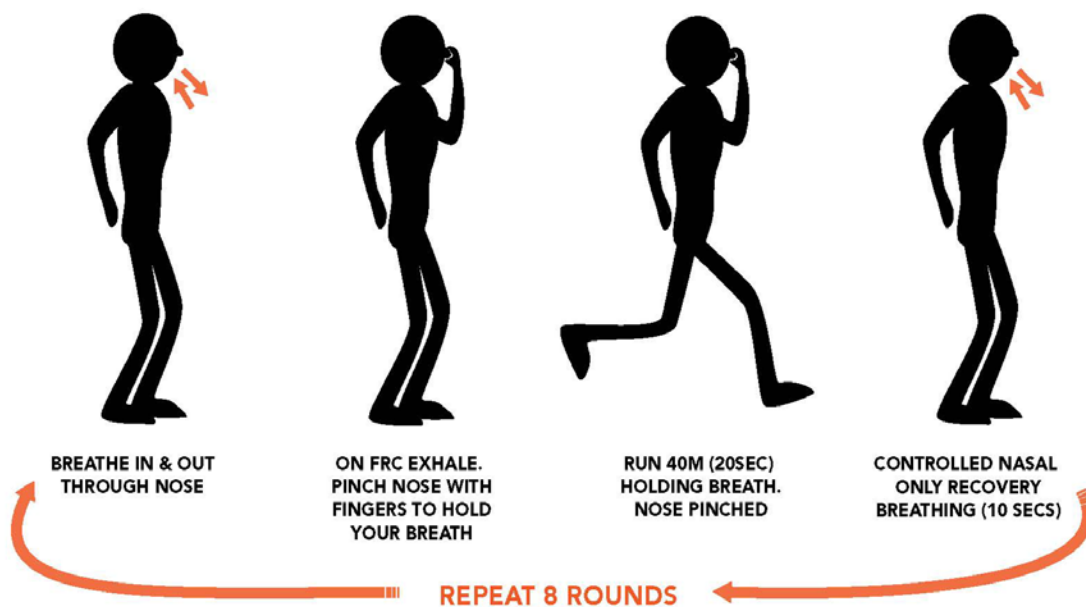
Recovery breathing for altitude simulation warm up.

- Warm up recovery breathing objective – Maintain a comfortable air hunger.
 - Method – Slow controlled nasal breathing.
- a) Stop walking and release your nose.
 - b) Stand in a relaxed stationary position.
 - c) Inhale through your nose and resume relaxed nasal breathing.
 - d) Relaxed and controlled inhales (2-3 counts)
 - e) Pause slightly 2-3 counts.
 - f) Relaxed and controlled exhale long and slow (6-9 counts) pause and repeat.

2. Altitude Simulation Drill – Level One

- Level one session objective – Lower O₂, elevate CO₂, create a strong air hunger.
 - Method – Running exhale breath holds to a strong air hunger (70-85% of max PRE) with limited rest.
- a) Breathing only through the nose
 - b) Take a normal relaxed breath in and normal relaxed breath out.
 - c) Pinch nose closed and hold your breath.
 - d) Whilst holding your breath jog for 40 Meters (10 sec)
 - e) Stop – recover – nasal breathing for 20 sec.

Repeat 8 rounds.

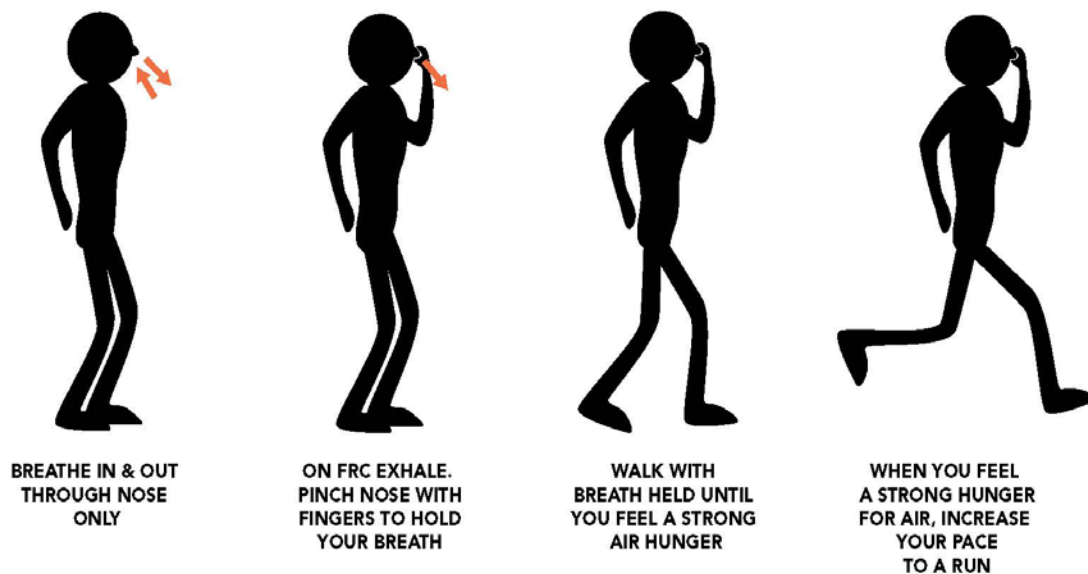


ALTITUDE SIMULATION - LEVEL1

3. Altitude Simulation Drill – Level Two

- Objective –Lower O₂, elevate CO₂, create a strong air hunger, and restrict recovery – High Intensity (IHHT)
 - Method – Running / row / bike / battle ropes with exhale breath holds @ high intensity air hunger (85% to Max PRE) with dynamic rest.
1. Breathing only through the nose
 2. Take a normal relaxed breath in and normal relaxed breath out.
 3. Hold breath.
 4. Whilst holding the breath, walk until a strong air hunger is acquired.
 5. When a strong air hunger is felt, continue holding the breath and move from a walk to a run.
 6. Continue running to break point.
 7. Upon reaching break point, recover by walking and breathing only through the nose for 20 sec.

Repeat continuously for 5 -10 minutes. Scale according to skill level.



ALTITUDE SIMULATION - LEVEL 2.1



**CONTINUE RUNNING
UNTIL BREAK POINT**



**WHEN YOU NEED
TO BREATHE, LET GO
OF NOSE & BREATHE
THROUGH YOUR NOSE**



**WALK 20 SECONDS
BREATHING THROUGH
NOSE ONLY.
REPEAT 5-10 MINUTES**

ALTITUDE SIMULATION - LEVEL 2.2

4. Altitude Simulation Drill – Level Three

- Create resistance to breathing mechanics by using sports training mask.
- Objective –Lower O₂, elevate CO₂, create a strong air hunger, and restrict recovery – High Intensity (IHHT)
- Method – Running / row / bike / battle ropes with exhale breath holds @ high intensity air hunger (85% to Max PRE) with dynamic rest.

Note: As per level 1 or 2 but wearing the Oxygen Advantage Sports training mask.

5. Hypoxic / Hypercapnic tolerance – Altitude simulation - Static FRC table (Land use only)

Perform 1 x per week as a stand-alone session.

Static breath holds form the foundation for all subsequent breath holding sessions and also provide a good retest to benchmark progress. Performance this table once per week and alternated with other breath holding sessions.

The exhale static table is designed to adapt the body to higher levels of CO₂ and reduced levels of O₂ by reducing the duration rest between fixed breath holds. The duration of the timed breath hold should not exceed 50% of your personal best for an exhale static breath hold and the table should consist of not more than 8 cycles.

The following 8 cycles are based on a personal best exhale static breath hold of 2 minutes. Total drill duration 25:15 min.

The static FRC table is performed to a tolerable air hunger (60-70% of maximum perceived rate of exertion (PRE))

Taking the last breath

- Breath only through the nose
- Take a normal relaxed breath in and normal relaxed breath out
- Pinch nose and hold the breath

Rest	Hold
1.00	1.00
1.00	1.00
1.00	1.00
1.00	1.00
1.00	1.00
0.45	1.00
0.30	1.00

0.15	1.00
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Recovery breathing for Exhale static breath hold tables

Hook breathing.

The inhale first or hook breathing technique maintains O₂ pressure in the lungs and increases diffusion of O₂ throughout the body.

How to do it.

1. As soon as you break the breath hold, inhale a full breath deep into the lungs.
 2. Hold your breath for 1 – 2 seconds.
 3. Create pressure around your lungs. While holding your breath exert slight force onto your lungs by flexing your torso, abs, ribs, diaphragm and chest
 4. Passive Exhale. After 1 – 2 seconds passively exhale (don't force it).
 5. Repeat 3 breath cycles (steps 2 – 4).
 6. Commence normal natural breathing. Do not hyperventilate just breathe at a normal, natural pace in and out through the nose.
 7. Rest.
- The noise made during the inhale ideally sounds like "HOO" (as in 'who')
 - The noise made when exerting pressure through the lung space ideally sounds like the start of a word beginning with K IE a short 'Ka' sound.
 - Together both the 'HOO' and the 'K' "HOOK". Hence the name 'HOOK' breathing.

How to find your current max exhale static breath hold

You will need to find your max exhale static breath hold time in order to calculate your training tables. To do this undertake the following:

- Repeat the below sequence anytime you are testing your max static FRC breath hold.
- Perform the test at the same time of the day each time you do it. Preferably first thing in the morning after a good night sleep.
- Warm up - relaxation – full lung nasal breathing (5 minutes).

Method

Every 4 minutes on the 4 minutes. E.g. if your first breath hold is 60 seconds you'll have 3 minutes rest before you start the next one. If it is 1.00 you'll have 3.00 rest and so on.

During the rest periods recover naturally by using hook breaths to reoxygenate your system followed by 3-5 superventilations to dump excess CO₂.

Then return to normal relaxed tidal breathing until you're ready to take the last breath in

and out again.

4 x exhale breath holds on the 4 minutes (warm ups).

Rest 3 minutes (FRC breathing)

1 x max breath hold (PB attempt)

Record the time of the longest breath hold and use it as your PB for calculating future training tables. Re jig the training table times pending your new PB.

Note: if new PB is obtained in first attempt it is not necessary to commence a second PB attempt. Retest PB once per month.

Group B

Full lung static tables

1. Hypercapnia threshold table

Definition Hypercapnia

- Hyper – Higher than normal levels
- Capnia - CO₂ in blood
- Hypercapnia – Higher than normal levels of CO₂ in the blood

Hypercapnia threshold training

Hypercapnia or CO₂ retention training consists of drills performed with a higher-than-normal carbon dioxide (CO₂) levels in the blood. CO₂ is elevated during exercise and normally expelled through the lungs by increased breathing. When we hold our breath CO₂ is not expelled and accumulates in our blood and lungs and drives a much stronger urge to breathe. This may result in an intense exercise experience.

Hypercapnia thresh-hold training results in the body shifting the set point for how CO₂ stimulates breathing and conditions our system to be more comfortable with higher baseline levels of CO₂.

Hypercapnia thresh-hold training benefits include:

- Increased tolerance to CO₂
- Increased tolerance to stress
- Increased performance during high stress situations
- Enhanced exercise and breath hold recovery times
- Enhanced dive response activation
- Makes breath holds more comfortable

- Lengthens breath holds
- Slows (decreases) the onset of the urge to breathe and our normal breathing rate

Hypercapnia training table

The CO2 static table is designed to adapt the body to higher levels of CO2 by reducing the rest duration between fixed breath holds. The duration of the timed breath hold should not exceed 50% of your personal best (PB) and the table should consist of no more than 8 cycles. The following 8 cycles are based on a personal best static breath hold of 3 minutes. Total duration 25:15 min.

Rest	Hold
1.00	1.30
1.00	1.30
1.00	1.30
1.00	1.30
1.00	1.30
0.45	1.30
0.30	1.30
0.15	1.30

As you progress adjust the table to suit new PBs by changing the breath hold duration to 50% of your improved breath hold time.

2. Hypoxia threshold table

Definition Hypoxia

- Hypo – lower than normal levels
- Oxia – Oxygen
- Hypoxia – Lower than normal levels of oxygen

Hypoxia training (O2 deprivation)

Hypoxia is a condition in which the body or a region of the body is deprived of adequate oxygen supply at a tissue level. Hypoxia may be classified as either generalised - affecting the whole body or localised - affecting a region of the body. Eg brain – cerebral hypoxia. Hypoxia training is characterised by a deficiency in the amount of O2 reaching the body's tissues.

Due to its nature of depleting the body's O2 reserves which significantly elevates the risk of cerebral hypoxia (black out) Hypoxia training should only be used by experienced breath holders and when under supervision of a competent training buddy.

Hypoxia training builds tolerance to low O2 environments by creating an environment low in O2 using progressively increased breath hold durations.

Hypoxia Tolerance Static Table

The below static table adapts the body to lower levels of oxygen by increasing breath hold length and maintaining set resting periods. The length of the last breath hold in the table should not exceed 80% of your current max breath hold with no more than eight cycles. The following table is based on a max breath hold of 3 minutes. Total duration 30:45 min.

Hold	Rest
1.00	2.00
1.15	2.00
1.30	2.00
1.45	2.00
2.00	2.00
2.15	2.00
2.30	2.00
2.30	2.00

As the breath holder progresses adjust the table to suit new PBs by changing the breath hold duration to 80% of your improved breath hold time.

Note: Always be cautious when performing Hypoxia breath holds, know your limits and always restrict your exertion to 7/10. This ensures there is limited to no risk of blacking out!

Recovery breathing techniques - Surfing hold downs and hypercapnia training

During Hypercapnia training levels of CO2 in the body can increase in pressure to an intolerable point forcing us to breathe. Blood pressure also increases, and it is not uncommon for the breath holder to experience sensations of wanting to urinate. This is the body's way of dumping fluid as it attempts to relieve itself from the increased blood pressure.

Due to the high intensity and short recovery opportunity provided by surfing hold downs and hypercapnia training it can be difficult to use freediving style hook breaths. Nor are these

techniques necessary or appropriate for Intense high CO₂ / high O₂ rich, short duration breath holds with limited recovery opportunities. The priority here is to quickly unload excess CO₂ and set up the best possible last breath prior to the next hold down or breath hold.

For the surfing hold downs it is preferred to use superventilation (controlled hyperventilation for 3-5 breaths starting with an exhale immediately upon surfacing for 3 – 5 breaths (if possible) before returning to natural relaxed breathing (if there is an opportunity to do so) or taking the next last breath if required for a subsequent hold down. Each scenario will dictate how many breaths you get to take. Sometimes it may be only one solid exhale followed by the last inhale.

The superventilation helps quickly eliminate excess CO₂ built up following the previous breath hold and brings CO₂ levels back closer to normal levels. Due to the relatively short duration of surfing hold downs we should never be depleted of O₂ if we get a good last breath in and hold on to all our air so this technique is perfectly safe when used in the appropriate setting.

Longer breath holds and hypoxia training.

During Hypoxia training O₂ saturation can be depleted to near critical levels. For this reason, we use a freediving hook breathing technique of inhaling first immediately upon surfacing followed by a short pause then a passive exhale for 3 - 5 breaths before trying to lower CO₂ levels. This technique helps to keep the pressure of O₂ in the lungs high enough to optimise diffusion.

As we are often depleted of O₂ when training hypoxia any forced exhalation may result in loss of internal O₂ partial pressure which negatively impacts the process of diffusion, reducing the ability of O₂ to move from the lungs to blood vessels and tissues. A consequence of this can reduced O₂ delivery to the brain and extremities resulting in loss of motor control (samba) or black out.

Group C

Dynamic land-based drills (full lung)

1. Walking CO₂ tables

Aim:

- Experience the sensations of rising levels of CO₂ levels in the body during exercise and become familiar with the physiological changes and mental stress associated with a strong urge to breathe.
- Use specific recovery techniques to assist initiate a rapid adjustment of your biochemistry to enable preparation for subsequent Breath holds.

Description:

- A. The walking CO₂ table is a set of continuous 30 second full lung (inhale) breath hold intervals separated by a 15 second of recovery period.

Or

- B. The jogging CO2 table is a set of continuous 60 second full lung (inhale) breath hold intervals separated by a 60 second static full recovery period.

Note: Walking and running can be swapped out for any piece of cardio equipment

How:

Table 'A'

- a) Walk continuously in a circle at an easy strolling pace.
- b) Continue walking for two minutes with relaxed nasal breathing.
- c) Using last breath in technique (Lessons 12) hold your Breath for 30 seconds whilst continuing to walk at a relaxed pace with your nose pinched.
- d) Recovery Breathing (Lesson 13) 15 seconds and set up next last breath in whilst continuing to walk at a relaxed pace for 2 minutes.
- e) After 2 minutes increase walking pace to a moderate speed.
- f) Hold Breath 30 seconds whilst maintaining walk at a moderate pace with nose pinched.
- g) Recovery Breathing 15 seconds and set up next last breath in whilst continuing to walk at a relaxed pace for 2 minutes.
- h) After 2 minutes increase pace to a brisk walk.
- i) Hold Breath 30 seconds whilst maintaining walk at a quick pace with nose pinched.
- j) Recovery Breathing 15 seconds and set up next last breath in whilst maintaining walk at a brisk pace for 2 minutes.
- k) After 2 minutes increase pace to a light jog.
- l) Hold Breath 30 seconds whilst continuing to lightly jog with nose pinched.
- m) Recovery Breathing 15 seconds and set up next last breath in whilst maintaining a light jogging pace.
- n) After 2 minutes increase pace to a moderate jog.
- o) Hold Breath 30 seconds whilst continuing to lightly jog with nose pinched.
- p) Recovery Breathing 15 seconds and set up next last breath in whilst maintaining a moderate jogging pace.
- q) After 2 minutes or when you can no longer hold the pace for the full duration of the 30 sec breath hold return to a strolling pace and relaxed breathing in and out through the nose.
- r) Continue at a stroll for two minutes for until recovered.
- s) Finish.

The total time for this drill is 12 minutes. Increase the pace of the walk every two minutes starting with an easy walk (approximately 4kph) ending with a moderate jog (approximately 8kph).

Table 'B'

- a) Hold your breath on a full lung and jog (70% max) for 60 seconds with your nose pinched.
- b) Stop and remain static for 60 seconds whilst recovering your breathing.
- c) Set up next last breath in for the next breath hold.
- d) Repeat 10 rounds
- e) Finish.

The total time for this drill is 20 minutes. Breath holds are moderate jogging pace (approximately 8kph) or 70% of your max.

The drill builds tolerance to accumulating CO₂ in the body and how intensity increases with increases in activity. The drill enables you to practise hypercapnia recovery breathing techniques, setting up for a last breath in and maintaining awareness and control.

This is a great land-based training drill. Which can be performed just about anywhere. E.g. Walking on the Beach, walking the dog or pushing a pram, etc.

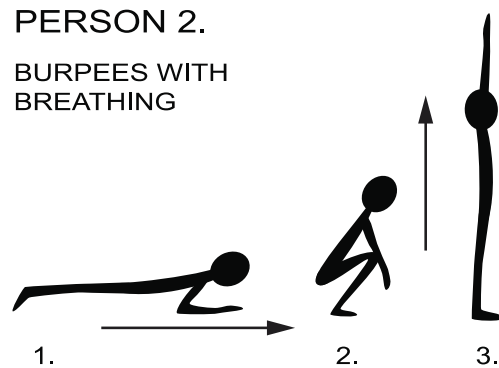
Burpee squat pyramid

- Improves CO₂ tolerance plus.
- Teaches dynamic recovery breathing.
- Improves taking of a last breath in.

PERSON 1.
STATIC SQUAT
HOLDING BREATH



PERSON 2.
BURPEES WITH
BREATHING



Breathing gears

Breathing gears are about consciously regulating your breathing to manage the energy demands and off load of waste during the performance of a given task.

1. Gear 1.

Controlled nasal inhale , nasal exhale (eg 3 in 3 out) – Low aerobic output – easy lower stress activities.

2. Gear 2.

Powerful nasal inhale and controlled and relaxed nasal exhale – High aerobic – nasal superventilation – provides greater turnover of gases and is used for high aerobic output.

3. Gear 3.

Power nasal inhale and power nasal exhale – faster, nasal bellows type breath, that activates full use of primary breathing muscles - crossing over from aerobic to anaerobic (Anaerobic threshold).

4. Gear 4.

Power nasal inhale and longer but controlled and relaxed mouth exhale – superventilation - work intensity increasing – unloading accumulating CO₂ - low anaerobic effort.

5. Gear 5.

Mouth inhale and powerful mouth exhale – – superventilation – strong rapid gas turn over – off loading excess CO₂ High anaerobic (short duration / high intensity)

Recovery breathing

Work back through the gears aiming to be able to return to gear one as quickly as possible.

Apnea training drills – Pool

Safety First

Never training in water alone – always train with a competent buddy!

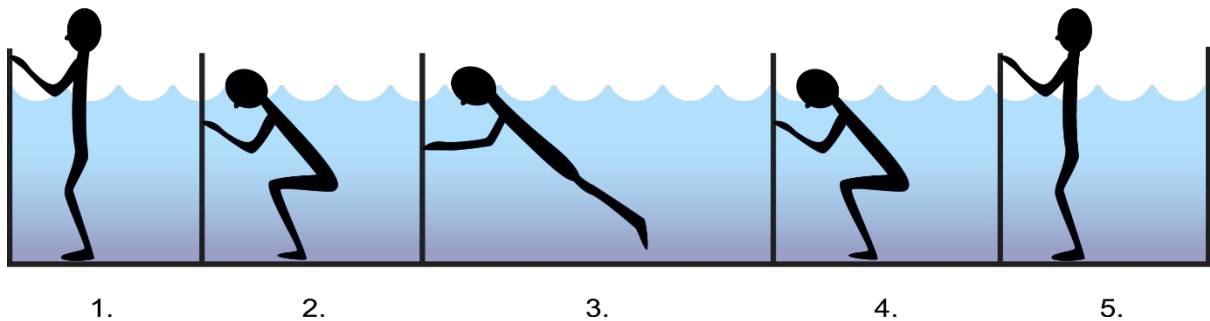
When training in water always train with a competent buddy and always use a pre rehearsed buddy system that both you and your buddy are familiar with. The buddy system is a safety system that requires a person to remain above the water and / or have the breath holder under direct observation throughout the entire breath hold. The job of the buddy is to monitor the breath holder's behaviour and respond to any circumstances that may place the breath holder in danger.

Safety points to consider when training in water:

1. Never train in water alone.
2. Always training with a competent buddy and use a buddy system.
3. Training buddies must both know each other's limits and abilities, practice rescue procedures such as black out, LMC and recovering a breath holder to the surface from the bottom of the pool and what to do at the surface and how to manage an emergency response.
4. Keep all training intensity to a maximum of 70% of your maximum perceived rate of exertion.
5. Use only clear and untinted, non-fogging goggles or masks that always provides.
6. unobstructed observation of the breath holder's eyes.
7. Due to the very fast onset of hypoxia associated with exhale breath holds do not perform any exhale breath holds in water-based environments (these are best performed using land-based drills).
8. Plan every breath hold / training session (plan the breath hold and stick to the plan when breath holding).
9. Breath holder and buddy must discuss the particulars of the training / session plan prior to any breath holds being conducted. For example. Types of and times for safety checks and how various signals ('OK' / Not OK) will be communicated.
10. The buddy should remain at the surface or in a position that allows them to have direct observation of the breath holder during the breath hold and be prepared to render immediate assistance if required.
11. The buddy must maintain observation of the breath holder during the entire breath hold and during the recovery periods.
12. During long dynamic swims consider following your breath holder using a snorkel and swimming above them or use an outside lane and walk up and down the pool with the swimmer. This enables direct observation and an immediate response.
13. Watch for signs of loss of consciousness and loss of motor control (LCM). E.g. bubbles - sudden air loss, change in stroke rate, sinking etc. Increases in stroke speed or changes in swimming technique during dynamic efforts may be an indicator of increases in stress due and hypoxia. *Note - If any of following are observed: tremors, loss of motor control, loss of consciousness, sudden air loss (including trickling bubbles or air), and /or failure to react or respond to signals make immediate physical contact with the breath holder, terminate the breath hold and assist them to the surface.* Failure of the breath holder to react or respond to signals during static holds may indicate the breath holder has become hypoxic, disorientated, or switched off their consciousness. If two consecutive OK requests have failed to solicit a response from the breath holder terminate the breath hold immediately.
14. If black out or loss of motor control occur withdraw the person from training immediately and have them seek medical attention from a medical practitioner who is trained to conduct diving assessments before returning to training.

Pool Drills

STATIC BREATH HOLD POSITIONS



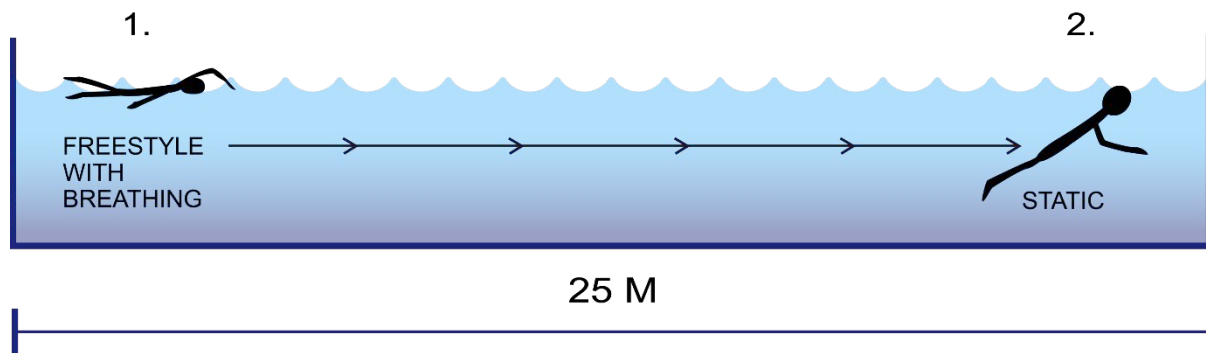
Hypercapnia training table

The CO₂ static table is designed to adapt the body to higher levels of CO₂ by reducing the rest duration between fixed breath holds. The duration of the timed breath hold should not exceed 50% of your personal best (PB) and the table should consist of no more than 8 cycles. The following 8 cycles are based on a personal best static breath hold of 3 minutes. Total duration 25:15 min.

Rest	Hold
1.00	1.30
1.00	1.30
1.00	1.30
1.00	1.30
1.00	1.30
0.45	1.30
0.30	1.30
0.15	1.30

As you progress adjust the table to suit new PBs by changing the breath hold duration to 50% of your improved breath hold time.

FREESTYLE STATICS



Aim

A water based version of the Squat burpee drill. Highly effective at developing CO₂ tolerance in a dynamic environment whilst maintaining self-awareness and self-control.

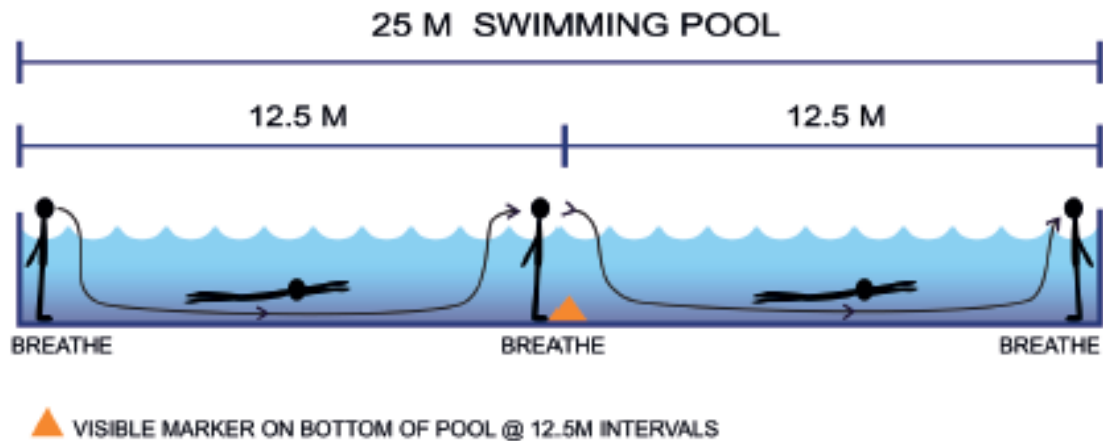
Drill

The Freestyle static drill is performed by swimming 25M freestyle at a firm (approx. 70% max exertion rate) followed immediately by a static breath hold. The breath is held until a strong urge to breathe is felt (70% max). Upon which the swimmer undertakes the next 25M freestyle (breathing and recovering during the 25M of freestyle only).

The goal is to complete multiple sets of 4 x 25M lengths (with 4 statics). Rest between sets 1-2minutes.

This is a good baseline drill for developing dynamic recovery and also keeps the breath holds safe by ensuring the swimmer is loaded with CO₂ (and O₂) before commencing the holds.

ONE BREATH DRILL



Aim

Build CO2 tolerance in a dynamic environment whilst maintaining self-awareness and self-control.

Drill

The one breath drill is performed by swimming 16 consecutive 12.5M lengths underwater using a frog style stroke on a single breath for a total of 200M. Breathing only at each 12.5M interval. Breathing is restricted to 1-5 controlled breaths per exit. The drill will increase in intensity as it progresses. The idea is to maintain a calm mind and consistent breath and stroke rate regardless of the intensity increasing.

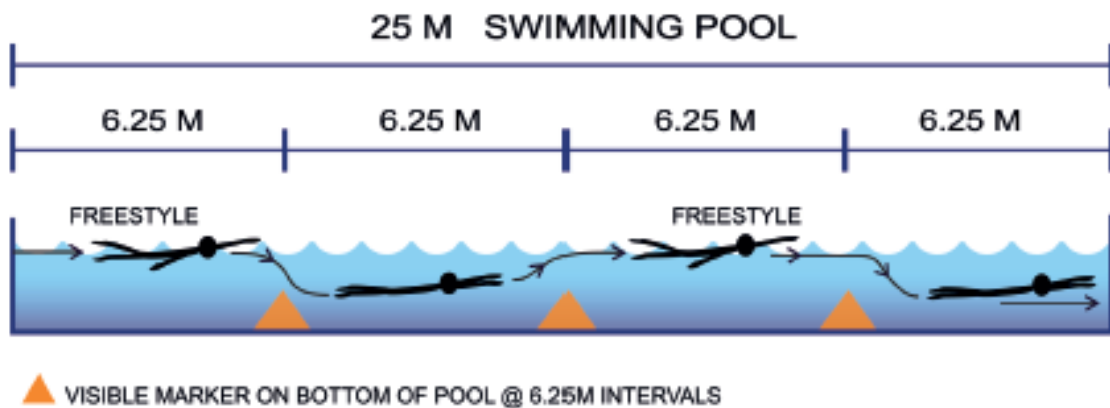
The ultimate goal is to be able to complete the entire drill with only one breath per exit.

This drill shouldn't get too intense until the last 75-50 meters. If it does get intense earlier add an additional breath or at each exit to allow more recovery. During future sessions work on progressively reducing your breaths as you become better conditioned.

Start with 5 breaths per exit and scale it according to your ability. EG. If it is too easy drop to 3 or 4 breaths and so on.

This is a good baseline / progress drill to keep track of your progress and can be added to the end of any session as a finisher.

OVER UNDER DRILL



Aim

Develop CO₂ tolerance, maintain self-awareness and self-control and develop good last breath habits when under stress in a dynamic environment.

Drill

This drill is a progression from the One Breath drill. To which we are simply adding freestyle swimming during the rest period. All the same principles apply. The intermittent freestyle increases the breath holding challenge by breaking up the rhythm and requires CO₂ generating activity to be performed during the rests.

It is performed by swimming a total of 100M continuously using consecutive 6.25M lengths alternating freestyle swimming with underwater swimming. Breathing only during the freestyle. The drill will increase in intensity as it progresses and CO₂ accumulates. The idea is to maintain a calm mind and consistent breath and stroke rate regardless of the intensity increasing. The ultimate goal is to be able to complete 200M continuous swimming.

The drill should not get intense until the last 50 % of the drill. The swimmer will need to focus on unloading CO₂ during the freestyle as well as setting up the last breath.

As CO₂ accumulates longer exhales will better manage the urge to breathe prior to each underwater length. The key here is not so much a matter of how many breaths you can squeeze in during the freestyle but more so optimising the few breaths you do take.

This is a great drill that simulates a paddle out scenario where you must keep paddling (working), ducking under waves and holding your breath to negotiate the break. It teaches you to remain calm, use recovery breathing techniques to unload CO₂ and developing a good last breath before diving under again.

Note: The drill can be broken down into 50M / 100M reps or 150M repeats performed at relevant intensities (EG shorter reps are performed at a higher all out intensity with less rest than the longer reps which have longer rest periods) with equal interval to rest and repeated in sets of 4 or 5 reps.

DYNAMIC POOL SESSION DESCRIPTIONS

Dynamic pool session 1.

Warm up

4 x static every 4 minutes on the 4 minutes (70% max - Rate of perceived exertion).

Main set

8 x 50M Over Under (equal rest to effort) 85% RPE

2 minute rest

4 x 50M Over Under (equal rest to effort) 85% RPE

Dynamic pool session 2.

Warm up

4 x 25 meter underwater swim - on a single breath) Equal rest to effort

Main set

2 x 200M one breath drill (2 minute rest between each set – focus on recentring the mind and slow relaxed nasal recovery breathing during the 2 minute rest period)

2 minute rest

Finisher

10 x 25M freestyle no breathing (holding the breath and sprinting for the entire 25M) every 45 sec on the 45 95% RPE. Recovery is the time you have left until the next 45 sec comes around. If you are not a fast swimmer do the same drill but on the 60 and so on. Scale to your ability.

Dynamic pool session 3.

Warm up

4 x 25 meter underwater swim - on a single breath) Equal rest to effort

Main set

4 x 100 meter (4 x 25 meter reps) freestyle static (2 minute rest between each set – focus on recentring the mind and slow relaxed nasal recovery breathing during the 2 minute rest period)

Dynamic pool session 4.

Warm up

10 x 25M freestyle no breathing (holding the breath and sprinting for the entire 25M) every 60 sec on the 60 sec 75% RPE. Recovery is the time you have left until the next 60 sec comes around. If you are not a fast swimmer do the same drill but, on a time, you can manage and repeat. Scale to your ability.

Main set

10 x 25M freestyle no breathing (holding the breath and sprinting for the entire 25M) every 45 sec on the 45 95% RPE. Recovery is the time you have left until the next 45 sec comes around. If you are not a fast swimmer scale the drill accordingly your ability.

5 minutes rest

10 x 25M freestyle no breathing (holding the breath and sprinting for the entire 25M) every 60 sec on the 60 sec 75% RPE. Recovery is the time you have left until the next 60 sec comes around. If you are not a fast swimmer do the same drill but, on a time, you can manage and repeat. Scale to your ability.

The end.

Weekly Programming

Week one							
SESSION	DAY OF WEEK						
	MON	TUES	WED	THUR	FRI	SAT	SUN
Static table hypercapnia	X				X	rest	rest
Static table Hypoxia							
Dynamic pool 1			X				
Dynamic pool 2							
Dynamic pool 3							
Dynamic pool 4							
Walking CO2 table 'A'		X					
Walking CO2 table 'B'				X			

Note: Any pool session can be converted to a land based session using walking or running in lieu of swimming.

Week Two							
SESSION	DAY OF WEEK						
	MON	TUES	WED	THUR	FRI	SAT	SUN
Static table hypercapnia	X					rest	rest
Static table Hypoxia					X		
Dynamic pool 1							
Dynamic pool 2			X				
Dynamic pool 3							
Dynamic pool 4							
Walking CO2 table 'A'		X					
Walking CO2 table 'B'				X			

Note: Any pool session can be converted to a land based session using walking or running in lieu of swimming.

For the first 4 weeks Cycle through both weeks 1 and 2 consecutively then repeat for the second two weeks.