

L'APNÉE

De la théorie

à la pratique



Sous la direction
de Frédéric Lemaitre

 **PURH**

Chapter 3

Contribution of yoga to freediving training

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Summary

We cannot deny that on an empirical level, practicing yoga is helpful for freedive training, even though it has been only partially demonstrated on a scientific level. In this chapter, we will first introduce the main scientific knowledge on the virtues induced by yoga on physical, physiological and psychological parameters for freediving performance. Then, we will discuss the relationship between freediving and yoga on a more practical level, by offering exercises that are commonly used by freedivers practicing both of these complementary activities. We will present in turn exercises from postural yoga (*Hatha-yoga*), from the yogic science of breathing (*prāṇayāma*) and from relaxation. In each case, we will explain the benefits of each exercise and how to practice them technically. Finally, as an indication, we will provide an example of a pre-competition program.

Keywords: *Yoga – Practical approach – Hatha-yoga – Prāṇayāma – Relaxation – Poses – Breathing exercises.*

1. Introduction

The word *yoga* means “union”. Actually, it is about union between body and mind, about the search for unity (26). We also find this same osmosis in freediving, a sport which can be considered as quite different from others: admittedly, it requires physical abilities just like all other sports, but it also requires psychological skills such as relaxation, self-control or focus, which are supposed to help save energy. It then seems logical that yoga and freediving would be closely linked. On this topic, Umberto Pelizzari, variable weight world-record holder in October 1999, wrote:

The scuba-diver dives to look around. The freediver dives to look inside...
The body disappears and all sensations take on a new shape.

Yoga itself gives a significant place to apnea, especially for advanced yoga students. But beyond this direct relationship between apnea and yoga, this oriental art offers many techniques which are in synergy with freediving practice. The most obvious ones are those helping to control and improve breathing, grouped under the Sanskrit and international name of *prāṇayāma* (25), or those focused on relaxation. Some of these techniques were used by famous freedivers in their preparation, such as Jacques Mayol, or more recently the Scandinavian diver Wim Hof who dove the longest distance under ice on breath-hold (57.5 m) on March 16th, 2000, in 2 °C water. Loïc Leferme, the deepest man of the beginning of the third century (171 m), agreed with the oriental philosophy when, to face the stress that the body experiences while deep underwater, he suggested to behave as during martial art practice, and to “consider water as a partner rather than an opponent”.

But the benefits of yoga go beyond the use of *prāṇayāma* or of relaxation techniques. Postural yoga, or *Hatha-yoga*, can also help improve freediving performances, especially by increasing overall flexibility of the ribcage and of the body. However, it seems like the objective evidence showing that yoga is helpful to improve freediving is only a small part of an even greater synergy existing between these two activities. When looking solely at the example of breathing exercises, recent studies confirmed that breath-hold time is improved after only a few weeks of *prāṇayāma* practice (7, 9). The same studies encourage us to keep researching the complementarity of these two activities in a scientific rather than an empirical way.

In this chapter, we will briefly discuss which yoga benefits have been scientifically proven, to this day, as being helpful for freedive practice,

then we will present in a very practical way, some *Hatha-yoga*, *prāṇayāma* and relaxation techniques, that freedivers can use to improve their preparation for apnea performances. In this practical approach, we will even offer, as an indication, a program to use in pre-competition phase.

2. Influence of yoga on anatomo-physical, physiological and psychological parameters in freediving

2.1 Improving body flexibility and ventilatory function

Hatha-yoga techniques involve taking postures, *asanas*, and holding them for a certain amount of time so as to bring significant benefits to the body. These postures aim at stretching and invigorating the body, and making it more flexible, while developing physical and mental relaxation. Progress lies both in improving the *asanas*, which requires an increase in flexibility, and on holding the poses for longer. Controlling the breath plays a role, firstly in the way to get into the pose, especially by decreasing diaphragmatic work and the discomfort that may come with it, and then in maintaining the posture, which is done while continuously breathing rather than on breath-hold. If practicing *Hatha-yoga* in order to improve freediving performances, this activity is usually carried out mainly using chest breathing, and avoiding abdominal breathing. Those practicing yoga will therefore have to optimize the use of their chest, which is usually and naturally less developed than their abdominal breathing. Certain efforts are necessary to mechanically improve the overall contraction and dilation abilities of the ribcage, with some exercises localized in specific zones such as the infrascapular and infracostal areas. Besides improving the mechanical ability to store air, *Hatha-yoga* contributes to increasing overall body flexibility, especially of the “back chain” (head, neck, spine, pelvis), which plays a major part in aquaticity and in movement efficiency, therefore contributing to freediving performances (see III, 2).

In addition to *Hatha-yoga*, *prāṇayāma* allows to improve several parameters of the breathing function. The most striking effect of yogic breathing is the increase in breath-hold times. Breath-holds are already longer after only six weeks of *prāṇayāma* training (7). Madanmohan *et al.* (9) pointed out that breath-holds become longer after an inhale as well as after an exhale. Yogic breathing training improves several parameters of the respiratory function. In particular the VC (vital capacity) and the FEV (forced expiratory volume in 1 s; 7, 21, 29). An improvement of these parameters shows that breathing rates and volumes are higher, which is beneficial for freediving performances. Indeed, the exhale that

precedes the full inhale just before a breath-hold will be more efficient, emptying the lungs more fully (bigger expiratory reserve volume). When it comes to the inhale, it will be deeper, which will increase the initial lung volume. The oxygen saturation in the blood (close to 100%) will remain unchanged, but the stores of oxygen will be slightly bigger, which will allow to keep the oxygen partial pressure in the alveoli favorable to a transfer gradient of this gas towards the blood for longer.

2.2 Lower metabolism and anti-oxidative effects

During basic *prāṇayāma* exercises, ventilation is slow and deep, with post-inhale and sometimes post-exhale breath-holds. These apnea phases are considered as very important in the respiratory cycle. We should differentiate two levels of *prāṇayāma* depending on the duration of the breath-holds, which will impact oxygen consumption. Indeed, when practicing the different types of yogic breathing which include short pauses of a few seconds (small *prāṇayāmas*), O_2 consumption increases by 50%. Whereas when breathing with long pauses (big *prāṇayāmas*), O_2 consumption drops by at least 20% (20). In this case, even though the tidal volume is bigger (given that each breath is close to vital capacity), the breathing rate is significantly lower (19, 21). This induces a decrease in ventilatory flow and in oxygen consumption per minute (11-13). For advanced subjects who practice these breathing techniques with long holds on a regular basis, the uncontrolled natural breathing is significantly changed compared to normal. Such a lower level of O_2 consumption observed at rest is believed to come from a lower base metabolism, which is balanced by a better use of oxygen by the tissues (6).

In yogic meditation exercises and in relaxation exercises practiced in the western world, in order to reach the best possible focus state, yoga advises to become conscious of the breathing and to progressively decrease it until it becomes almost unnoticeable. It becomes more and more silent, slow, and with the same amplitude as when breathing at rest. When yogis practice this breathing, their level of consciousness is between awareness and sleep (which is equivalent to the sophroliminal state in sophrology), they are in an altered state of consciousness. According to Wallace *et al.* (28), the basic metabolism then drops lower than when at rest and becomes equivalent to that of a deep sleep state. When it comes to blood parameters, the cardiac output decreases by 25%, the heart rate drops by 30 bpm, and the blood lactate concentration is significantly lower. On a respiratory level, ventilation drops by $1 \text{ L} \cdot \text{min}^{-1}$ and by 3 breathing cycles per minute. We see a lower level of O_2 consumption at rest, as well

as a drop in arterial oxygen saturation (SaO_2 , – 17%; 12, 21). In these studies, results are explained by an hypometabolic state, balanced by a better oxygen use by the tissues.

This oxygen conservation mechanism is therefore close to that observed during apnea. Thus, we can imagine using a certain ventilatory preparation so as to maximize this oxygen conservation, and therefore to improve the breath-hold.

Less free radicals are measured after *prāṇayāma* training compared to before, and compared to a control group, which shows a better anti-oxidative system in the body (2; see III, 1).

2.3 Adaptation to hypoxia and hypercapnia

In freediving, the lack of pulmonary oxygen is one of the main issues, as it leads to a lack of oxygen in the blood. For advanced freedivers, it is essential to get used to this state of hypoxia. However, pushing our limits must always be done safely. This is why working on *prāṇayāma*, with its influence on the basic metabolism by lowering oxygen consumption, could help freedivers better cope with a drop in oxygen levels during their breath-holds.

Yogic breathing techniques also have effects on another gas in the blood: carbon dioxide (CO_2). When practicing big *prāṇayāmas*, the ventilatory rate is very low and is not sufficient to expel enough CO_2 , which then accumulates inside the cells; this leads to hypercapnia (CO_2 levels in the blood are too high). Stanescu *et al.* (19) observed that the ventilatory response triggered by CO_2 in the *rebreathing* method is less striking for subjects who train *prāṇayāma* compared to control subjects. Moreover, their chemo-reflex sensitivity to hypercapnia is lower during very slow breathing (6 cycles.min⁻¹; 1, 17). Similarly, their chemo-reflex sensitivity to hypoxia is higher, and the baro-reflex sensitivity is increased (17). For advanced yogis, the ability to breathe at one respiration per minute for one hour with low chemosensitivity to hypercapnia must be due to a long-term adaptation of such controlled ventilation (10). In that case, arterial pH is low, and arterial CO_2 concentration (PaCO_2) is high.

Long breath-holds induce an accumulation of CO_2 in the blood. Given the results described above, practicing *prāṇayāma* would therefore be an additional training method enabling freedivers to tolerate higher CO_2 levels in their bodies. This would therefore increase their breath-hold times, however it will also increase the risk of blackout due to the lack of breathing stimulus linked to CO_2 , stimulus which acts as an “alarm bell”.

2.4 Relaxation and stress management

In sophrology, certain breathing techniques coming from yoga are used to induce relaxation. Some authors noticed an improvement of psychological parameters (14). Kamei *et al.* (8) showed an *increase in low frequencies on electro-encephalograms* (Alpha waves), which is a sign of great relaxation. On an hormonal level, these authors also showed that cortisol levels, the stress hormone par excellence, are lower in people practicing yoga. Lactate levels at rest are also lower, which proves that the parasympathetic nervous system is dominant. During a study on athletes, Raju *et al.* (12) measured lower lactate levels both at rest and after physical exercise, compared to a control group.

Other authors also noted *relaxing effects of prânayâma* on the *nervous system* and on the *cardio-vascular system*. Most exercises induce a decrease in the sympathetic nervous system activity, in favor of the parasympathetic nervous system. This has been measured through an evaluation of the cardio-vascular system, especially by measuring catecholamines and plasma renin activity. The renin-angiotensin system is improved, which leads to blood volume regulation (15). According to electrocardiogram recordings, *prânayâma* training modulates the performance of the ventricles, which confirms the effect on parasympathetic system activation (24).

Yogic breathing induces a decrease in blood pressure and heart rate. Several studies also confirmed such results, along with a decrease in systolic and diastolic blood pressures (27). Indeed, Damodoran *et al.* (4) noted a decrease in blood pressure, in blood glucose levels, and in cholesterol and triglycerides in patients suffering from hypertension. In yoga, there are several quick and deep breathing techniques (*kapalabhati* and *bhastrika*) leading to better *concentration*. Bhavanani *et al.* (3) noted that after practicing these techniques, subjects were able to set the outside world aside and ignore inadequate stimuli. This is a sign that the sensori-motor performance and therefore the central nervous system are improved. These authors advise to use these techniques in order to increase concentration when in situations requiring high reactivity (photo no. 1).

Another breathing technique is the *alternate breathing* (*Anuloma viloma*). The idea is to breathe alternating between each nostril. Alternate breathing has a balancing effect on beta and alpha waves in left and right brain hemispheres (18). Moreover, breathing only with the right nostril stimulates the sympathetic nervous system (23). On the other hand, breathing with the left nostril lowers the heart rate (16) and increases

galvanic resistivity of the skin, which can be interpreted as a decrease of the sympathetic nervous system activity (22).



Photo no. 1. – A peaceful breath-hold...

3. Postural techniques which can be used in preparation to freediving

In this part, we will present a panel of poses from *Hatha-yoga* which are meant to be complementary and adapted to freedivers' needs. This list is non-exhaustive and can be completed as needed. We should insist on the fact that certain postures can be dangerous for beginners and that we strongly recommend performing them under the responsibility of a certified teacher, especially when initially starting practicing.

3.1 First pose: the "reclining hero" (*Supta virasana*)

- Value

The reclining hero pose allows a deep stretching of the thigh muscles. It also strengthens the knees which must not lift off from the floor when the upper body leans back. It is also an excellent pose to focus, to begin a series of poses or to prepare for breathing exercises or for meditation.

- Technique

- > Place yourself on your knees, on the floor;
- > using your hands, roll your calves outwards, then lower your buttocks on the ground (or on a stand, for beginners) so as to place them between your heels;
- > knees are together and the soles of the feet are turned upwards;

- > the back is straight and the coccyx is turned inwards;
- > open the shoulders and lower the shoulder-blades towards the waist;



Photo no. 2. – Reclining hero pose (Supta virasana).

- > Place your hands on the floor behind you;
- > tilt your pelvis and contract your buttocks;
- > open the upper part of your ribcage (if your knees hurt, do not go further; photo no. 3);

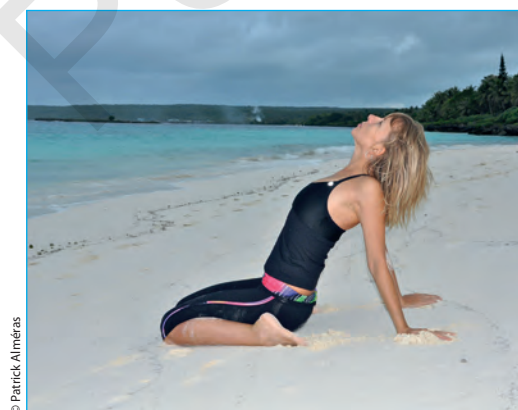


Photo no. 3. – Reclining hero pose (Supta virasana).

- > place your elbows on the floor;
- > continue to stretch your chest and your thighs (photo no. 4);



Photo no. 4. – Reclining hero pose (Supta virasana).

- > slowly lie down on the ground (if you did not place a stand under your buttocks and you are flexible enough);
- > make sure to tilt your pelvis to reduce the lower back arch and to stretch the thighs;
- > do not let your knees separate;
- > stay in this position for several breaths;
- > to stand back up, press on your hands (photo no. 5).



Photo no. 5. – Reclining hero pose (Supta virasana).

3.2 Second pose: the “downward-facing dog” (Adho Mukha Svanasana)

- Value

The downward-facing dog pose is performed before other poses, as a warm-up. It is an excellent way to feel and improve the back stretch, from the coccyx to the top of the neck. This is a dynamic and invigorating pose.

It increases blood flow especially to the head. Stretching the diaphragm towards the upper chest slows down the heart and contributes to a better relaxation.

- Technique (photo no. 6)
 - > Spread your feet 30 cm apart;
 - > place your hands on each side of your chest, fingers pointing forward;
 - > extend your arms and legs;
 - > stretch your back, move your head between your arms towards your feet, and rest the top of your skull on the floor;
 - > breathe deeply while pulling the abdomen inwards (during the inhale as well as the exhale).



Photo no. 6. – Downward-facing dog pose (Adho Mukha Svanasana).

Variant: the “upward-facing dog” (Urdhva Mukha Svanasana)

- Value

This new pose reinforces flexibility of the spine and improves lung stretching thanks to the opening of the chest.

- Technique (photo no. 7)
 - > Lower the chest between your arms;
 - > press the top of your feet flat on the floor;
 - > stretch your arms and push the chest forward;
 - > tilt your head and your chest back without letting your knees touch the floor: the body is only resting on your hands and the top part of your toes;
 - > breathe while invaginating the abdomen (during the inhale as well as the exhale).



Photo no. 7. – Upward-facing dog (Urdhva Mukha Svanasana).

3.3 Third pose: the “extended triangle” (Trikonasana)

- Value

This pose will help align hips, legs and torso on the same plane. It also develops strength, flexibility and resistance. Breathing must be regular and deep.

- Technique

- > Spread your feet 1-1.2 m apart;
- > inhale and stretch your arms out horizontally to each side, palms facing down;
- > with straight legs, open the ribcage, stretch out the neck;
- > turn the left foot 90° outwards and turn the right foot inwards (photo no. 8);



Photo no. 8. – Extended triangle pose (Trikonasana).

- > on the exhale, lean to the left starting from the hip;
- > place your left hand on your leg, on your ankle or on the floor, according to your flexibility;
- > stretch your right arm vertically and look upwards (photo no. 9);



Photo no. 9. – Extended triangle pose (Trikonasana).

- > lift the upper body and turn it so as to bring your right arm above the left leg (photo no. 10);

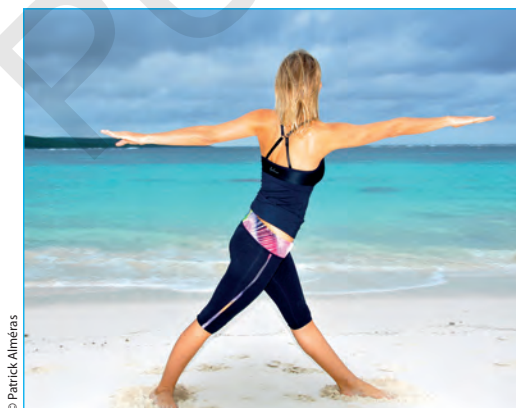


Photo no. 10. – Extended triangle pose (Trikonasana).

- > inhale and lean your upper body on top of your left leg;
- > place your hand on your leg, on your ankle or on the floor, on the outside of your left foot;

- > look up;
- > then change sides (photo no. 11).



Photo no. 11. – Extended triangle pose (Trikonasana).

3.4 Fourth pose: the “extended side angle” (Parsvakonasana)

- Value

This pose increases flexibility and strength of the spine and of the legs, improves digestion, toxin elimination, and breathing. Moreover, it provides an intense lateral stretching which frees the cardiac area.



Photo no. 12. – Extended side angle pose (Parsvakonasana).

- Technique

- > Spread your feet 1.2 to 1.5 m apart;
- > open the right leg 90° and turn the toes of the left foot inwards;
- > on the inhale, stretch your arms out horizontally on each side;
- > on the exhale, bend your right knee and make a wide split;
- > the knee must be above the ankle (photo no. 12);
- > on the exhale, stretch the upper body to the left;
- > place your right hand on the floor (or on a stand for beginners), on the outside of the right foot;
- > stretch your left arm above and upwards;
- > look towards your hand (photo no. 13);



Photo no. 13. – Extended side angle pose (Parsvakonasana).

- > stretch the arm above your head;
- > then change sides (photo no. 14).



Photo no. 14. – Extended side angle pose (Parsvakonasana).

3.5 Fifth pose: the “warrior” (*Virabhadrasana*)

- Value

This pose invigorates and strengthens the thigh muscles and channels the energy and strength, which are directed towards the parts of the body or of the mind that need it.



Photo no. 15. – Warrior pose (*Virabhadrasana*).

- Technique (photo no. 15)

- > Spread out your feet about 1.3 m apart;
- > open the left leg 90° and turn the toes of the right foot slightly inwards;
- > rotate the hips to the left so as to place the upper body above the left leg;
- > inhale and stretch your arms above your head;
- > stretch your sacrum downwards and anchor your back foot strongly into the ground;
- > exhale and bend the left knee, which comes and places itself above the ankle;
- > look upwards and lift the chest;
- > then change sides.

3.6 Sixth pose: the “king pigeon” (*Kapotasana*)

- Value

This pose improves the ability to open your ribcage, and the tonicity of your abdominal muscles. It also helps the spine get more flexible.

- Technique (photo no. 16)
 - > Kneel down, feet and knees tight together (or slightly apart for beginners);
 - > place your hands on your hips (or at the back of the thighs), stretch out your thighs and keep them perpendicular to the floor;
 - > exhale and stretch your spine by flexing your back while projecting your hips forward, so as not to let the whole body fall backwards;
 - > finally, place your hands on your heels.



Photo no. 16. – King pigeon pose (Kapotasana).

3.7 Seventh pose: the "half-moon" (*Ardha Chandrasana*)

- Value

As for all back bends, the half-moon pose is energizing and rejuvenating. It tones muscles of the back, thighs, and abdominals. It also helps with opening and expanding the ribcage.

- Technique

- > Go down on all-fours;
- > stretch your legs out as if you were about to do press-ups;
- > contract the abdominals and thigh muscles;
- > on the inhale, bring your right leg forward and place the foot between your hands;
- > place the left knee on the floor;

- > look straight in front of you;
- > on the exhale, relax the inner thigh muscles and contract the abdominals to support the spine;
- > inhale, straighten your chest up;
- > place your hands on your hips;
- > make your chest wider and stretch your sacrum downwards (photo no. 17);



Photo no. 17. – Half-moon pose (Ardha Chandrasana).

- > on the inhale, bring your arms above your head;
- > keep your abdominals contracted and the chest open;
- > bring your torso upwards and tilt your head back;
- > look up and breathe deeply;
- > then change sides (photo no. 18).



Photo no. 18. – Half-moon pose (Ardha Chandrasana).

3.8 Eighth pose: the "bridge" (*Setu Bandhasana*)

- Value

The bridge is a powerful back bend, easy to achieve for beginners. This pose helps develop flexibility and strength, and be aware of the abdominals and the pelvic floor. The bridge pose tones the legs and improves the opening of the ribcage, which frees the cardiac area. This pose also stimulates the spine.

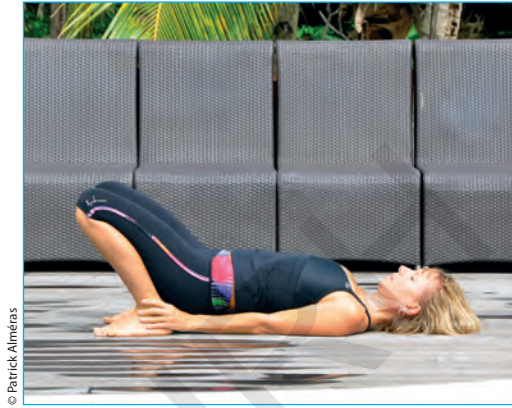


Photo no. 19. – Bridge pose (Setu Bandhasana).

- Technique

- > Lie on your back;
- > bend your knees and bring your feet close to your buttocks while keeping them apart same width as your hips;
- > hold onto your ankles (photo no. 19);
- > on the exhale, contract your abdominals, buttocks, and pelvic floor;
- > lift your hips off from the ground and lift the whole body up;
- > open the chest and lift it up as high as possible (photo no. 20);



Photo no. 20. – Bridge pose (Setu Bandhasana).

- > place your hands under your ribs. Fingers are pointing to each other on each side of the spine;
- > try to push your upper body upwards with your hands but without leaning on them (photo no. 21);



Photo no. 21. – Bridge pose (Setu Bandhasana).

- > then stretch your left leg vertically;
- > continue to push your chest upwards and do not let your shoulders sink down;
- > keep the left leg straight and breathe deeply;

- > bring the left leg back down then lift the right leg straight upwards (photo no. 22).



Photo no. 22. – Bridge pose (Setu Bandhasana).

3.9 Ninth pose: the “head-to-knee” (Janu Sirsasana)

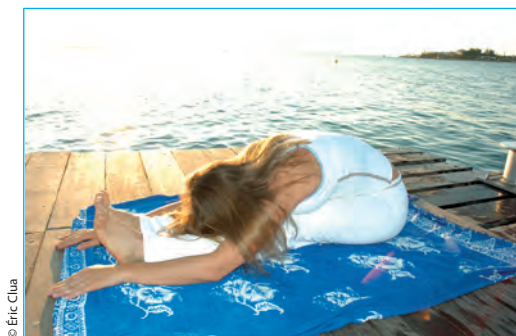
- Value

In this pose, the forward bend is easier than with both legs stretched out. It can therefore be used as a warm-up before the “seated forward bend” or “standing forward bend” (see III, 3, 3.5). This pose invigorates the liver, kidneys and spleen, and contributes to draining the abdominal area.

- Technique (photo no. 23)

Begin the pose by flexing the right leg so as to invigorate the ascending colon, then the left leg to invigorate the descending colon.

- > Sit down with legs outstretched;
- > bend the left knee and place your heel on the right inner thigh, as close as possible to your pelvis;
- > grab the toes of the right foot, then the sole of the foot and the heel progressively;
- > on the exhale, lean the upper body and the pelvis over your right leg;
- > make sure to keep the right leg straight, with the back of the knee in contact with the floor;
- > do the same on the left side.



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Photo no. 23. – Head-to-knee pose (Janu Sirsasana).

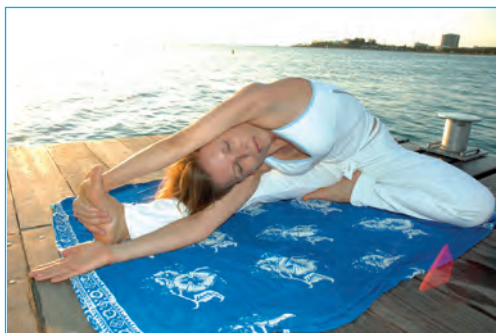
Variant: the “revolved head-to-knee” (Parvirtha Janu Sirsasana)

- Value

Unlike in the previous forward bend pose, here the sides of the abdomen are stretched a great deal. Therefore, both variants are complementing each other.

- Technique (photo no. 24)

- > Sit down with legs outstretched;
- > bend the left knee and place your heel on the right inner thigh, as close as possible to your pelvis;
- > turn the upper body and the pelvis to your left;
- > stretch your right arm towards your right leg, and grab your right toes;
- > lift your left arm above your head and grab the right foot;
- > bring your upper body backwards and turn it as much as possible upwards.



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Photo no. 24. – Revolved head-to-knee pose (Parvirtha Janu Sirsasana).

3.10 Tenth pose: the “seated forward bend” or the “standing forward bend” (*Paschimottanasana*)

- Value

The back of the body is fully stretched, from the heels up to the tip of the spine. In this pose, the spine is kept in a straight horizontal line and the heart is lower compared to the spine. Therefore, when this pose is done properly, it allows massaging the heart, the spine, and the abdominal organs.

- Technique (photo no. 25)

Do not try to get your head closer to your knees right away, as this usually comes with a curvature of the back, that should be avoided. Instead, try to bring the chest as far forwards as possible, while keeping the knees and the back straight.

- > Sit down with legs outstretched;
- > keep the back straight for a few breaths;
- > on an exhale, bend the upper body forward starting from the waist; keep the chest and the back straight;
- > grab your toes and stretch the spine while bringing the abdomen inwards;
- > make sure to keep the legs straight and the back of the knees in contact with the floor;
- > with practice, bring your chin on your shins and your chest on your thighs;
- > breathe deeply and try to progress with each exhale, and to maintain the gain in flexibility during the next inhale.

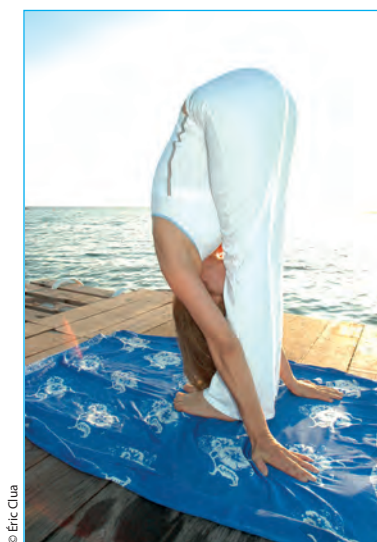


Photo no. 25. – Seated forward bend pose (Paschimottasana).

3.11 Eleventh pose: the “twist”

- Value

Twists are poses which improve flexibility of the vertebrae and energetically stimulate the inner organs. They also develop a better control of the breath.

- Technique

- > Sit down with your legs outstretched in front of you (photo no. 26);
- > shoulders wide open, shoulder-blades low in your back;
- > bring the left knee close to your chest and place your left foot on the outside of your right thigh (photo no. 27);



Photo no. 26. – Twist pose .

- > stretch the spine and contract your abdominal muscles;
- > on an exhale, rotate your upper body to the left;
- > place your right hand on the outside of your left thigh, and your left hand on the floor for balance but without leaning on it;
- > suck the belly in so as to get your belly-button closer to your spine and, on an exhale, increase the twist of your upper body;
- > then, change sides.



Photo no. 27. – Twist pose.

3.12 Twelfth pose: the “shoulder stand” (*Salamba Sarvangasana*)

- Value

The shoulder stand has a direct effect on the thyroid and parathyroid glands which, in this position, benefit from a better blood irrigation thanks to the chin lock. In the inverted position, the veinous blood flow effortlessly brings blood towards the heart; it generously irrigates the chest, neck and head. For this reason, the shoulder stand pose soothes tensions and improves irrigation of the sinuses which can help relieve congestion.

- Technique (photo no. 28)

- > Lie down on the floor, legs together, palms of the hands turned to the floor, alongside the body;
- > on the inhale, push on your hands and lift your straight legs vertically;
- > lift your hips off the floor and bring your legs above them, then behind the head with a 45° angle;
- > on an exhale, bend your arms and support the body with your hands placed on your back, as close to the shoulders as possible;
- > straighten your back and bring your legs up vertically;
- > press your chin firmly against your throat;
- > breathe slowly and deeply in this position while trying to progressively bring elbows closer to each other and to lower the hands closer to the shoulder-blades, in order to straighten the torso;
- > to come out of the pose: slowly roll the spine, helping yourself with your hands at first, until the upper body is against the floor (keeping legs straight), then helping yourself with the abdominal muscles to lower the legs down to the floor.



Photo no. 28. – Shoulder stand pose (Salamba Sarvangasana).

Variant: the “plow” (Halasana)

- Value

This pose makes your spine and your neck more flexible. The position of the hands and arms reduces stiffness in the shoulders.

- Technique (photo no. 29)

- > Without bending the knees, exhale and lower the legs behind the head (if the feet do not touch the floor, do not bend the knees to try and make them; breathe deeply in the position you have reached);
- > if the feet do not touch the floor, bring them as far away from the head as possible, toes flexed towards the floor;
- > straighten your torso upwards and bring your heels behind you;
- > then interlock your fingers and extend your arms behind your back;
- > to come out of the pose: see above, the shoulder stand.



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Photo no. 29. – Plow pose (Halasana).

3.13 Thirteenth pose: the “fish” (Matsyasana)

- Value

The fish pose is the counter-pose to the plow; it must be performed right after. It comes as a complement to the stretches-compressions of the cervical vertebrae occurring in the shoulder stand and plow poses. It relieves the stiffness of the neck, of the shoulders, and corrects our tendency to round the shoulders. In this pose, the expansion of the ribcage allows to take deeper breaths and increases the lung capacity.

N.B.: we recommend staying in this pose at least half the time that was spent in the shoulder stand pose.

- Technique (photo no. 30)
 - > Lie down on your back, keeping your legs straight and touching each other;
 - > place your hands under your thighs, palms facing the floor;
 - > while pushing against your elbows, inhale and arch your back, and place the top of your head on the floor;
 - > breathe deeply while keeping your legs and lower back relaxed.



Photo no. 30. – Fish pose (Matsyasana).

Variant: the raised legs pose (Uttana Padasana)

- Technique (photo no. 31)
 - > Bring your hands out from under your thighs and place them above your chest in a praying position;
 - > then lift your legs until they make a 45° angle with the floor;
 - > spread your arms parallel to the legs and join your hands;
 - > arms and legs must remain straight, without bending either the elbows or the knees;
 - > the legs must touch each other at the feet, ankles, knees and thighs;
 - > on the exhale, lower your legs and arms onto the floor, straighten your neck and head, let the back rest on the floor and relax.



Photo no. 31. – Raised legs pose (Uttana Padasana).

3.14 Fourteenth pose: the “skull” and the “headstand” (Kapalasana and Sirsasana)

- Value

Head stand poses, queens of the *asanas*, have the most powerful effects on both body and mind. By inverting the usual effects of gravity, they relieve the heart and the pressure on the lower back. When practiced regularly, they improve focus and sensorial abilities. Inverting your body leads you to breathing deeply, slows down your heart rate, and improves the perfusion of the brain with oxygenated blood. These poses promote calm and balance, as long as we breathe through the nose.

- Counter-indications

Any pathology linked to the cervical vertebrae.

- Technique for the “skull” (*Kapâlâsana*; photo no. 32)



Start of the pose: go down on all-fours. Place the top of your head at the top of an equilateral triangle, and your hands at its base. To know the measures of your triangle, use the length of your forearm.

- > Once your head is on the floor, find the point where your body-weight will be applied, which is located at the front of your skull (around the fontanelle). Be careful, if you are putting your body-weight too far towards the back of your skull, when you raise your legs you will fall back!
- > once your head and hands are in place, straighten your legs while keeping your feet on the ground, and shift your body-weight onto your skull;
- > with straight legs, bring your feet as close as possible to your face;
- > bend one leg and place the knee on the arm, a few centimeters from the elbow. Repeat the same with the other knee; get used to holding this pose comfortably before moving onto the next step;

- > then bring your knees up and stretch your legs out by pointing your heels to the sky;
- > find the perfect balance point where the headstand no longer requires any muscular effort and where you can relax;
- > *Breathe slowly and deeply (always through the nose). To come out of the pose:*
- > bend the knees;
- > bring your feet close to your buttocks;
- > lower your knees towards your elbows and place them back in the starting position, on the arms;
- > bring your feet back on the floor;
- > stay for a while with your head on the ground, relax and slowly get back up.

Variant 1: the "headstand" technique (Sirsasana; photo no. 33)

If you are already mastering the skull pose, you can try the headstand pose.

Start of the pose: go down on all fours. Interlock your fingers while keeping them loose and bend your elbows. The thumbs touch each other and the whole thing forms the shape of a cup. Place the round of the head inside the cup and the top of the skull on the ground (close to the fontanelle, as for the skull pose). Elbows are wide apart and aligned with the width of the shoulders.

Careful: hands act as a wedge, not as a support. They only prevent the head from rolling backwards.

- > Straighten your legs so as to lift your hips up, and straighten your back vertically while keeping your feet on the ground;
- > your body-weight is now mostly resting on your forearms;
- > without bending the knees, bring your feet as close as possible to your face;
- > bend your knees towards your chest, and lift your feet off the ground by pushing your hips backwards;
- > find your balance first before continuing further;
- > then, while keeping your knees bent, raise them towards the ceiling using your abdominal muscles;
- > when hips and chest are aligned, slowly stretch your legs out to the sky;
- > your body-weight is resting on your forearms;
- > *Breathe slowly and deeply (always through the nose). To come out of the pose:*

- > bend your knees;
- > bring your feet to your buttocks then your knees to your chest;
- > place your feet on the ground and stay a few minutes with your head on the floor, relax and get slowly back up.



Photo no. 32. – Skull pose (Kapâlâsana).



Photo no. 33. – Headstand pose (Sirsâsana).

Variant 2: “headstand” associated with the “lotus” (Urdhva padmasana in Sirsasana; photo no. 34)

If you are mastering the lotus while sitting, you can associate it to your headstand, to perform the most accomplished pose in *Hatha-yoga*.

Start of the pose: same as for the simple headstand. *Once in the headstand position:*

- > exhale, bend the right knee and place your right foot on the upper part of your left thigh, as close as possible to the hip. Take one or two breaths;
- > exhale, bend the left knee and bring the front side of your left shin in front of the front side of your right shin. Bring the outer edges of your feet closer to the nape of your inner thighs;
- > keep both knees facing towards the ceiling;
- > bring both knees and thighs closer together;
- > *breathe slowly and deeply (always through the nose).*



Photo no. 34. – Variant of the headstand combined with the Lotus (Urdhva padmasana in Sirsâsana).

To come out of the pose:

- > exhale, free your left leg and stretch it out, then do the same with your right leg.
- > repeat the pose, this time starting with the left leg, by following the indications above. Stay in the pose for the same amount of time as for the right side;
- > come back to the simple headstand pose;
- > come out of the pose as explained for the headstand;
- > place your feet on the ground and stay a few moments with the head on the floor, relax and get slowly back up.

3.15 Fifteenth pose: the “child” (*Balasana*)

- Value

The “child” pose, also called “diamond” pose, relaxes the back, gently stretches the spine, and soothes the nervous system.

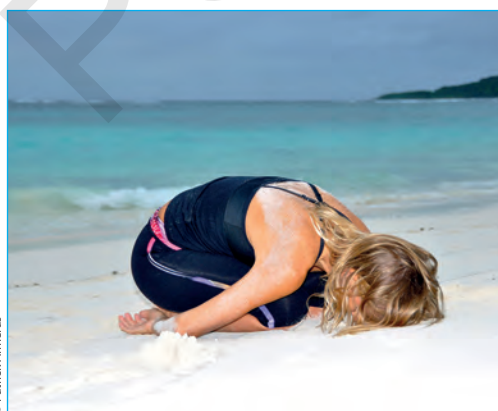


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Photo no. 35. – Child pose (Balasana).

- Technique

- > Sit on your heels, knees and feet together;
- > keep your arms relaxed alongside your body;
- > lean forward and place your forehead on the ground;
- > leave your hands close to your feet, palms facing upwards;
- > breathe slowly but deeply;
- > relax your neck, shoulders and chest.



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Photo no. 36. – Child pose (Balasana).

4. Recommended breathing techniques to prepare for freediving

In this section, we will offer a breathing plan which combines the benefits of *Hatha-yoga* and of standard freediving training. This is a non-exhaustive plan, and can be completed further. Exercises come from *prāṇayāma*. *Prāṇa* means “vital energy” and *prāṇayāma* can be defined as the science of breathing, where the breath is likened to a circulating energy.

4.1 Preliminary advice

4.1.1 Postural and psychological preparation

Moderate breathing exercises should be done on empty stomach, or 1 to 2 h after a meal. For exercises including extended breath-holds and / or abdominal retraction, it is better to wait 3 to 4 h after a meal. Choose a quiet and airy location, and always start with a series of *asanas* in order to stretch the spine. You must be in a comfortable position, otherwise any discomfort will disturb your focus. The best position is sitting on the ground or on a chair, legs folded, in the lotus position if possible, or it can be standing (only if really needed). The basic *asana* posture is also often used for breathing exercises (photo no. 37). In these various postures, the position of your legs is not so important, but the spine must be straight and vertical, the pelvis tilted slightly forward, and the chin low. Only the back muscles should be slightly in tension. The rest of the body is relaxed, including the face and the tongue. We advise you to keep your eyes semi-shut so as to reach a better focus. Experts can even allow themselves to close their eyes completely, as they are less likely to risk losing focus. Besides favoring an efficient practice, taking on a specific posture is also a ritual that allows breaking from daily life: it is about “letting go”, on a physical and a mental level. If thoughts come over you, let them go by, like clouds, without fighting them. It will then be easier to empty your mind by focusing your attention on your breathing. After each series of breaths, make a pause, preferably long, in order to observe the results, without involving willpower.

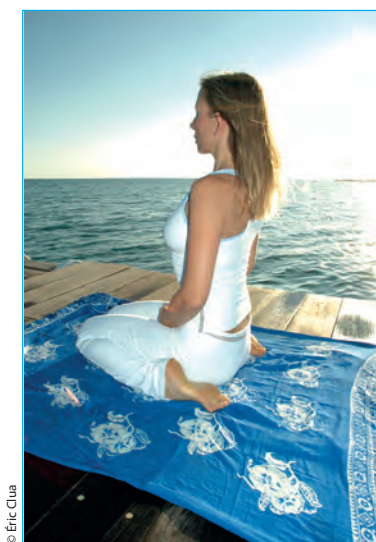


Photo no. 37. – Basic Asana for breathing exercises.

4.1.2 Basic advice for ventilation

The basic breathing training is to progressively make each breath longer. To this end, the goal is to reach the smallest possible ventilatory flow, obtained by breathing in a calm, long and steady, slow and soft fashion. The less noise you make, the closer you are to the goal, which is only possible when doing as little effort as possible. In other words, do not force your breathing. You will gain better and easier control when you get the impression that the air flows through you by itself, simply by offering it some space. During the whole session, always breathe through the nose, never through the mouth, except if you need to yawn, which you should not repress. Try to be aware of your breathing. Observe how the air is traveling, feel and follow its path, from the nostrils to the nasal cavities and the back of the throat. This focus should require minimum effort so that you can still bring enough attention to feeling the air vibrations, especially inside the nostrils. We recommend trying to reach a *comfortable ventilatory amplitude* and the slowest possible rhythm while perfectly at ease. Take your time to reach this ease and if necessary, go back to an easier level if you feel any sort of discomfort.

4.2 Panel of exercises

4.2.1 First exercise: "skull-shining" breathing (*kapalabhati*)

Just before *prāṇayāma* exercises involving very slow breaths, which can even reach a state of hypoventilation, you should start with *kapalabhati*. It is the only technique where the above advice will not be put in practice. This fast and deep breathing is a type of hyperventilation, with a rhythm of 60 breaths per minute (in yoga, you can find another different type of hyperventilation: *bhastrika*, with an even faster rhythm). This technique induces a decrease of CO₂ arterial pressure. It also triggers oxidative mechanisms (increase of creatin and tyrosin levels; 5), which is why it is recommended before practicing *prāṇayāma*.

- Technique

Breathing is done through the nose during the whole exercise, and using only the abdomen, without involving the ribcage.

- > Exhale quickly and powerfully all the air from your lungs, as if imitating the noise of bellows. This exhale is done only by contracting the abdominal muscles (push your belly fully inwards) and by lifting the diaphragm up;
- > inhale naturally: relax your belly muscles and the lungs will fill up by themselves without having to force the inhale;
- > as soon as the lungs are full, empty them right away like at the beginning, and keep going. One inhale and one exhale constitute a *kapalabhati*-breath.
- > perform around twelve *kapalabhati*-breaths if you are a beginner, or keep going for one minute if you are more advanced;
- > breathe once slowly and deeply;
- > once your lungs are completely full, hold your breath (a few seconds at the beginning, then as long as possible, but without pushing).

Duration: breathe like this 3 to 5 times.

Rest and observation: in lying position.

4.2.2 The "full yogic breathing"

This way to breathe is the basis for all *prāṇayāmas*. The goal is to inflate the lungs slowly and as much as possible, then to empty them fully, just as slowly. The amplitude of each breath is such that all accessory muscles are involved: inhale and exhale are both done methodically, in three successive stages (abdomen, thorax and collarbone). The belly, the chest and the top of the lungs are each filled in successive waves.

- Technique

- > *Inhale* quietly and steadily through the nose:

- first by lowering the diaphragm, which dilates the abdominal wall and allows the air to fill the lower part of the lungs;

- then by opening the ribcage so as to let the air enter the middle part of the lungs;

- finally by raising the collarbones and the shoulders, which allows filling the top part of the lungs.

- > *Apnea*: keep the air inside your lungs, for 1 or 3 s, without contractions, simply by pausing the breathing.

- > *Exhale* still quietly and steadily:

- first by lowering the shoulders;

- then by closing the ribcage;

- then by pulling the diaphragm upwards;

- and by pushing the belly inwards.

- > *Apnea*: hold for 1 to 3 s, with the feeling of empty lungs.

Duration: breathe like this for 5 to 10 min.

Rest and observation: in lying position.

4.2.3 The “square *prāṇayāma*”

While normal breathing includes only two phases, inhale and exhale, in yoga we introduce two other phases which are breath-holds done at the end of the inhale or of the exhale. Please note that all the real wealth of *prāṇayāma* lies in these breath-hold phases.

- Technique (figure no. 1)

The square *prāṇayāma* is a fully rhythmic yogic breathing (therefore, always follow the advice given as for full breathing). It is calm and steady. Its specificity lies in the fact that each phase of the ventilation is equal in length: half of each breathing cycle is a breath-hold. If starting on the basis of 4 s, you will count 4 s for the inhale, 4 s for post-inhale apnea, 4 s for the exhale, and 4 s for post-exhale apnea. Gradually, progress from 4 s to 8 s. When working with 8 s, the breathing rhythm will be 2 breaths per minute on average, which is equivalent to a “big *prāṇayāma*”.

In order to reach a higher stage, it is better first to increase only the active phases (inhale and exhale). The rhythm is what is important, extended times will come naturally according to personal abilities (table no. 1).

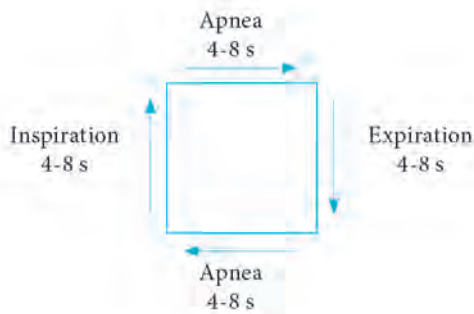


Figure no. 1. – Diagram of the square prânayâma.

Duration: breathe like this for 5 to 10 min.

Rest and observation: in lying position.

Stages	Inspiration	Apnea with lungs filled in full	Expiration	Apnea with empty lungs	Technique
1	4 s	4 s	4 s	4 s	Square of 4 s
2	6 s	4 s	6 s	4 s	Intermediate
3	6 s	6 s	6 s	6 s	Square of 6 s
4	8 s	6 s	8 s	6 s	Intermediate
5	8 s	8 s	8 s	8 s	Square of 8 s

Table no. 1. – Progress for the square prânayâma.

4.2.4 The “full breath retention” (Kumbhaka prânayâma)

This is another type of rhythmic breathing. It is a symbol and a reference in big prânayâmas. It is directed to advanced yogis and requires training. The goal is to progressively make each breath longer by making only one long breath-hold after the inhale. This long pause in the respiration is called *Kumbhaka* in Sanskrit.

- Technique (figure no. 2)

Always follow the same guidelines as for the full yogic breathing. When taking inhale time as the basis, the goal is to hold 4 times longer, and to make the exhale twice as long as the inhale. After successive steps,

you will eventually reach the following rhythm: 1 unit for the inhale, 4 units of apnea, and 2 units for the exhale. This ends up with an impressive rhythm of one breath per minute, which can last several hours (table no. 2). Only advanced freedivers should attempt this base of 8, like the advanced yogis, while making sure to maintain relative ease of execution.

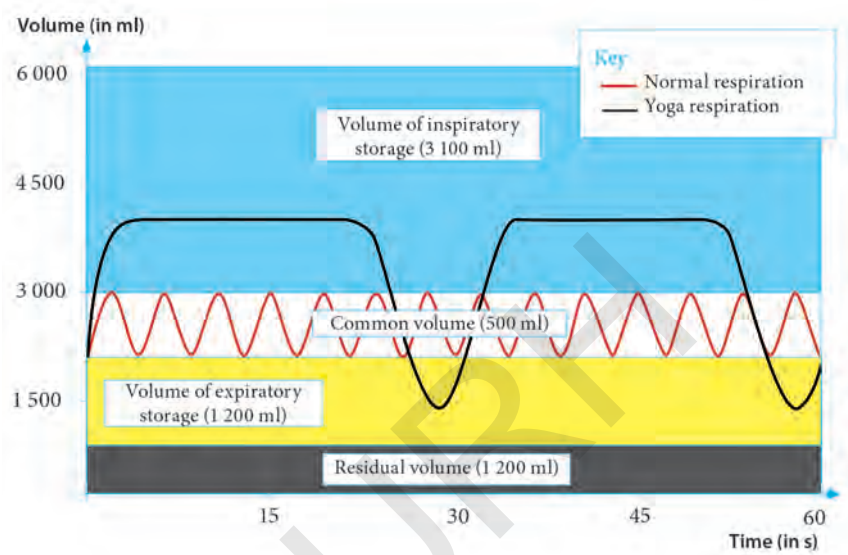


Figure no. 2. – Spirogram presenting a comparison between the full breath retention technique (Kumbhaka prāṇayāma) and normal breathing.

Duration: repeat this prāṇayāma 5 to 10 times. With experience, you will be able to keep going for several minutes.

Rest and observation: in lying position.

Stages	Inspiration	Apnea with lungs fully filled with air	Expiration	Technique
1	4 s	8 s	8 s	Intermediate
2	4 s	12 s	8 s	Intermediate
3	4 s	16 s	8 s	Basis of 4 s
4	5 s	20 s	10 s	Basis of 5 s
5	6 s	24 s	12 s	Basis of 6 s

Table no. 2. – Progress for the Kumbhaka prāṇayāma.

4.2.5 The “diaphragm stretching” (Uddiyana bandha)

This exercise is not really a breathing exercise per se, but rather an exercise to stretch the diaphragm, essential complement to *prāṇayāma*, especially for “deep” freedivers. In deep freediving, the body undergoes strong pressure changes correlated with depth. The pressure is acutely exerted on cavities containing compressible gases, such as the ribcage. In extreme hyperbaric situations, the ribcage and the lungs are compressed, and once the ribcage has reached its deformation limit, the pleura would detach if it was not for the *blood shift*, or “lung turgescence”, which protects these tissues thanks to a massive influx of blood. On its lower part, the ribcage is lined with the diaphragm, a dome-shaped muscle which moves along a vertical axis like bellows. The extreme lung compression due to increasing outside pressure sucks the diaphragm upwards. Such diaphragm deformation can be huge and reaching big depths requires an adapted flexibility of the diaphragm, to avoid small or more serious injuries.

Regarding the ribcage, we can explain the compression phenomenon using an image from Loïc Leferme who compared the body to a bottle that we submerge:

Made of glass, it will resist until it implodes, made of plastic it will deform but will not break. You have to make the body malleable, relaxed, pliable. Diaphragmatic work is key.

Even though *Hatha-yoga* can help increase ribcage flexibility, *Uddiyana bandha* is recommended to improve diaphragmatic flexibility. Moreover, when practicing diaphragm stretching on a regular basis, the heart gets massaged and used to getting compressed, which is what happens during a deep dive.

- Technique (photo no. 38)

We should be able to see the abdomen, to visually check that the exercise is performed correctly (choose clothes that show this part of the body). Even though this exercise can be done while sitting, the ideal position is standing up, legs apart, back bent slightly forward, and eyes looking towards the belly. Bend your knees slightly and place your hands flat on your upper thighs, fingers turned inwards.

Careful: this exercise should be done on empty stomach, or at least 4 h after the last meal. Stop the exercise if you experience any abdominal pain.



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Photo no. 38. – Uddiyana bandha practice.

The exercise starts at the end of the exhale:

- > Exhale strongly and as deeply as possible in 2 s, then push out the last remaining air with one or two extra exhales by contracting the abdominal muscles if necessary. Help yourself by pushing your hands on your thighs;
- > close the glottis to avoid inhaling (for beginners, it is easier to pinch the nose with one hand);
- > while on breath-hold, quickly and fully relax the abdomen which you had contracted to achieve the forced exhale;
- > then stretch your ribs outwards and simulate taking a deep thoracic inhale (while maintaining apnea). As soon as the ribs open, the diaphragm will move upwards and the belly will automatically retract into an impressive hollow shape. We should point out that the term *bandha* means “lock” (25); in this exercise, the lock lies in this abdominal retraction;
- > at the same time, lift your perineum;
- > hold the pose, more or less long according to your level of training.

Ending the pose: 1° first of all, relax the glottis, let the ribcage take its normal size and let the belly return to its usual position by relaxing the diaphragm, and only then, inhale. *Be careful:* if you let the air come in while still in *Uddiyana bandha*, the depression inside the thorax will create a violent pull of air inside the lungs, which is traumatic for alveolar membranes and can be painful. If you can inhale deeply, it is a sign that you performed the exercise successfully; 2° secondly, relax all your contractions: let the ribcage fall down and relax the abdominal muscles. Note

that these muscles should not be contracted during *Uddiyana bandha* (see description above).

Repetition: breathe deeply and quietly one or several times, then repeat the exercise.

Duration: perform *Uddiyana bandha* 3 to 5 times. *Rest and observation:* in lying position.

4.3 Example of pre-competition preparation

The goal is to reduce psychological and physical stress, *i.e.* to decrease the sympathetic nervous system activity, in favor of the parasympathetic system. Before a big dive, the first stage is to reach a “pre-calm” state. You should try to “let go” as we described in the previous paragraph. The second stage can rely on the use of some or all of the following breathing exercises.

4.3.1 The “left polarized breathing with long exhale”

In Asia, the vital energy is an essential phenomenon. For the Chinese, it is the *chi*, the *ki* for the Japanese, and the *prâna* in India for yogis. This energy is difficult to measure and we are still unsure of its existence. In acupuncture, it is believed to circulate along the *meridians*, energy paths running around the body. It is apparently possible to feel it by becoming aware of it while breathing, given that it is believed to circulate through the body via the breath. This energy has two polarities, or two opposite actions: the *Yin* and the *Yang*.

According to this concept, each nostril has a regulatory effect on this energy. Through the left nostril we breathe a *prâna* which is negative, lunar, dense, cold, called “inertia”, whereas through the right nostril we breathe a *prâna* which is positive, solar, light, warm and invigorating. Even though this definition seems filled with a certain poetry, several studies showed similarities between the description of these two energies and the physiological effects. As an example, breathing only with the right nostril stimulates the sympathetic nervous system (19), which matches the invigorating aspect. On the other hand, breathing with the left nostril induces an increase in galvanic resistivity of the skin, interpreted as a decrease in sympathetic nervous system activity (20). Here, we will only discuss the left polarized breathing, which only uses the left nostril in order to help relaxation.

Just as the side of the nose through which we breathe, the rhythm used during respiration is also a conditioning factor on the excitation level of

the nervous system. Still according to observations coming from yoga, a respiration cycle includes an invigorating inhale phase, and a relaxing exhale phase of inertia. For this reason, breathing with long exhales tends to bring a sense of calm.

- Technique (photo no. 39)

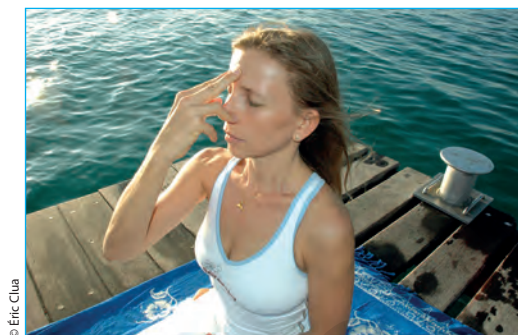


Photo no. 39. – Position of the fingers for polarized breathing.

If possible, in the sitting position of your choice, and after finding the correct posture and quietness:

- > place the middle finger and index of your right hand on your forehead, while folding ring finger and little finger. Then place your thumb lightly on the right nostril;
- > breathe through the left nostril, quietly and steadily, as for the full yogic breathing, and slightly increasing the exhale time. Given that breathing through only one nostril offers more resistance to the air flow, feel free at the start to open the right nostril slightly if you need to;
- > be aware of your breathing: observe the flow of air, how it vibrates inside the nostrils and higher up at the back of the nose, like wings rustling.

Rhythm: 3 s to 4 s for the inhale and 6 s to 8 s for the exhale.

Duration: You can keep breathing like this for several minutes.

Rest and observation: in lying position.

4.3.2 Superficial breathing

As its name indicates, it has a very small amplitude. It is characteristic of pre-ecstatic states, or meditative states. Therefore, it is interesting for

freedivers in pre-competition phase when they are trying to reduce stress and to focus.

- Technique
 - > Make your breathing progressively longer until the exhales are as long as the inhales. Breath-holds are short, around one second. Try to reach your maximum comfortable breathing amplitude, *i.e.* by reducing the margin as much as possible. Keep going for a few minutes;
 - > then, inversely, progressively reduce the breathing rhythm until exhale and inhale last just one second. Unlike for deep yogic breathing done in three stages (abdomen, chest and collarbones), here, keep your breath only in the chest. Bring your awareness to the periphery of your ribcage;
 - > you will become aware of a very fine and light breathing, of very small amplitude. It will help you cut yourself from the outside world, in quietness. Lungs have a smaller role, whereas the psyche is dominant;
 - > finish with what you started with: making your breath progressively longer.

4.3.3 The “colored breathing”

The colored *prāṇayāma* is based on the idea that the colors of the rainbow can modulate your mood and have an influence on the nervous system. In painting, it is well-known that warm colors, yellow, red and orange, are fortifying and energizing. On the other hand, blue, purple and indigo are cold, calming colors. Green, an intermediate color, is balancing. Therefore, visualizing blue will have a calming effect.

- Technique
 - > Visualizing the color blue should be done during the post-inhale breath-hold phase;
 - > the color does not always come naturally to you, therefore you can help yourself by placing a blue paper in front of your eyes;
 - > to perform the visualization, you need to be in a receptive state and get rid of any tension.

4.3.4 Example of pre-competition program

After testing several techniques, you can choose either to always perform the same one(s), or to combine several of them. This is what we chose to do here. Indeed, here are two types of breathing that you can practice after a diaphragm stretching exercise.

- Program
 - > *Diaphragm stretching (Uddiyana bandha)*: it can be done on the morning of the competition to prepare the diaphragm by stretching it, and also to relax the solar plexus (anti-stress).
 - > *Superficial colored breathing*: simply use the superficial breathing technique while placing yourself in a blue atmosphere. If possible, finish the exercise lying down to recover and observe the effects.
 - > *Colored, left breathing, with long exhales*: use the left-sided polarized breathing with long exhales and add the blue color visualization. Finish the exercise same as above.

Especially before a dive, do not force your breathing, but rather work on ease and comfort instead. Use your willpower in order to minimize all efforts.

5. Relaxation

Relaxation is an essential component of freediving preparation, especially just before a performance. It helps lower the metabolism and prepares the body towards a controlled effort, which will be the best compromise between energy expenditure and actions needed during the performance. Here we will present a relaxation posture, often used at the end of *Hatha-yoga* sessions in order to feel their effects, and a relaxation technique.

5.1 Example of a pose: the "Corpse" (*Savasana*)

The first precept is that our mental state and our physical state are intimately linked: if your muscles are relaxed, your mind will be too; similarly, if your mind is tense, your body will suffer.

- Value

The corpse pose seems easy at first but it is one of the most difficult poses to perform in the correct way, as it is not easy to let go of body and mind agitation. It requires complete relaxation, while keeping a certain awareness of the mind. It is very common to fall asleep while in this pos-

ture, although it should be avoided. This pose allows relaxing while focusing the mind on other exercises to come.

- Technique (photo no. 40)
 - > Lie down on your back;
 - > spread your legs about one meter from each other;
 - > spread your hands about 15 cm from your body, palms turned to the sky;
 - > get comfortable in the position and check that your body is symmetrical;
 - > thighs, knees and toes are turned outwards;
 - > close your eyes and breathe deeply (full breaths);
- If your mind starts to wander, focus on the rhythm of your breath.



Photo no. 40. – The corpse pose as a relaxation exercise.

5.2 Relaxation protocol

There are many relaxation techniques. Here, we offer you a simple method, accessible to all. It involves focusing chronologically on different parts of the body in order to relax each one successively and cumulatively.

- Relaxation of the face
 - > Relax your forehead;
 - > relax your eyelids;
 - > relax your jaw: lips unlocked, mouth slightly open;
 - > let your tongue separate from the roof of your mouth and become soft.

- Relaxation of the body
 - > relax your neck which is no longer supporting the weight of your head;
 - > relax your shoulders;
 - > relax your right arm, from the shoulder to the tip of the fingers;
 - > relax your left arm, from the shoulder to the tip of the fingers;
 - > relax your entire chest: thorax, abdomen, muscles along the spine;
 - > relax your pelvis;
 - > relax your right leg, from the hip to the tip of your toes;
 - > relax your left leg, from the hip to the tip of your toes;
 - > feel all your body relaxed and heavy on the floor;
 - > feel how your breath is calm and peaceful;
 - > listen to your heartbeat.
- Relaxation of the mind
 - > relax your mind “as if it were a muscle”;
 - > let all your thoughts come to you without holding them back, without hanging onto them. Be a simple spectator of your thoughts;
 - > focus on the peaceful rhythm of your breath while keeping your mind alert;

To come out of the pose: take a few deep breaths, slowly move your hands and feet, and avoid sudden movements as you stand up.

6. Conclusions

In this chapter we presented a certain amount of knowledge acquired to this day on the benefits of yoga practice for freedivers who wish to improve their performance. We have to admit that even though these benefits are undisputed, we still know very little about the objective effects of yoga. It also seems important to point out that in this chapter we presented three domains coming from yoga, namely the postural practice, breathing exercises and relaxation, but there is a fourth domain which can also be beneficial to freedivers: meditation. Undeniably, the effects of meditation on freediving performance will be difficult to identify. However, given that the mind is so important, we have every reason to believe that this will be a complementary and promising area, just as the other domains discussed in this chapter.

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