



Dealing with Fitness Training

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There is no such thing as safe technical rebreather diving without proper preparation. But preparation means much more than just checking equipment, going through dive planning and "What-ifs". It is also a matter of long-term preparation.

Just think about how strenuous a technical dive could be and how it impacts your body. You carry tons of tanks, cases, bags and equipment, travel for hours in an uncomfortable position, gear up with a dry suit under a tropical sun, and wait long minutes before being able to jump in the water. And this is just the beginning of the stress you are going to put your body through. You still have to swim to go down, swim on the bottom, swim to go up, on-gas, off-gas, fight against the cur-

rent and drag off your deco tanks, your bailout tank(s), your huge twinset (the one you nicknamed Potemkin!) or your favourite rebreather, swim at the surface, climb the ladder or the shore and carry everything again! And some people think we do that just for fun! Needless to say, preparing for these kinds of dives goes beyond just resting the evening before the dive and drinking a so-called energy drink a few minutes before kitting up. It takes year-round preparation. Moreover, it's a lifestyle!

The benefits of fitness training

A better cardiovascular system means a lot for your body. It doesn't only improve your dives but also your general health. Some studies show that there is a relationship between VO_2max (your maximal O_2 consumption,

i.e. the ability of your body to efficiently transport and use the O_2 in your lungs) and risks of Decompression Sickness. And a better use of the oxygen means a better/slower ventilation. You are less exerted if you have to swim for a long time, or harder than usual, and it becomes easier for your body to get rid of the CO_2 you produce.

The Body Mass Index (BMI) is

a way to determine the ratio between fat tissues and muscles in your body, based on your age. A lower BMI has the following significance for a rebreather diver:

- Less fat and more muscles is a good way to decrease your susceptibility to DCS. Because of a higher vascularisation, muscles tend to be less prone to DCS than poorly perfused fat tissues.

- Muscles are heavier and less buoyant than fat tissues (1.10gr/cm³ for muscles and only 0.90 gr/cm³

for fat tissues). So, a

lower BMI means a less buoyant body, which in turn means a lesser need for weights, something that all divers should appreciate. And with less weight, rebreather divers have usually a better trim.

- More muscles also mean more strength, something that can prove to be useful in case of an unexpected situation (fighting against a strong current, holding on a shotline, etc.) or an emergency (helping another diver to surface, rescuing a diver and removing him/her from the water, etc.).

The Body Mass Index can be calculated by different complex equations based on the skin thickness, or more simply, with modern digital scales. Obesity is when your BMI is



for Technical Divers

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over 20 percent, if you are under 35 years of age (31 percent for women). But if you are older than 35, then obesity only appears if your BMI is over 25 percent (37 percent for women). So, check it out on a regular basis!

More comfort

Fitness is of paramount importance for your comfort level at the surface and underwater. Before the dive it gives you more strength to carry the tanks and all your kit, noticeably reducing the pre-dive stress. It also helps you

to stand up, walk and jump in

(or

anything else), minutes

the water with all the gear on. During the dive, swimming becomes less tiring and less stressful, allowing your muscles to better avoid cramps. You swim more efficiently and more relaxed, and your gas consumption (or your oxygen consumption, if you dive with a rebreather) doesn't go through the roof every time

you have to swim slightly harder. After the dive, your body will be subjected to a certain level of post-dive decompression stress. But one of the most stressful events is to climb a ladder (or anything else), minutes

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after surfacing. Your heart has to pump faster and harder to supply blood to your muscles when you already have a peak in

bubble formation in your bloodstream.

A good program

Fitness training is like so much else in life. You have to find the right balance between too much and not enough. Too much and your body becomes tired, reducing your motivation. Not enough and the results are difficult to perceive. So, no need to hurt yourself, if the only kind of physical activity you've done in the last few years was to move your giant flat screen TV from your living room to your bedroom. Better to start slowly and gradually, rather than giving up after a week.

1. Get more muscles. Which ones? The ones you use the most in diving. You don't need to become the future governor of California for that. Just slowly increase the mass of your legs, chest and back and their ability to transform into energy the nutrients they store. Between one and three times a week, go to a gym club and work out for 20 to 40 minutes. Focus on some critical muscular groups like quadriceps (the thighs), back, deltoids (shoulders) and arms. If you have enough free time to go working out several times a week, a complete circuit (all body muscles) once a week is a good idea. And

never forget to spend five minutes every time to exercise your abs. They help you to keep a good posture at the surface and to stay horizontal underwater, hence avoiding back problems when you carry heavy stuff.

Improving your cardiovascular system

Aerobic exercise refers to exercise that involves or improves oxygen consumption by the body. Aerobic means "with oxygen", and refers to the use of oxygen in the body's metabolic[2] or energy-generating process. Many types of exercise are aerobic, and by definition are performed at moderate levels of intensity for extended periods of time—about 85 percent of your maximum output, depending on your age—but is more or less stable for a long period of time. Anaerobic exercise is what happens when you need your muscles for a very short and intense period of time. Of the two forms of metabolism, aerobic is the one you use the most in diving, while you swim at the surface or underwater.

Aerobic activity has a beneficial effect on your Vital Capacity (the maximum amount of gas you can exhale from your lungs), Stroke Volume (the blood pumped by your heart at each

heartbeat) and Cardiac output, and improving any of these comes with some clear benefits to a rebreather diver. The best way to train your aerobic energy production system is to use the muscular group you're supposed to use in diving. Swimming, but also running or bicycling are some of the best training methods. Practice two or three times a week, at moderate intensity but for at least 30 to 60 minutes. A heartbeat monitor can help you to adjust your intensity, following these recommendations:

Maximum heart rate = 220 – age

If you haven't done any exercise for a couple of years, keep your heart rate between 60 and 70 percent of maximum heart rate. With more training, you can slowly increase your target heart rate.

Become more flexible.

Proper stretching is an important part of any fitness program. It helps to protect your muscles, ten-

dons, ligaments and joints. It also helps you to reach all your equipment (sling tank clips and D-rings, isolation valve on your twinset, etc) more easily. Always do a short—about five minutes—but careful and slow stretching session at the end of each aerobic training session. Go through all the main muscles and joints and gently stretch them one by one for at least 20 seconds.

Don't forget hydration and diet

A proper hydration program doesn't start a few minutes before a "big" decompression dive. You should at least increase your fluid intake 24 to 48 hours before the dive. Food is also a very important issue, as most of the people have an improper balance between the different types of nutrients: carbohydrates (glucose, or glycogen stored in the cells), lipids (fat) and proteins.

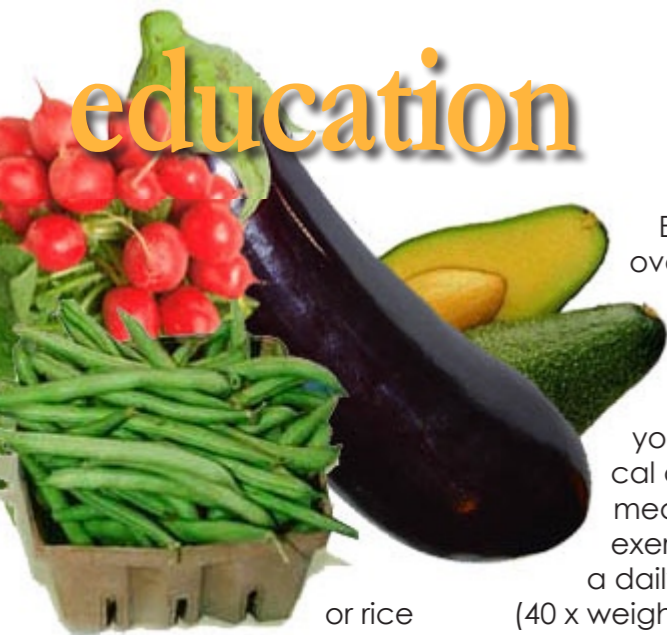
A good starting point for your daily intake is 60 percent of sugar ("slow sugars" like bread, pasta



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or rice are more useful than "fast sugars" like candies), 30 percent of proteins (meat, fish, cheese, milk, eggs) and 10 percent of lipids (unsaturated oils). Don't forget a large portion of fibres (salads, fruits) to help your digestion and get the necessary vitamins and minerals your body needs.

Some proteins (amino-acids) are good anti-oxydants, but physiologists are still puzzled with their ability to decrease one's susceptibility to oxygen toxicity. More proteins also actually helps to decrease your Respiratory Quotient, the ratio between oxygen metabolized (used by your body) and the CO₂ produced. A good way to decrease your CO₂ production and to save your scrubber!

Even if you feel over-weight, don't try to reduce your food intake. Just select carefully what you eat. A technical diver with a light/medium level of exercise should have a daily intake around (40 x weight) calories. For instance, if you weight 80kg, you should eat 3200 calories per day, and that's quite a lot of food. Have a look at a nutrient table to have an idea of what it is. Spread this food over three meals, according to the above 60-30-10 ratio.

A healthy lifestyle

If you committed to a fitness training program, it might be the right time to also improve your lifestyle. Quit smoking. Nicotine and 32 other components decrease your ability to properly use your alveoli for efficient gas exchange. Slow down your alcohol intake. Alcohol is as high as fat in caloric content. No chance to loose your love handles if you don't give up the 20 beers you usually drink to celebrate a good and safe deep dive. Slow down your caffeine intake. Caffeine (in tea, coffee, soda) is a stimulant of the basal metabolic rate, increasing (and



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after a while decreasing) blood pressure and heart rate, something you don't really need during a technical dive. And caffeine is a diuretic that increases dehydration and definitely requires a P-valve on your dry suit.

Most technical divers spend a lot of time preparing their equipment and fine-tuning their dive plan and decompression.

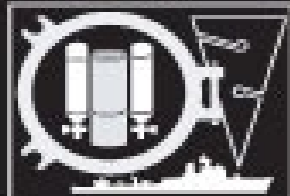
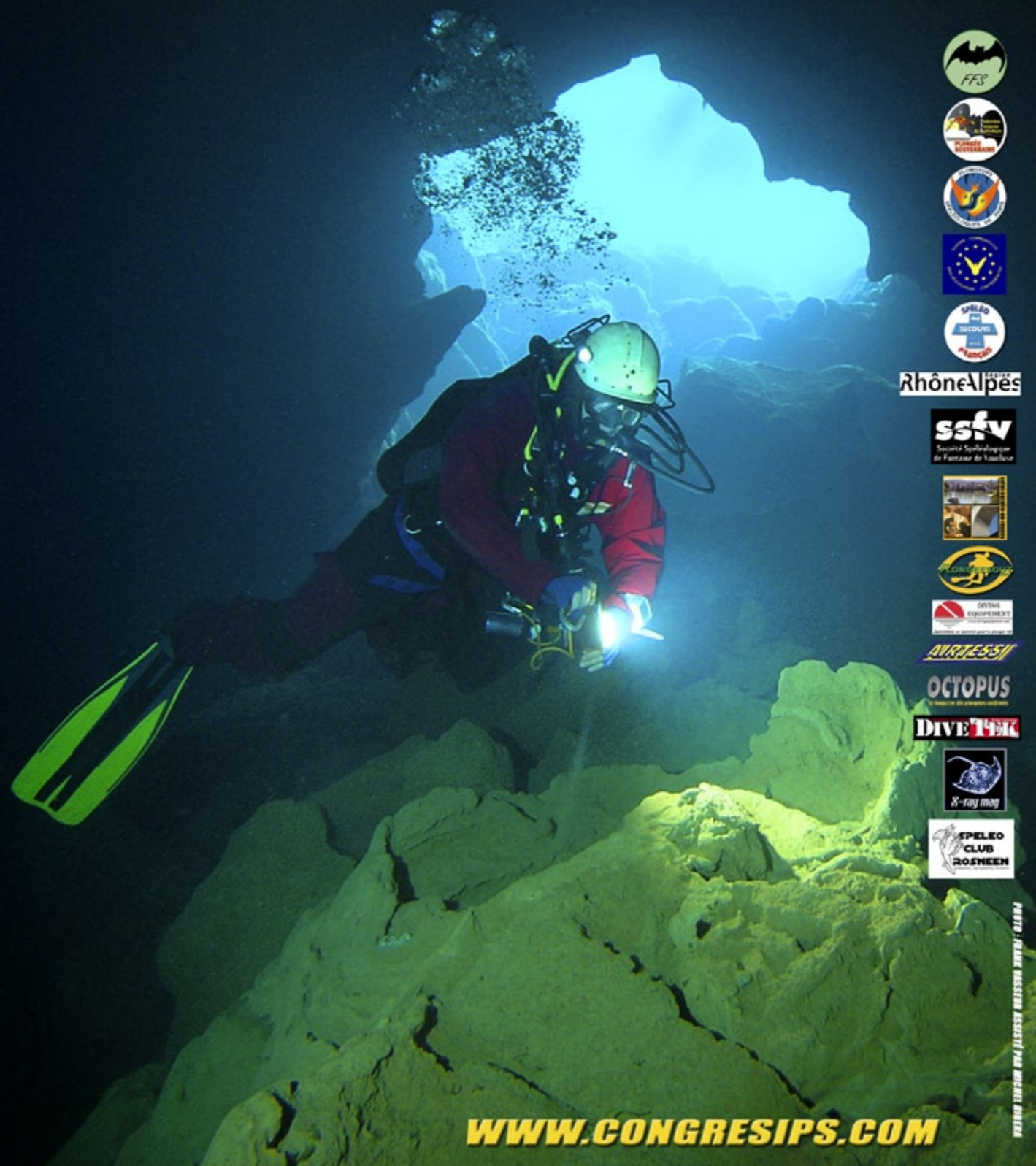
Just don't forget that your most important tool is not your dive gear but your body! ■

Aboard the NOAA research vessel, *Ron Brown*, Operations Officer LT Mike Hoshlyk's duties include acting as the liaison between the scientists and the ship's crew, serving as dive master for the ship, standing in as the ship's medical officer, conducting damage control drills, and safety and lifesaving equipment maintenance. He endures long periods at sea by keeping to a daily routine. From 12-4am, Mike is on navigational bridge watch; he catches a bit of shut eye before he is on watch again from 12-4pm; he exercises a bit and then gets to do it all again the next day, seven days per week. Mike's daily fitness regime, proper hydration and diet, rest and relaxation helps him maintain a healthy outlook, focus and concentration on the job.

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