

FCB on Oxygen: Greater Success Through Greater Staying Power

How FC Basel aims to leave the competition behind with simulated altitude training.

How “Hypoxia” works and why it is not doping.

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During preparations for the new season, FC Basel is using a special method: simulated altitude training. Machines purchased specifically for this purpose are intended to give Basel an advantage. Teams such as FC Barcelona also use “Hypoxia”. Here is how it works and why it is not doping.



FC Basel is doing altitude training called Hypoxia during pre-season. Here Kevin Carlos is shown wearing the breathing mask.

Intense. Extensive. Meticulously scheduled. Those are the words the FC Basel players use when asked to describe their current pre-season preparations.

The ten days in Schruns, Austria, where the FCB squad held its training camp, were particularly packed. At least two training sessions on the pitch each day, with a gym session in between. “We are in the stress-work phase,” says Carlos Menéndez with a smile.

The Spaniard, who has worked as FCB’s fitness coach since last summer, has added another element to this pre-season: a training method called Hypoxia. Put simply, this training is based on reducing the body’s oxygen supply. In other words, FCB is simulating altitude training.

Hypoxaemia

The word hypoxaemia comes from Ancient Greek. Hypo means “under”, oxys means “sharp” and is used here as a shortened reference to oxygen, while haima means “blood”. Together they form the word hypoxaemia, which refers to a deficiency of oxygen in arterial blood. The normal value depends on age and sex and is generally 18.6 percent by volume for women and 20.4 percent by volume for men.

For this purpose, Basel has purchased two breathing machines that induce hypoxia and is renting two more during pre-season.

The idea of increasing lung volume by working against air resistance and accelerating recovery is not new at FC Basel. Back in winter, at Menéndez’s initiative, the players trained with breathing masks that they had to use after getting up and before going to bed.

At the time, the aim was to improve muscle hypertrophy - in other words, muscle growth - and breathing. But that was only the first step. “Now we wanted to go one step further. Working with the

machines is an evolution of the work we did in winter,” Menéndez explains, also implying that the current work would not be possible without the conditioning carried out during the winter.



A leading expert in his field: Spaniard Carlos Menéndez, FC Basel's fitness coach since summer 2024.

But how exactly does Hypoxia work? During pre-season, the players are connected to the machines four times a week for one hour at a time. The machines provoke the same reaction in the body that altitude training would trigger.

However, they do so without the secondary effects associated with actually adapting to an altitude of 3,000 or 4,000 metres. “Not everyone is able to adapt to altitude,” says Menéndez. With the devices, the players continue to live at their usual elevation, but intermittently experience an oxygen supply equivalent to that found at Alpine altitudes.

Put simply, altitude training deprives the body of oxygen, forcing it to produce more red blood cells. With more red blood cells, the body can transport more oxygen, which in turn improves endurance.

Pre-season preparations continue until mid-August

FCB is once again taking a new approach to its preparation plan. In winter, Basel began conditioning at the end of November while the competitive season was still under way. This time, after three completely free weeks of holiday, the players did not start training until 20 June. As before, pre-season will last between six and eight weeks and will not finish until early or mid-August - when the Super League season is already under way. Is that not a risk? “It depends on what you value. What is most important for the club? Winning now and losing in December? Or becoming champions at the end and being able to compete for important things?” Menéndez says, explaining his approach. He is convinced that the difference is made in the final phase of the season, just as it was last season.

Under the current plan, however, the players should reach 100 percent for the first time just before the two Champions League play-off matches and be perfectly tuned. The five friendly matches played within two weeks are also intended to replicate the high intensity that awaits in August. (cfe)

“If we actually trained at altitude, we would need an adaptation period lasting at least 21 days. Only then would we achieve a positive effect that also lasts,” says Menéndez.

The 48-year-old Menéndez, a recognised expert in his field with years of experience at Real Madrid and Atlético Madrid, explains the effect as follows: “When you reduce the amount of oxygen entering the body, the body has to react in some way.”



Philip Otele wearing the breathing mask, which is intended to give him and his teammates more air so they can give everything on the pitch.

In a sense, the body begins to fill its reserves. At first, it has only a small cushion of extra air. After a friendly match, that small cushion is gone and the reserve is empty again. If the players did not continue working consistently with Hypoxia and building on it, that would remain the case.

But with continued training, the body builds cushion upon cushion. "The body learns to build on what is already there," says Menéndez. Suddenly there are two, three, four cushions in reserve, and so on. A player can draw on these during a match.

The more cushions there are, the more air the player has available.

The machine can also supply more oxygen

Modern machines can also work in the opposite direction by increasing the oxygen supply. The air delivered by the machine is enriched with additional oxygen. The aim is clear. Menéndez explains: "We are trying to improve the muscle-recovery processes that take place after intense work."

While this part is not strenuous, the reduced-oxygen phase is demanding. At the training camp, these sessions were therefore always carried out in the evening. Back in Basel, they are to take place before the afternoon power nap. According to Menéndez, doing them before training would be impossible: Hypoxia is too demanding on the body.

He says it is not risky, however. There is no danger of a player receiving too much or too little oxygen. Oxygen saturation is monitored in real time, the players are supervised throughout the session, and their heart rate is measured.

If they reach a point close to their minimum saturation level, they are disconnected from the machine. Everyone has individual values and tolerates different levels. Because the sessions are intermittent, they are entirely safe, Menéndez says.

As if someone taped your mouth shut

Or, as Menéndez puts it in his vivid language: "If I tape your mouth and nose shut for ten minutes, something fatal will happen. But if I do it for only one minute, then give you a break and tape them shut again for another minute, nothing serious happens. That is exactly how working with these machines functions."

FC Basel's use of such methods is largely down to Menéndez. But sporting director Daniel Stucki is also open to innovation and is happy to read studies on Hypoxia.

Stucki is convinced that this training approach can improve the players' performance, even if the improvement cannot be expressed as a measurable percentage. The sporting director also believes it is clear that all these approaches ultimately help the head coach work more effectively and successfully.



FCB sporting director Daniel Stucki credits the fitness department with a significant share of the club's league-and-cup double.

The unconventional approaches used by Basel's fitness department have already been vindicated by last season's success. The Basel players looked very fit and, with the exception of Finn van Breemen, suffered hardly any serious injuries. On the sidelines of the training sessions in Schruns, Stucki also indicated that, in his view, the fitness department played a major role in the two titles won last season.

FC Barcelona also uses this method

For FCB, working with such devices is an investment whose benefits may not be immediately obvious to people who do not work with the team and staff every day, but it is an investment that can pay off - and one the club is therefore willing to make.

Simulated altitude training has long been familiar in individual sports, especially cycling. Its use in football is not new either. But, Menéndez says: "The technology has become more accessible. In addition, not all clubs have the same concept or are equally willing to experiment scientifically. That certainly has something to do with economics, but also with the ideology of the country, the ideology of the club and its sporting management."

Clubs such as FC Barcelona are currently also working with Hypoxia machines. Teams such as Tottenham Hotspur even have their own hyperbaric chamber at their training ground. Atlético Madrid is also familiar with these chambers and was already using them when Menéndez worked there.

These chambers, however, carry risks, according to the FCB fitness coach: "The pressure in these chambers can cause secondary effects similar to altitude. If someone has had a problem with pressure in their ears since childhood, for example, they will not tolerate these chambers." The consequences can include nausea and pain.

Hypoxia machines do not cause these effects because they do not generate atmospheric pressure. The method used by FCB may therefore not only be less expensive than the methods used by the biggest clubs, but may also involve fewer side effects.

The question of doping

The fact that FC Basel initially did not want this new method to become public had nothing to do with concerns that Hypoxia might raise questions about possible doping. Menéndez firmly rejects that accusation: "We are not administering a prohibited substance; the haematocrit level improves naturally."

The reason for the initial desire for discretion was simpler: improving the haematocrit level - the percentage of total blood volume made up of red blood cells - is simply an advantage. It is an advantage that any team could gain, but, based on current knowledge, FCB is so far the only club in Switzerland implementing it.

"In a Formula One race, thousandths of a second decide who finishes first and second. It is similar for us, just measured differently. Strategy and tactics for a match are also only released an hour and a half before kick-off," says Menéndez. "But because it is a very interesting topic and our fans may also be interested in a little more detail about how we work at FCB, it is fine to talk about it."

The effect is "guaranteed"

Ultimately, however, the success of these technologies is a combination of many factors: not only the Hypoxia method itself, but also the knowledge available within the staff, the financial resources and the players' willingness to put all of it into practice.

Menéndez is convinced that it will benefit FCB. In any case, the effect of simulated altitude training is "scientifically guaranteed", says the Spaniard.

Will it ultimately result in FCB reaching the Champions League? "We cannot achieve that through breathing alone," Menéndez says with a laugh. "But in the end, it is these small details that can make the small differences that allow the big stage to become yours."