ALTITUDE TRAINING FOR BASKETBALL

by Rutenis Paulaskas

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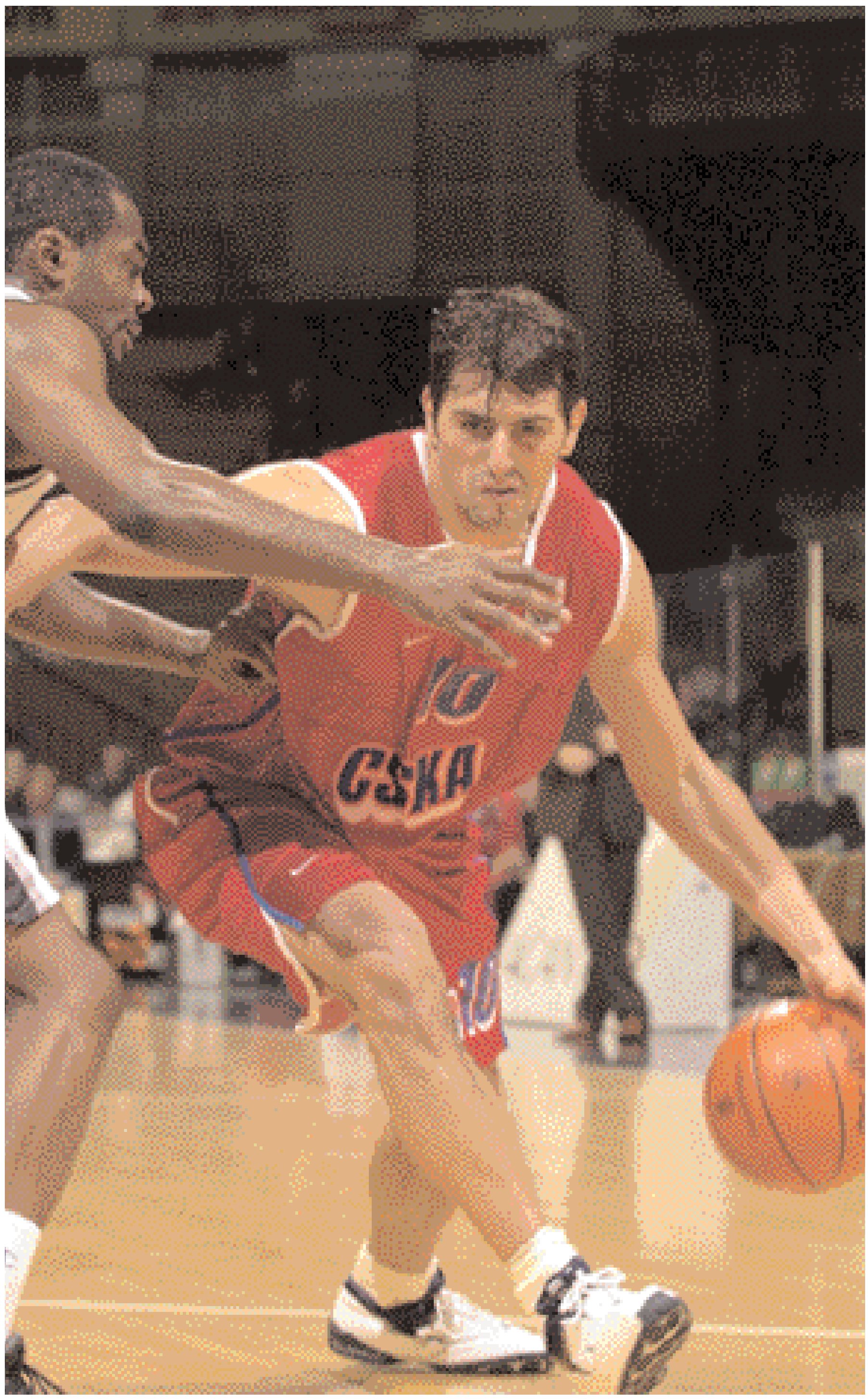
The preparation of a high-level basketball team for Euroleague and national championships is a complicated and sometimes difficult process when it comes to the physical conditioning of each individual player. The innovative coach always seeks ways to improve training and increase the functional and physical capacity of his basketball players using natural means. One such way is to train his athletes in the mountains.

The higher you go in the atmosphere, the thinner the air. Thinner air means less air resistance, so basketball players who sprint and jump will perform better at high-altitude competitions. But thinner air also means less oxygen, so the pace of hard endurance training and competition-which depends on high rates of oxygen consumption-actually gets slower at altitude. Basketball players don't play as well above sea level.

If you live at altitude for several weeks, however, the body begins to adapt to the oxygen shortage. The most important adaptation for the basketball player is an increase in the number of red blood cells, which are produced in response to greater release of the hormone erythropoietin



(EPO) by the kidneys. Red cells carry oxygen from the lungs to the muscles. More red cells means the blood can carry more oxygen, which partly makes up for the shortage of oxygen in the air. So to compete in a basketball event at altitude, a basketball player should live at altitude for several weeks before the event.

But what about when the basketball player comes back to sea level? Will the extra blood cells supercharge his muscles with oxygen and push him along faster than ever? That's what should happen, but there are problems.

When a player first moves to altitude, the shortage of oxygen makes it difficult to train intensely, and he may also suffer from altitude sickness. If the player doesn't adapt well to altitude, he may overtrain or lose muscle mass and strength. Even if he does adapt well, he still can't train with the same intensity as at sea level. The result? He detrains. When he comes back down to sea level, he may do better or worse than before, depending on the balance between adaptation and detraining.

Many athletes and coaches have generally accepted the idea that traditional altitude training-living and training high-benefits sea-level performance. Some experts believe that the average best altitude and best duration at altitude is 2200 meters for four weeks. These same experts also believe that the effects of altitude training were optimal two to three weeks after return from altitude.

How High Should You Go?

It is now known that training at medium-altitude mountain conditions (from 1200 to 2500 meters) is enough to trigger alterations in the functions of cardiorespiratory system, muscles, and nervous system. What we wanted to do was explore the changes in functional and physical fitness under these medium-altitude mountain conditions. We recruited the CSKA Moscow (Russia) basketball team players during their preseason mezocycle, when the training took place 1250 meters above sea level.

During one preseason training in Bormio, a mountain city in the Lombardy region of Italy, 10 players were studied for 18 days in the late summer of 2001. Training during this mezocycle was broken down into four micro-cycles of four days each. The basketball players performed practical exercises twice for two hours each day, and the last day of the micro-cycle was given over to rest.

At the beginning of the micro-cycle (just after arrival), in the middle (before the 3rd micro-cycle) and near the end (after the 4th micro-cycle), we examined the muscle power parameters of the athletes with a standing high jump. Arm strength was measured with a standard bench press, while quickness was measured in a timed 20-meter sprint. Also, every morning (just after waking up), we measured arterial blood pressure and pulse rate in rest conditions to evaluate cardiovascular system capacity.

We chose to study the high jump, muscle strength, and sprinting because these parameters have importance in the game itself: rebounding, jump shooting, inside play, and the fast break. The 20-meter sprint test also gave us the chance to test anaerobic threshold levels and quickness.

The pulse rate and the arterial blood pressure under rest conditions showed us recovery levels and gave us a partial look at physical endurance levels as well.

We statistically worked on the results of the tests, calculated arithmetical average (X) and standard deviation (Sx), and reliability of indices of the arithmetical average difference (p).

ANALYSIS

Just after arrival in Bormio, we performed the first examination that would reveal the athlete's physical fitness level at the beginning of mezocycle (Table No.1). The height of the jump during the first test was 64 (2,38 cm).

This measure, which is so essential for basketball players, was comparatively low. The strength of arm muscles reached 95.56 (6.65 kg), while the 20-meter sprinting time was 3.08 (0.04 seconds).

TABLE 1

Change of high jump, muscle power, and sprinting (X±Sx) of CSKA team players training under medium-altitude conditions in the preseason camp in Bormio, Italy.

Test	I st examin.	II nd exami.	IIIrd examin.	Reliability between I-III exam p
High jump (cm)	64.00 ± 2.38	63.80 ± 2.21	64.61 ± 1.68	p>0.05
Muscle power (kg)	95.56 ± 6.65	94.68 ± 7.01	97.43 ± 6.83	p>0.05
20 m sprint (seconds)	3.08 ± 0.04	3.11 ± 0.04	2.99 ± 0.03	p>0.05

CONCLUSION

Due to the medium mountain altitude, the resistance of body mass to muscles is much less due to its decreased atmosphere.

Thus, in our work we tried to have the athletes reach optimal anaerobic physical fitness levels and optimal muscle strength.

Our study revealed that during the 18-day mezocycle, training under medium-altitude mountain condition had some positive effects on the physical capacity and some functional features of the basketball players.

Just being in the mountain, where oxygen pressure is decreased, gave the cardiovascular systems of the athletes an extra load-and this helped aerobic fitness. Mid-altitude training certainly merits more scientific investigation.