

## **An Introduction to Conditioning For Mountain Biking**

“take a long-haired tattooed bike mechanic, a pinstriped corporate lawyer and a bustling midwife, put them on their bikes in a muddy forest, and suddenly all three will be indistinguishable and simply be fellow mountain bikers”

(Tim Brink 2007, p.9)

Mountain biking or off-road cycling appears to have begun in the early seventies in Marin County California, with pioneers such as Gary Fisher, and reached Olympic status in Atlanta 1996. Exact participation figures are hard to come by but for most people mountain biking offers a great opportunity for exercise and exploring the great outdoors, with 262 official trails listed on the [www.britishtrails.co.uk](http://www.britishtrails.co.uk) mountain biking resource.

For those so inclined, there is also the opportunity to test themselves in racing trim and there are three main types of mountain bike racing.

**Cross country** races take place on short circuits of a few kilometres, with racers covering several laps of courses that tend to include a mixture of very technical elements, steep climbs and descents. Some of you may have seen recent coverage of Lance Armstrong competing in the Leadville 100 mountain bike race, this is an example of an **endurance** race, where bikers covered 100 miles on an out and back course taking 6 hrs 45 mins for the winner (Armstrong came second by the way). This type of course is likely to include longer climbs and some steep descents. For the extremists there is **downhill**, which is basically self-explanatory; in the region of 5km downhill as quickly as possible, but don't underestimate the difficulty here, these courses can be highly technical and require tremendous skill.

Irrespective of whether your cycling is recreational or racy, improving your physical condition will improve enjoyment and performance.

### **Physiology of Mountain Biking**

Very little analysis of mountain biking has been carried out, particularly in the endurance and downhill disciplines. That which exists, focuses predominantly on the cross-country style of racing. Cross-country racing is performed at extremely high intensities. High start speeds, repeated climbs, increased rolling resistance from the terrain, and stabilisation requirements of handling, are suggested to be responsible (Impellizzeri & Marcora, 2007). This means off road cyclists need to develop the ability to sustain high workloads for extended periods, and like their road based counterparts ability to generate high power outputs is indicative of an elite performer (Faria, Parker & Faria 2005)

A well developed aerobic system is clearly an advantage for cross country mountain biking, however the evidence that exists points to a significant

contribution from anaerobic metabolism; the duration, intensity and geography of terrain are likely explanations. Training strategies that are likely to be most effective for mountain bikers are therefore interval and intermittent type approaches.

Strength training may also provide significant advantages when considering the increased power outputs needed on the steep ascents, and increased stability challenges. Interestingly, Impellizzeri & Marcora (2007) suggested the challenging terrain in off road cycling meant that technical ability, and trunk, and upper body strength and endurance, are likely to influence energy consumption. That would mean that better conditioning of the upper body could lead to better bike stabilisation and better overall performance.

### **Conditioning your way to better mountain biking**

Cycling like many sports requires significant commitment. A willingness to put the hours in “on the bike” might be considered a “truism” of improving ability. That said, the specific choices you make about how you spend your time on the bike can have a powerful impact on your results.

The asymmetrical physical demands of riding on the trail means that your training should reflect this undulating type approach. Most of you should be familiar with the concept of **interval training**, where you select appropriate exercise intensities and rest periods to target specific energy pathways. Your training strategy will therefore be based on an analysis of the specific metabolic profile of the mountain biking you or your client does and then your training designed accordingly. The table below provides basic guidelines to follow:

<b>% of maximum power</b>	<b>Primary energy system stressed</b>	<b>Duration of Exercise</b>	<b>Work to rest ration</b>
90-100	PCr	5-10 secs	1 : 12 - 20
75-90	Fast glycolytic	15-30 secs	1 : 3 - 5
30-75	Fast glycolytic and aerobic	1-3 mins	1 : 3 - 4
20-35	Aerobic	> 3 mins	1 - 1 - 3

(Adapted from Conley 2000, p.88)

**Fartlek training**, another well-established training approach, makes an excellent choice as a method of developing condition for the mountain biker. Since its profile offers a potentially close match to the intermittent nature of off road cycling it can offer an approach that “resonates” with the biker, as it feels more like the profile of their biking. This type of training can be particularly useful, as it can enhance VO<sub>2</sub> max, lactate threshold, and fuel utilisation (Potteiger, 2004).

Assuming you have established a sound base of general resistance training experience, **specific resistance training** that addresses the demands of biking makes sound sense as part of your overall training programme. The major purpose of strength training for the cyclist is to increase their ability to generate force into the pedals. Extension through the ankle, knee and hip are key lower body movements to consider. Although theoretically this is predominantly a sagittal plane motion, off road cycling places a greater emphasis on stability while generating this force, and as discussed also places greater demands on the upper body and trunk. In summary your choice of movements should focus on strengthening the hip, knee, ankle complex and the trunk and shoulder girdle. You should focus on structural exercises that integrate the lower body and the trunk if possible.

Your choice of acute programming variables (e.g. sets, reps) is dependant on objectives and design of your overall plan. It is important that your choice of movements reflects the skill level and experience of your client. Once they have demonstrated sufficient ability the following are excellent exercise choices for you to consider:

Split squat and progressions (e.g. dumbbell, barbell, stability ball)  
Step Ups and progressions (consider movements that also incorporate ankle plantar flexion)  
Single Leg Squats  
Rowing movements and variations

Mountain biking is great exercise and participants come from all walks of life. Improving physical condition can only improve a persons biking. A well designed combination of metabolic and resistance training can create a performance platform for both recreational and racing riders.

## **References and Supplemental Reading**

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