

# *Functional Weight Lifting for Endurance Athletes*

By Chris Burnham

*\*This is an overview of a winter weight lifting program and not recommended to be used without guidance and supervision.*

## **Fundamentals**

The biggest priority to any successful weight lifting program is safety. When starting any new exercises, make sure you are comfortable with all movements and machine functions. If you are not sure you are using correct form, how a machine works, or how to adjust a machine please seek advice from myself or from a fitness professional. In all good fitness facilities there should be a weight room attendant that can help you with machines and movements.

When starting any new movements, start with low weight and use slow and controlled movements. After you become comfortable with the exercise, weight and speed can be increased.

All successful weight programs follow the overload principle. Which basically states: that a muscle will get stronger and more fatigue resistant when it is called upon to do more work (weight or repetitions) than usual. It is also important to note that stronger does not always imply bigger. A lot of the strength gains made in the gym are neuromuscular gains and not an increase in muscle fiber size. By doing controlled, progressive movements you will improve the nerve-muscle connection thus engaging more muscle fibers with each contraction resulting in an increase in strength. This effect is usually noticed within 2 – 4 weeks of weight lifting.

It is only after this neuromuscular improvement and with a progressive workload that muscle fiber size will begin to improve. As endurance athletes, we should be more focused on strength gains and not on muscle size. At a certain point, increases in muscle size (and corresponding strength gains) will reach a point of diminishing returns where the increase in body weight will become more of a detriment than the increase in strength. At this point, gym work will begin to shift to more of a maintenance mode and riding volume will begin to increase. Most winter weight lifting programs for endurance athletes will last between 12 – 16 weeks. For those athletes above 35, continuing a maintenance weight workload of at least one day a week is recommended.

Since our main goal to any winter weight lifting program is increased strength and power on the bike, we must keep the movements in the gym as close to cycling movements as possible. This also includes the velocity of the concentric movement (raising the weight). For example when doing leg presses, the concentric, or lifting movement, should be as close as possible to the speed you normally pedal while climbing. The eccentric movement (lowering the weight) should always be slow and controlled. Upper body exercises should always be slow and controlled on both the concentric and eccentric movements unless the cyclist is also a triathlete in which upper body movements should be similar speed as arm speed while swimming.

Always start your workouts with multi-joint exercises first and then progress to single-joint movements. This will allow you to be the freshest while you are doing the

most difficult exercises. Single-joint movements can then be done to further isolate specific muscles.

All sets should be done at the max weight you can lift to complete the specified number of repetitions. If an exercise calls for 15 repetitions, you should not be able to do 16 with the amount of weight being lifted. You may have to lower the weight on consecutive sets to achieve the specified number of repetitions. See the table at the beginning of the exercises section for more information.

Through out the winter, avoiding the common cold and staying as healthy as possible is always a challenge. Since the gym can harbor many viruses and bacteria, it is important to wash your hands soon after finishing your workout, avoid touching your face while in the gym, and stay hydrated and eat well through out the winter. It is also advisable to skip a workout if you are sick rather than “working through it.” Trying to work through a cold often extends the sickness and results in a decrease in the quality of the workout.

## **Weight Lifting Phases**

(Refer to your individual lifting plan for specifics)

### **Adaptation**

The first couple of weeks in gym are the time for you to become comfortable with the gym environment and get familiar with the equipment. Physiologically, your body will begin to strengthen the connective tissue and start to improve the nerve-muscle connection. This phase will consist of light weights and high reps. Typically it will be 3 sets of 15-20 repetitions (reps). This phase will last for 2-3 weeks with 2-3 workouts a week. If you have been lifting throughout the season this phase can be shortened or eliminated entirely.

### **Hypertrophy**

After the initial adaptation, we will begin the hypertrophy phase. The goal of this phase is to increase strength from increased muscle fiber size and by improving the neurological connection to the muscle. Most initial strength increases come from improving this nerve-muscle connection that will allow your central nervous system to stimulate more muscle fibers with each contraction. This phase lasts for 4 – 6 weeks with 2 – 3 workouts a week (If you only have time for 2 workouts in the gym a week, you will receive 80% of the benefit of those that can do 3) with 3 sets of 8 – 12 reps.

### **Strength**

The strength phase is where the workouts will really begin to intensify. Our main goal for this phase is to continue our strength building by increasing muscle fiber size and efficiency. The muscle-nerve connection will continue to improve as well but most of the strength gains through out this phase will be a result of increased muscle fiber size, thus, as endurance athletes not wanting to add too much muscle mass, this phase is usually limited to 4 weeks. This is where you will see the bulk of your improvements. Three workouts a week is mandatory through out this phase because we will be using a Daily Undulating Periodization cycle (DUP). A DUP cycle consists of varying the reps each day of the week to maximize the strength gains. The first workout of the week will consist of 3 sets of 8 reps done at your 8 rep weight maximum (RM). The second

workout is 3 sets of 6 reps at your 6RM. The third workout is 3 sets of 4 reps at 4RM. Since this is a very intense lifting phase, each workout should be separated by a day of complete rest or a very light aerobic workout.

### **Endurance**

The endurance phase is characterized by tapering down the gym workouts and an increase of on the bike training. The goal of this phase is to maintain strength gains with a smaller time commitment in the gym and to convert the increased strength gained in the gym to an increase of power on the bike. Workouts will taper from 2 days a week to a maintenance workout once a week which could be continued through out the season of 3 sets of 15-20 reps.

## Exercises

\*\*\*Seek further instruction if you are not comfortable or experienced with any movements or exercises\*\*\*

Weight should always be maximum amount of weight you can lift for the prescribed number of repetitions. As a rough guideline see table below:

<b>If you can do:</b>	<b>Increase weight by:</b>
1 or 2 reps more	5 pounds
3 or 4 reps more	10 pounds
5 or 6 reps more	15 pounds
<b>If you fall short by:</b>	<b>Decrease weight by:</b>
1 or 2 reps	5 pounds
3 or 4 reps	10 pounds
5 or 6 reps	15 pounds

### Lower Body

- Leg Press: Lie on your back in a leg press machine and adjust angle of back rest to approximate the upper torso angle while on the bike. Make sure to keep back in contact with the back rest through entire movement. Lift weight by straightening the knees and hips at approximate leg speed of legs while climbing on the bike. Do not lock knee at the top of the movement and do not bend your knee past 90 degrees. Lower weight slow and controlled.
- Knee Extension: Seated in a machine with the pivot point even with the knee joint, straighten your leg so that it is straight out but not locked. It is important that you work the last 30 degrees of motion, as this will strengthen the weaker section of the thigh. For the lifting phase, keep your toes pointed outward. As you lower the weight, point your toes inward.
- Hamstring Curls: There are several different types of hamstring curl machines. I prefer the seated machine. For this exercise, sit in the machine with one pad above the knee and one pad below the lower calf. Bend the knee to lift the weight. Be sure to move the leg through the entire range of motion.
- One Legged Squat (Advanced Functional Movement): This exercise is highly recommended to increase leg strength while improving strength imbalances. Since it is a single leg exercise, you will also improve your balance while utilizing stabilizing muscles. Begin by using just your body weight, adding resistance with dumbbells when you are ready. Stand upright with one leg behind supported by a chair or bench. Squat downward by bending both legs keeping the torso upright, abdominal muscles held tight, and chest out. Lower your body down until you have approximately an 80-degree bend in your front knee. Extend upward and repeat recommended number of repetitions. Repeat with the other leg. For increased difficulty, you can use a balance or wobble board under front foot.

## Upper Body

- **Bench Press:** There are many variations of this movement. If you are inexperienced with free weights you should use a machine unless you are supervised by someone who is experienced. In all movements you should use a hand grip that closely mimics your hand position of the bike. The weight should be pushed away from your chest with a slow and controlled movement, not locking your elbows, and lowered to a maximum of a 90 degree bend at the elbow. To increase difficulty, you can use dumbbells instead of a bar or machine. To further increase difficulty, use a balance ball under your upper back with your knees on the ground instead of a bench while lifting individual dumbbells.
- **Balance Ball Push-up:** While supporting your feet on a balance ball in the plank position, lower your upper body to a 90 degree bend at the elbow and push back up to complete a rep. To make this exercise easier you can move the balance ball closer to your knees.
- **Pullovers:** Use a dumbbell while lying on a bench, cup your hands under one end of the dumbbell and hold it over your chest for the starting point. Slowly lower the dumbbell behind your head toward the floor while keeping the arms slightly bent at the elbows. Allow the hands to lower to the point where their level with your ears and then return to the starting point powerfully and under control. Remember to keep you hips up, belly button in, not allowing your back to sag or arch excessively. Difficulty can be increased by using a balance ball instead of a bench.
- **Seated Rotational Row:** Using a seated row machine and a straight bar, position seat height so your hands are even or slightly lower than shoulder height. While keeping back straight and motionless, pull handle toward upper chest while raising (shrugging) the shoulders. Rotate shoulders back and down keeping the handle close to the body as you lower and return to the start position. Introducing rotation while performing this exercise is a great way to engage the upper and middle back, which houses the all-important musculature that helps stabilize the scapula. To increase difficulty, use a cable pull machine on a low setting with a straight bar. Sit on a balance ball with your feet braced against the machine and pull bar to chest.
- **Lat-Pull Down:** Utilizing the lat-pull down machine with a flat bar, handle-bar width grip, adjust machine so that the pads rest on your thighs when your feet are flat on the floor. Start the movement by pulling the bar down in front of head only to the point that your forearms stays in a parallel line with the cable that is attached to the bar, extending back up slowly. Avoid moving or jerking upper body to help with movement.
- **Tricep Extension:** Using a cable pull machine set on its highest pulley position with a flat bar, stand with feet at shoulder width, knees slightly bent. Grab bar with both hands at handlebar width, and pull down until your elbows are at your sides. While keeping your elbows at your side, press the bar towards you thighs, pause, then return to starting position. Do not allow your shoulders to assist in bringing your arms forward and backward during this exercise. For an advanced

movement, us a one-handed attachment, while standing on one leg use the opposite hand to complete the movement.

**Core Exercises** (There are more core exercises than listed here. These are just basic exercises that should be done year round.)

- **Balance Ball Crunches:** While placing a balance or stability ball under the lower back, feet on the floor, exhale while contracting your abdominal muscles and lift your torso forward. To add resistance, hold dumbbells against your chest.
- **Back extensions:** Using a back-extension stand, position the pad so that it is just below your pelvis. Bend forward at the waist and extend your back so that it is in line with your legs. Do not extend past this point. If you feel you can do more than 15 reps, add resistance by holding a dumbbell or weight plate against your chest.
- **Back Extension on a Balance Ball:** These back extensions are performed with your thighs and hips resting on a balance ball. It may be necessary to place your feet against a wall for extra support.

*Chris Burnham is a USA Cycling Certified Level I coach and one of six Level 1 Coaches who is also a Certified Power Based Training Coach. He has been a coach for over 7 years and has trained over 100 athletes. He continues to race at a Semi-Pro level on the mountain bike and regionally on the road, always using his power meter!*