

# **DISTRICT 9 HOCKEY**

Strength Training Program

**Phase 1—[Hypertrophy](#)**

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**Phase 3—[Power](#)**

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# DISTRICT 9 HOCKEY Strength Training

## Phase 1—building muscle (Hypertrophy)

<p><b>Day 1 - Hamstrings/Quadriceps</b></p> <p>Hamstrings</p> <ul style="list-style-type: none"> <li><a href="#">Stiff leg deadlifts</a> 4 X 10</li> <li><a href="#">Glute-ham raises</a> 3 X failure</li> <li><a href="#">Single leg curls</a> 3 X 12</li> <li><a href="#">One leg barbell squats</a> 2 X 12</li> </ul> <p>Quadriceps</p> <ul style="list-style-type: none"> <li><a href="#">Front Squats</a> 4 X 10</li> <li><a href="#">Leg Press</a> 3 X 12</li> <li><a href="#">Reverse deadlifts (barbell hack squats)</a> 3 X 12</li> <li><a href="#">Leg extensions</a> 2 X 12</li> </ul>	<p><b>Day 3 - Shoulders/Trapezius</b></p> <p>Shoulders</p> <ul style="list-style-type: none"> <li><a href="#">Seated military press</a> 4 X 10</li> <li><a href="#">Standing dumbbell laterals</a> 3 X 12</li> <li><a href="#">Bent dumbbell laterals</a> 3 X 12</li> <li><a href="#">Dumbbell Shrugs</a> 3 X 10</li> </ul>
<p><b>Day 2 - Back/Chest/Abdominals</b></p> <p>Back</p> <ul style="list-style-type: none"> <li><a href="#">Wide grip pull-ups</a> 4 X failure</li> <li><a href="#">Wide grip rows</a> 3 X 12</li> <li><a href="#">Single dumbbell rows</a> 3 X 12</li> <li><a href="#">Close grip bent-over rows</a> 2 X 12</li> </ul> <p>Chest</p> <ul style="list-style-type: none"> <li><a href="#">Flat dumbbell press</a> 4 X 10</li> <li><a href="#">Incline press</a> 3 X 12</li> <li><a href="#">Dips</a> 3 X 12</li> <li><a href="#">Flat dumbbell flyes</a> 2 X 12</li> </ul> <p>Abdominals</p> <ul style="list-style-type: none"> <li><a href="#">Flat back curl-ups</a> 3 X 15</li> <li><a href="#">Vertical leg raise</a> 2 X 10</li> </ul>	<p><b>Day 4 - Triceps/Biceps/Abdominals</b></p> <p>Triceps</p> <ul style="list-style-type: none"> <li><a href="#">Lying head covers</a> 3 X 10</li> <li><a href="#">Bench Dips</a> 3 X 12</li> <li><a href="#">Straight bar pushdowns</a> 3 X 12</li> <li><a href="#">Single arm pushdowns (supinated grip)</a> 2 X 12</li> </ul> <p>Biceps</p> <ul style="list-style-type: none"> <li><a href="#">Reverse preacher barbell curl</a> 3 X 10</li> <li><a href="#">Standing dumbbell curl</a> 3 X 12</li> <li><a href="#">Hammer curls</a> 3 X 12</li> <li><a href="#">Dumbbell wrist curls</a> 3 X 12</li> </ul> <p>Abdominals</p> <ul style="list-style-type: none"> <li><a href="#">Russian twists</a> 3 X 15</li> <li><a href="#">Oblique raises</a> 3 X 15</li> </ul>

### Schedule

Mon.	Tues.	Wed.	Thur.	Fri.	Sat.	Sun.
<b>Day1</b> <b>July17</b>	<b>Day2</b> <b>July18</b>	<b>Day3</b> <b>July19</b>	<b>Off</b> <b>July20</b>	<b>Day4</b> <b>July21</b>	<b>Day1</b> <b>July22</b>	<b>Off</b> <b>July23</b>
<b>Day2</b> <b>July24</b>	<b>Day3</b> <b>July25</b>	<b>Day4</b> <b>July26</b>	<b>Off</b> <b>July27</b>	<b>Day1</b> <b>July28</b>	<b>Day2</b> <b>July29</b>	<b>Off</b> <b>July30</b>
<b>Day3</b> <b>July31</b>	<b>Day4</b> <b>Aug.1</b>	<b>Day1</b> <b>Aug.2</b>	<b>Off</b> <b>Aug.3</b>	<b>Day2</b> <b>Aug.4</b>	<b>Day3</b> <b>Aug.5</b>	<b>Off</b> <b>Aug.6</b>
<b>Day4</b> <b>Aug.7</b>	<b>Day1</b> <b>Aug.8</b>	<b>Day2</b> <b>Aug.9</b>	<b>Off</b> <b>Aug.10</b>	<b>Day3</b> <b>Aug.11</b>	<b>Day4</b> <b>Aug.12</b>	<b>Off</b> <b>Aug.13</b>

### Workout Rate

Since this is a hypertrophy workout the key here is to fatigue the muscle. Therefore the volume is rather high (many sets and reps) and the intensity moderate (75-80% of 1 rep max). Rest intervals between sets should be kept to a minimum (60-90 sec.) and the lifting tempo should be moderate 1-1-3 (1 sec to lift the weight, 1 sec pause, 3 sec to lower the weight). Using a 1-1-3 tempo raises the time your muscle is under tension to about 40-60 sec/set. This is perfect for inducing increases in muscle size.

### Amount of Weight

Never sacrifice perfect technique for more weight. If you can't do the lift properly, you're using too much weight. Find amounts that you can do well for the required reps and sets, then increase the amount of weight used for each subsequent workout. For example, if you use 200lbs for 10 reps of stiff leg deadlifts during the first cycle (days 1-4), then increase the weight by 5-10lbs for the next cycle. Therefore you would be lifting 210lbs for 8 reps. This is still ideal for inducing hypertrophy as the time the muscle is under tension is still 40 sec. (1-1-3 = 5 sec, 5 sec X 8 reps = 40 sec.). Although this phase is designed to induce muscle growth you will also see some increase in strength that will allow an increase weight while maintaining a rep range of 8-12.

### Fitness

Since gaining muscle size is the goal during this phase, doing too much of the old stationary bike won't do much but burn needed calories. Therefore I suggest 15-20 minutes of stationary bike riding 2-3 times per cycle at an intensity of 50-60% of max (this is about 70% of HR max). Do no more than this! This type of aerobic work should be included after hitting the weights and used as a cool down activity. Later on, during other training phases, aerobic and anaerobic work will be included to improve overall fitness. For now, just get big!

# Gladiator Training - Part 1

## Hypertrophy Phase

By [Ryan Foster](#)

First published at [www.johnberardi.com](http://www.johnberardi.com), June 21 2002

**Each month this column will contain a newfangled article, one making its maiden voyage into the tumultuous communication channels of the Internet. It will feature, in particular, new talent in the industry - individuals who will be bringing some new blood and a fresh new perspective.**

*For all of you Mark Twain wannabees (he was a writer, silly), if you think have something worthwhile to say, take the time to write a short letter with your article ideas. Ultimately, if we publish an article of yours, we'll send you a free science link t-shirt for your contribution.*

*For this month's update, our good friend and true hockey aficionado, Ryan Foster, has submitted an excellent 3 part article delving into the theory and practice of hockey training. Ryan is an accomplished hockey player and coach as well as a great strength coach in his own right. This month's article will focus on how to develop a periodized hockey program. It also addresses the first phase of this program, the hypertrophy phase.*

### Unnecessary Roughing

Ever walk into a room and feel a little over-awed by what you see? I'm sure it has happened to all of us at least once or twice in our lives. How about the first time you walked into a gym as a 17 year old kid after reading Flex magazine's 56th edition of 'top 10 ways to gain mass', then low and behold, you saw some monster squatting five wheels a side for an easy ten reps. Or how about having to walk through the Radisson Hotel in Columbus Ohio, and nearly having to become one with the hallway wall so that Bill Kazmeir can make his way through? Oh yea, Bill Kazmeir provokes awe.

One of my major bouts of awe occurred in the fall of 1999 as I stood at the entranceway of a hotel conference room and watched as 60 of the most intimidating figures I had ever seen walked by. Most were dressed in t-shirts, sandals and shorts. They were in possession of doorway wide shoulders and legs that resembled tree trunks. The group chatted only minimally and had a look of seriousness and purpose in their faces that was not unlike a certain boxer named Balboa, whom one commentator stated 'the champ has a look tonight that could burn through lead.' I don't know about lead, but their looks were scary enough to melt ice. Along with the eye of the tiger look came many one to four inch scars and more then the occasional disfigured nose. It looked as if some these guys regularly vacationed in Bosnia or Iraq. Well, it didn't look like the preliminary heats for the world's strongest man competition, as there were no 300 plus pounders here. And it certainly wasn't a professional bodybuilding competition; these guys were too tall and, let's face it, too ugly for that. A military boot camp might of fit the bill, but most of these guys looked more like rabble-rousers than keepers of the peace. With the sandals and shorts it could have been the set of Baywatch, but pretty boy actors don't have 4-inch scars on their chins.

So what was this event and who were all these guys?

It was, in fact, the NHL's Philadelphia Flyers and they were here in Peterborough Ontario for training camp. And what was I doing here? Trying to whip these boys into shape.

Throughout the next week this group of athletes took part in fitness testing that involved such things as bench presses for maximum reps, maximum number of wide grip chins and either a 23 mile bike ride or 6 mile run through the winding hills of the Kawarthas. This was followed by two more weeks of vigorous on ice practices to prepare for the season. Then, the pre-season games began as a prelude to a grueling seven-month, 84 game regular season. Since these guys make the playoffs, there are a few extra weeks tacked on for good measure.

This crew (and similar other crews like them) and the demands of their sport are indeed impressive. Most of these guys stand at 6 feet in height and 200lbs with a body fat percentage of somewhere between six and twelve. Now that doesn't sound too astronomical but lets take into account that these guys are extremely skill based, functionally strong, very anaerobically and aerobically fit, not to mention tough. You know, the kind of tough that enables them to jersey that stingy neighbor or yours AI, who still hasn't returned your chainsaw, and feed him upper cuts until he drops like a sack of potatoes while simultaneously flipping a sirloin steak and swilling a Molson.

Some of the best and more notable players at the camp were pure and freaky physical specimens, to say the least. Take for instance guys such as John Leclair, 6'3" - 226lbs, Michael Renberg, 6'2 - 218, Dan McGillis 6'2 - 234lbs, Rod Brind'Amour 6' - 200lbs, and of course Eric Lindros 6'4 - 236lbs (Lindros won the Flyers Top Fitness award in 1998).

Couple this size with some impressive strength, athletic ability and aggressiveness and you've got yourself a fab - five lineup that could take on Lexx Luther and the Cobra Commander any day. Rumor has it that these guys eat roughly 24 Philly steak and cheese hoagies after games, snap hockey sticks in half and use the splinters as toothpicks.

Since I have some experience in working with these types of monsters, I'd like to share with you some of the training secrets those hockey players have tucked up their sleeves. In this article I will introduce the theory of periodization and discuss how hockey players should train for muscle growth (or hypertrophy, for you science types). In future articles, I'll introduce the concepts of maximal strength training, speed/power training, anaerobic training, and skill-specific training.

### Plan For The Pain - Periodization

As the hockey season ends, banged up players usually pack up their gym bags and head to their summer homes and cottages in the beautiful Rocky Mountains of Alberta and the amazing Muskoka Lakes of central/northern Ontario. At this time the only thing on their minds is a little R & R. And that is precisely what they should be doing. After playing 84 plus games of hard-core hockey the body and mind craves a little rest. So I advise that players take a minimum of one-two weeks off from doing any type of physical training after their season ends. When I say this I mean none, nothing! These one to two weeks off before the start of a rigorous training program will pay large dividends in the future. During this recovery time, however, athletes must be planning for their next season. Since there is only a maximum of sixteen/eighteen weeks of solid training that one can get in before the up-coming season, a well thought out plan must be put in place. This is where I look to the theory of periodization to play a big role. Quite simply periodization can be taken as dividing a training program up into several phases. For elite hockey players I suggest dividing the off-season training program into three phases - hypertrophy (big), maximal strength (strong), and power (fast). The thinking process behind dividing training into three separate phases instead of embarking on them all at once is that an athlete will receive greater benefit in all three areas by dividing them up into their own specific phase. For instance an athlete will gain greater muscle size by channeling all of their efforts into

hypertrophy training rather than worry about maximal strength training at the same time. Secondly it is extremely difficult to lift the heavy loads used for maximal strength training after completing hypertrophy work. The same can be said towards training for power, as a fatigued muscle cannot contract nearly as fast as a rested muscle. And that's the whole point of speed/power training, isn't it? The result being a muscle that learns to contract slowly which is just the opposite of what a hockey player is looking for.

Having said that, I suggest splitting up the training phases and allotting time increments to them in the following manner:

**Get Big - Hypertrophy - 4 weeks**

**Get Strong - Maximal Strength - 6 weeks**

**Get Fast - Power - 4 weeks**

Now some of you may be saying 'hey wait a minute Fozz, that only adds up to fourteen weeks and there are eighteen weeks in which to train'. True, but keep in mind that the body needs time to rest and recuperate. A train can only chug along for so long before it needs to stop and refill its tanks, and the body is no different. So, in the above example the athlete would take a week off at the end of the season, a week off between each phase of training, and a week off before heading to training camp. That adds up to four weeks. Add those 4 weeks to the 14 weeks of actual training and we get 18 weeks of off-season time.

Having described how off-season training is divided into three separate phases, lets take a look at one of these phases in more detail, the hypertrophy phase. Again, the other phases will be addressed in upcoming articles.

#### **Why, Why, Why? - The Workout Breakdown**

As you can see above the program is split up into four different days, for reasons that I will now elaborate on. First, in order to induce hypertrophy a muscle must be worked through many sets (9-12 in the above example), and working more than two muscle groups per workout would be extremely fatiguing. Therefore four days are needed to cover most of the body's muscles. Secondly, this protocol allows for at least 72 hours of recovery before a muscle group is worked again. This should be sufficient time for a muscle to rebuild bigger and badder than before. Thirdly, using a four-day split taking every Thursday and Sunday off ensures that each muscle group will be worked after a day of rest at least once throughout the four weeks of training. This will help ensure that not one body part is being trained after a day off (being better rested) a significant number of times over other body parts.

#### **Form and Function - Performing the Workout**

Since this is a hypertrophy workout the key here is to fatigue the muscle. Therefore the volume is rather high (many sets and reps) and the intensity moderate (75-80% of 1 rep max). Rest intervals between sets should be kept to a minimum (60-90 sec.) and the lifting tempo should be moderate 1-1-3 (1 sec to lift the weight, 1 sec pause, 3 sec to lower the weight). Using a 1-1-3 tempo raises the time your muscle is under tension to about 40-60 sec/set. This is perfect for inducing increases in muscle size.

In addition to using periodization throughout the entire off-season of workouts, it is also important to periodize each phase. This can easily be done by increasing the amount of weight used for each subsequent workout. For example, if I were to use 200lbs for 10 reps of stiff leg deadlifts during the first cycle (days 1-4), than I would increase the weight by 5-10lbs for the next cycle. Therefore

#### **Gettin' Big - Hypertrophy Training**

One of the more popular questions I hear from players goes a little something like this, 'Hey man, I don't want to get to big and bulky; and anyways, why would anyone want to train to become more muscular in a sport that requires strength and speed'? Well, quite simply hockey is like many other contact sports in that the more one weighs the harder it is to stop them once they are in motion. I ask you a question, who is harder to knock off the puck, Marc Savard or John Leclair? Leclair, of course. Leclair outweighs Savard by about 36lbs. That added weight surely helps Leclair while battling along the boards and in front of the net. In hockey, like in many other sports the more muscle one has the better. The only instances that I would prescribe laying off of a hypertrophy phase are if the athlete were becoming slower on the ice and if they have an extremely short time off season in which to train. As for becoming slower on the ice, this is very unlikely to happen if one incorporates a strength and power phase into their training regimen.

Since we have now determined that added muscle mass is a benefit when playing hockey lets look at a hypertrophy program designed for the elite hockey player. What follows is an outline of each day's workout (exercise, sets, reps) and the sequence in which the workouts are to be followed. Remember, this is just one example of what I might prescribe for a typical, completely healthy client of mine. It is, by no means what every hockey player should follow since every player has different strengths and weaknesses, different structures, and different injury profiles.

I would be lifting 210lbs for 8 reps. This is still ideal for inducing hypertrophy as the time the muscle is under tension is still 40 sec. (1-1-3 = 5 sec., 5 sec X 8 reps = 40 sec.). Although this phase is designed to induce muscle growth you will also see some increase in strength that will allow an increase weight while maintaining a rep range of 8-12.

#### **Fitness?**

What about aerobic training? After all, athletes need to be fit, right? Well, since gaining muscle size is the goal during this phase, doing too much of the old stationary bike won't do much but burn needed calories. Therefore I suggest 15-20 minutes of stationary bike riding 2-3 times per cycle at an intensity of 50-60% of max (this is about 70% of HR max). Do no more than this! This type of aerobic work should be included after hitting the weights and used as more of a cool down activity than a preparation ride for the Tour de France. Later on, during our other training phases, aerobic and anaerobic work will be included to improve overall fitness. For now, let's just get big!

#### **Just Do It**

So there you have it. In only four weeks you train each muscle group five times and receive some freaky growth. Remember to get plenty of rest and maintain a caloric intake above maintenance and a diet including plenty of good proteins, fats, and carbs. I know that's not too specific but this site is packed with nutritional articles that will point you in the right direction. My next few articles will discuss how to then transition from your hypertrophy cycle to max strength and power cycles as well as introduce proper anaerobic and skill training principles. In the meantime, if you have any questions or need more specific details about program design for yourself or your teams, feel free to contact me at [Fossy710@hotmail.com](mailto:Fossy710@hotmail.com).

# DISTRICT 9 HOCKEY Strength Training

## Phase 2—coordinating muscle (Strength)

<p><b>Day 1 - Monday</b>  <u>Squat (Box)</u> 9 X 6 (5 warm up-sets, 4 working sets)  <u>Bench Press</u> 7-8 X 6 (3-4 warm-sets, 4 working sets)  <u>Leg Press</u> 7-8 X 6 (3-4 warm-sets, 4 working sets)  <u>Push Press</u> 6 X 6 (3 warm-up sets, 3 working sets)</p>	<p><b>Day 4 - Thursday</b>  Lactic Acid Tolerance Training: Warm up 5min. - Cool Down 5 min  Ratio 1:2 Work Interval 30 sec. Rest Interval 60 sec.  Total Time 9-12 min.  Meet the Hill—4 30-second incline sprints per set  Sets by week: 1<sup>st</sup>: 1, 2<sup>nd</sup>: 1, 3<sup>rd</sup>: 2, 4<sup>th</sup>: 1, 5<sup>th</sup>: 2, 6<sup>th</sup>: 3</p>
<p><b>Day 2 - Tuesday</b>  Anaerobic Threshold Training: Warm up 5min. - Cool Down 5 min.  Ratio 1:1 Work Interval 60 sec Rest Interval 60 sec. Total Time 16 -24 min.  Steady 75% sprints on level ground; Set is 1-min. lap.  Sets by week: 1<sup>st</sup>: 8, 2<sup>nd</sup>: 9, 3<sup>rd</sup>: 10, 4<sup>th</sup>: 8, 5<sup>th</sup>: 10, 6<sup>th</sup>: 12</p>	<p><b>Day 5 - Friday</b>  <u>Deadlifts</u> 9 X 6 (5 warm-up sets, 4 working sets)  <u>Incline Dumbbell Press</u> 6 X 6 (3 warm-up sets, 3 working sets)  <u>Barbell Shrugs</u> 5 X 6 (2 warm-up sets, 3 working sets)  <u>Standing Calf Raises</u> 6 X 6 (2 warm-up sets, 4 working sets)</p>
<p><b>Day 3 - Wednesday</b>  <u>Cheated Barbell Rows</u> 8 X 6 (4 warm up-sets, 4 working sets)  <u>Lying Triceps Extensions</u> 6 X 6 (3 warm-up sets, 3 working sets)  <u>Wide Grip Weighted Chins</u> 5-6 X 6 (2-3 warm-up sets, 3 working sets)  <u>Barbell Curls</u> 5 X 6 (2 warm-up sets, 3 working sets)</p>	<p><b>Day 6 - Saturday</b>  Anaerobic Threshold Training: Warm up 5min. - Cool Down 5 min  Ratio 1:1 Work Interval 2 min. Rest Interval 2 min. Total Time 30 min.  Miler's Pace—1 set is 4 minutes  Sets by week: 1<sup>st</sup>: 5, 2<sup>nd</sup>: 6, 3<sup>rd</sup>: 7, 4<sup>th</sup>: 6, 5<sup>th</sup>: 7, 6<sup>th</sup>: 8</p>

### Some Explanation

Warming up the central nervous system: For example, to do a set of squats for 6 repetitions using 300lbs., do a warm up that looks like this:

Set 1: 4 X 135lbs

Set 2: 3 X 225lbs

Set 3: 2 X 275lbs

Set 4: 2 X 285lbs

Set 5: 2 X 295lbs

Do enough repetitions to warm up the central nervous system without bringing about local muscle fatigue. After the fifth warm up set, you're ready to start working sets of 6 repetitions with 300lbs. Use this type of warm up for all of the exercises in the program.

Rest interval between sets: 2 min between warm up sets, 3-5 between working sets

Lifting speed: X-1-2 (X - raise the weight as fast as possible, 1 - hold for one second at the top of the contraction, 2 - lower the weight in two seconds with no pause at the bottom of the repetition).

Two minutes between warm up sets is plenty of time to recuperate seeing as the warm up sets are not taxing the central nervous system enough to need a full 3-5 minutes for recovery and the repetitions are low enough that fatigue due to ATP/PC depletion never becomes a problem. However, when attempting to do 6 repetitions with as much weight as possible the body does need a full 3-5 minutes to recover. If one does not take the full 3-5 minutes the ATP/PC stores and central nervous system may not be fully recovered and the next set may not be beneficial. As for lifting speed the whole idea of training for maximum strength is to lift heavy loads, which can only be accomplished through trying to lift them as fast as possible. Although it may take 3 seconds to lift a 1 repetition maximum squat, it is the attempt to lift the weight as fast as possible that is important. Trying to lift the weight as fast as possible ensures that a good proportion of fast twitch muscle fibers will attempt to fire in synchronization.

### Periodizing the Program

The maximum strength program outlined above is to be used for six consecutive weeks. The repetitions to be used for working sets are as follows:

Week 1 - 6 repetitions	Week 4 - 5 repetitions
Week 2 - 4 repetitions	Week 5 - 3 repetitions
Week 3 - 2 repetitions	Week 6 - 1 to 2 repetitions

Of course, after the first three weeks you will have to rethink your poundages as you will no doubt be stronger. For example, if you were able to squat 305lbs for 6 repetitions before starting the program you may be able to squat 310lbs - 315lbs for 6 repetitions after 3 weeks. Without readjusting your weights you would end up

doing sets of 1-2 in week 6 with a weight that you could probably use for 3-4 repetitions. This would contradict the whole idea of maximum strength training which is to become as strong as possible.

### That's Not All

As important as strength training is to a hockey player one must not forget that there is a critical anaerobic and aerobic part to hockey. This is both good news and bad news. First the good news. By training the anaerobic and aerobic systems in the off season you will no doubt be further ahead of your teammates and opponents by the time training camp comes around. (not to mention in better shape from a medical/health point of view) It will help you on the ice, during fitness testing, and afterwards during recovery. Now the bad news. Some of this kind of training hurts like bleep - bla - bleep - bla - bleeeee! That's right guys; although it is very beneficial it can get a little antsy.

The following is a stationary bike/sprint program designed to train the anaerobic and aerobic energy system—since we don't have access to a full team of bikes, we'll have to use sprints:

### The Details

#### Anaerobic Threshold Training

Part of the problem with our bodies while playing hockey is that we get very tired very quickly. For instance it is very tough to head onto the ice and go full bore for 45 seconds without getting a terrible aching feeling in the legs. This happens because lactic acid builds up in your legs quicker than it can be removed. When this happens hydrogen ions dissociate from the lactic acid causing us to stop exercising (or vomit). Basically, what we hockey players need to do is train anaerobically to raise our anaerobic threshold to a higher level so that we can exercise at the same high intensity longer by being able to tolerate higher levels of lactate. Confusing? It is a bit, but all you really need to understand is that by training to increase your anaerobic threshold you will feel better at the 35 second mark of a shift compared to an opponent who has a lower anaerobic threshold.

The idea behind anaerobic threshold interval training is to increase the lactate level in the blood above the level it can disappear. How do we do that? Firstly, warm up for roughly 5 min. Secondly increase the tension so that at the 60-second mark, make sure you feel a good burn in your legs (some good lactic acid build up), then decrease the tension for the next 60 seconds. Keep alternating the tension from high to low every 60 seconds. Continue to do so for some 16 - 24 minutes. How do you know if you are working hard enough? Your heart rate should be some where between 150-170 bpm and your lactic acid concentration in the blood should be roughly 4 - 6 mmol.

#### Lactic Acid Tolerance Training

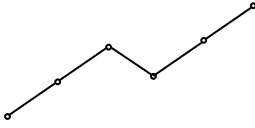
As discussed above it is the hydrogen ion that dissociates from the lactate that eventually leads to fatigue during high intensity anaerobic work. And that little thing called pain. Therefore lactic acid training is used to build up a tolerance to lactate both physiologically and psychologically. We do this by warming up with 5 min of easy pedaling and then increasing the tension high enough that by the end of 30 seconds of pedaling you have an extremely high build up of lactate in the

legs. The tension is then decreased dramatically and easy pedaling takes place for 60 seconds. The sequence is repeated 3-4 times. After 3-4 repetitions 15-25 minutes is then needed to pedal very easily and stretch out the legs. The reason for this rest time is to recover enough so that one will be able to work hard enough to accumulate extremely high levels of lactate once again. If one were to complete 8

repetitions without any rest, repetitions 5 through 8 would not be of high enough intensity to accumulate the necessary levels lactate needed for improvement. This type of training is extremely difficult and should only be completed once per week. Although this type of training can be ridiculously painful it can also be very rewarding.

#### **Aerobic Threshold Training**

Although many think of hockey as being fairly anaerobic with its 40 second shifts, that is no reason to neglect the aerobic energy system. Actually, by training the aerobic system one will be able to recover much better between whistles and while resting on the bench (not to mention when the coach skates the crap out of you after an 8-1 loss). After 5 min of easy pedaling increase the tension high enough so that your heart rate is roughly 140-160 bpm (lactate concentrations in the blood should be 2-3 mmol). After 2 minutes decrease the tension and pedal easily for another 2 minutes. Repeat the sequence for thirty minutes.



As far as periodizing anaerobic/aerobic training I suggest using the same type of step loading pattern used for the maximum strength cycle. Increase the intensity from weeks 1-3, than retreat slightly and increase the intensity again from weeks 4-6. **The pattern should look something like this:**

**Week 1: Lowest intensity**

**Week 2: Lower Intensity**

**Week 3: Medium Intensity**

**Week 4: Lower intensity (same as week 2)**

**Week 5: Medium intensity (same as week 3)**

**Week 6: Highest intensity**

#### **Conclusion**

To recap we have discussed a six week maximum strength training program and a six week anaerobic/aerobic training program. Both the maximum strength training program and the anaerobic/aerobic training program consists of training three days (Mon, Wed, Fri) and (Tues, Thur, Sat) respectively. In both programs the step loading pattern should be used for weeks 1-3 and 4-6. Now for a few words of wisdom. What ever you do always, always use a spot when training for maximum strength. One can never tell when an unfortunate incident could occur. Secondly, when training for maximum strength, pick a weight you feel confident with in terms of getting the desired number of repetitions. This will help keep confidence high, which will only aide in future lifts. Thirdly, get plenty of sleep and follow sound nutritional advice.

# Gladiator Training - Part 2

## Becoming Strong to the Max-imus

By [Ryan Foster](#)

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Strong to the Maximus? That's right I am referring to the Roman General Maximus Decimus Meridius, who was played by Russell Crowe in the blockbuster movie *Gladiator*. After viewing the movie, as I am sure many of you have, and witnessing some of its amazing battle scenes, there is no doubt in my mind that Crowe used some form of strength training in order to prepare for the roll. After all, twirling around a 40lbs sword and battling experienced behemoth like men on the battlefield and in the Coliseum is not likely the easiest of things to do. Similarly in the world of hockey battling behemoth like defensemen on the 200' X 85' sheet of ice is not the easiest of tasks either. And that is where training for maximal strength comes to the forefront.

Before we get too far ahead of ourselves lets take a quick moment to look back at the overall picture. In part one we described how to periodize training for an 18-week off-season. In essence the off season would consist of 4 weeks of hypertrophy training, 6 weeks of maximal strength training, and 4 weeks of training for power with a week of rest on weeks 1, 6, 13, 18. In addition we also discussed the first 5 weeks of the program that consisted of hypertrophy training. So now that we have added a few pounds of lean muscle mass, lets look at how we can become the Magnus Ver Magnusson of the ice.

### Why Train for Maximum Strength?

Ah ha, we have all heard this one before. I sometimes wonder how many dad's out there mutter something to their teenage sons that goes a little something like this: "if you want to become a better hockey player, play hockey, don't lift weights, you can't bench press your way to more goals." Well, although there is some truth to this often heard advice it is far from entirely accurate. There are in fact many benefits to becoming stronger. For instance, if two players of the same height, weight and ability are battling in the corner for a loose puck, but one player is stronger than the other, theory reasons that the stronger player will win positioning and the puck. This is particularly true for defenseman and wingers seeing as they are most often the ones doing the battling in the corners and along the boards. Secondly, as a player's maximum strength increases so does their potential to increase power. With an increase in power one can see an increase in skating speed, shot speed, and the speed of opponents wanting to get out of your way. Paul Coffey is a great example of how training for maximal strength can eventually lead to improved power and an improvement in your game. As I am sure many of you know Paul Coffey is one of the best, if not the best skater the game has ever known. How serious did he take his workouts? Well, one elite power skating instructor who worked with him on a video indicated that a few times during shooting Paul interrupted things so that he could get in a workout. Another great example comes not from the ice, but rather the track. Ben Johnson was not only the fastest human on the planet for some time but no doubt one of the strongest sprinters also. His strength levels were superb as his demonstration of bench pressing 352lbs for 10 repetitions attests.1 Now that's strong. Ben's ability to fire his fast twitch muscle fibers quickly, which can be improved through maximum strength training was no doubt one reason he had the best start in sprinting. Since hockey players also need to activate their fast twitch muscle fibers quickly, you can see how training for maximum strength can be of benefit.

### The Science

Although we could spend pages and pages talking about the science behind becoming stronger, here I will outline only a few of the main factors that you may wish to store on the top shelf where mom keeps your recovery drink. The following are occurrences seen during maximum strength training:

- increased recruitment of fast twitch muscle fibers<sup>2</sup>
- increased synchronization of motor units<sup>3</sup>
- increased co-ordination of muscle groups<sup>4</sup>

During the hypertrophy phase where loads were no greater than 75-80% of 1 rep maximum and the lifting tempo was rather slow (1-1-3) it is unlikely that we were able to tap into a large population of fast twitch muscle fibers. Our muscles are rather smart and usually use slow twitch fibers to lift lighter weights, saving the fast twitch fibers for heavier weights and more intense situations. So as one increases the load up to 85% of 1 rep maximum and beyond a greater percentage of fast twitch muscle fibers are required to lift the weight. With maximum strength training one becomes better at recruiting these fast twitch muscle fibers that enable the lifting of heavy loads.<sup>5</sup>

Similarly to the increase of fast twitch muscle fibers seen during maximum strength training, we also see an increase in the synchronization of activating such motor units.<sup>6</sup> Why would we want to do that? Well, let's look to Stan and Dan for the answer. Lets say Stan and Dan have a rope attached to a trailer full of Rockberry pies they want to pull into an icebox. At first try Stan pulls with all his might and Dan follows suit just two seconds later, however the trailer fails to budge. After taking a break, scratching their heads and devouring one of the 600 Rockberry pies from the trailer, Stan and Dan decide to try once more, but this time in synchronization. To the amazement of the glutinous competitors gearing up for

tomorrow's pie eating contest Stan and Dan are able to get the trailer moving and in to the icebox. So, as you can see when two people work simultaneously more force can be produced (and NO the trailer was not that much lighter because of the one missing pie, and NO the pie was not laced with a mixture of stimulants such as terodactyl venom and condor feathers). The same goes for your muscles; simply learning to better synchronize the activation of your motor units can produce more force. In fact, one's maximum strength increases during the first few weeks of maximum strength training due to better synchronization of motor units, not increase in cross sectional area.

Just as our motor units learn to become more synergistic, the coordination of our other muscle groups also increases. As the central nervous system adapts to heavier loads it increases its ability to inhibit the activation of antagonistic muscles.<sup>7</sup> For example, as the load increases during a workout of barbell curls, the central nervous system becomes better at inhibiting the triceps and activating the biceps. This is crucial when attempting to lift heavy loads as the last thing you want is your triceps stopping you from performing a set of barbell curls.

### On to the Program

Now that we understand a little bit about what happens physiologically in the body when it is trained through maximum strength training, lets get to the nuts and bolts of the routine. What follows is an outline of each days workouts and the sequence that the workouts should be performed.

### Some Explanation?

"Nine sets of six repetitions for squats, Fozz, are you getting a little Fuzzy".

Although my roommate may disagree, the Fozzmeister does indeed still have all his marbles. What I am talking about here is warming up the central nervous system. Think of it kind of like your dad's 1978 Ford F150 on an early January morning in Calgary, Alberta. If he tried to just start it up and drive away, the poor Ford would never have made it to the coffee shop. However by pumping the gas a few times, saying a prayer to the truck gods, slowly turning over the engine and then letting her warm up for a good ten minutes she was sure to make it to the coffee shop. Your body should be treated much the same way. For example, say I was going to do a set of squats for 6 repetitions using 300lbs. I would probably do a warm up that looked something like this:

Set 1: 4 X 135lbs

Set 2: 3 X 225lbs

Set 3: 2 X 275lbs

Set 4: 2 X 285lbs

Set 5: 2 X 295lbs

As you can see, I have done enough repetitions to warm up the central nervous system without bringing about local muscle fatigue. After the fifth warm up set I would be ready to start my working sets of 6 repetitions with 300lbs. I suggest using this type of warm up for all of the exercises in the program.

### Some Details

Rest interval between sets: 2 min between warm up sets, 3-5 between working sets  
Lifting speed: X-1-2 (X - raise the weight as fast as possible, 1 - hold for one second at the top of the contraction, 2 - lower the weight in two seconds with no pause at the bottom of the repetition).

Two minutes between warm up sets is plenty of time to recuperate seeing as the warm up sets are not taxing the central nervous system enough to need a full 3-5 minutes for recovery and the repetitions are low enough that fatigue due to ATP/PC depletion never becomes a problem. However, when attempting to do 6 repetitions with as much weight as possible the body does need a full 3-5 minutes to recover. If one does not take the full 3-5 minutes the ATP/PC stores and central nervous system may not be fully recovered and the next set may not be beneficial. As for lifting speed the whole idea of training for maximum strength is to lift heavy loads, which can only be accomplished through trying to lift them as fast as possible. Although it may take 3 seconds to lift a 1 repetition maximum squat, it is the attempt to lift the weight as fast as possible that is important. Trying to lift the weight as fast as possible ensures that a good proportion of fast twitch muscle fibers will attempt to fire in synchronization.

### Periodizing the Program

The maximum strength program outlined above is to be used for six consecutive weeks. **The repetitions to be used for working sets are as follows:**

**Week 1 - 6 repetitions Week 4 - 5 repetitions**

**Week 2 - 4 repetitions Week 5 - 3 repetitions**

**Week 3 - 2 repetitions Week 6 - 1 to 2 repetitions**

Of course, after the first three weeks you will have to rethink your poundage's as you will no doubt be stronger. For example, if you were able to squat 305lbs for 6 repetitions before starting the program you may be able to squat 310lbs - 315lbs for 6 repetitions after 3 weeks. Without readjusting your weights you would end up doing sets of 1-2 in week 6 with a weight that you could probably use for 3-4

repetitions. This would contradict the whole idea of maximum strength training which is to become as strong as possible.

### **That's Not All Folks**

So, you think that because you now know how to get strong you don't need anything else? Nice try! As important as strength training is to a hockey player one must not forget that there is a critical anaerobic and aerobic part to hockey. This is both good news and bad news. First the good news. By training the anaerobic and aerobic systems in the off season you will no doubt be further ahead of your teammates and opponents by the time training camp comes around. (not to mention in better shape from a medical/health point of view) It will help you on the ice, during fitness testing, and afterwards during recovery. Now the bad news. Some of this kind of training hurts like bleep - bla - bleep - bla - bleeeeeee! That's right guys; although it is very beneficial it can get a little antsy.

**The following is a stationary bike program designed to train the anaerobic and aerobic energy systems:**

**Day 2 Anaerobic Threshold Training: Warm up 5min. - Cool Down 5 min.8**

**Ratio 1:1 Work Interval 60 sec Rest Interval 60 sec. Total Time 16 -24 min.**

**Day 4 Lactic Acid Tolerance Training: Warm up 5min. - Cool Down 5 min**

**Ratio 1:2 Work Interval 30 sec. Rest Interval 60 sec. Total Time 9 - 12 min.**

**Day 6 Aerobic Threshold Training: Warm up 5min. - Cool Down 5 min**

**Ratio 1:1 Work Interval 2 min. Rest Interval 2 min. Total Time 30 min.**

### **The Details**

#### **Anaerobic Threshold Training**

Part of the problem with our bodies while playing hockey is that we get very tired very quickly. For instance it is very tough to head onto the ice and go full boar for 45 seconds without getting a terrible aching feeling in the legs. This happens because lactic acid builds up in your legs quicker than it can be removed. When this happens hydrogen ions dissociate from the lactic acid causing us to stop exercising (or vomit). Basically, what we hockey players need to do is train anaerobically to raise our anaerobic threshold to a higher level so that we can exercise at the same high intensity longer by being able to tolerate higher levels of lactate. Confusing? It is a bit, but all you really need to understand is that by training to increase your anaerobic threshold you will feel better at the 35 second mark of a shift compared to an opponent who has a lower anaerobic threshold.<sup>9</sup>

The idea behind anaerobic threshold interval training is to increase the lactate level in the blood above the level it can disappear. How do we do that? Firstly, warm up for roughly 5 min. Secondly increase the tension so that at the 60 second. Make sure you feel a good burn in your legs (some good lactic acid build up) then decrease the tension for the next 60 seconds. Keep alternating the tension from high to low every 60 seconds. Continue to do so for some 16 - 24 minutes. How do you know if you are working hard enough? Your heart rate should be some where between 150-170 bpm and your lactic acid concentration in the blood should be roughly 4 - 6 mmol.<sup>10</sup>

#### **Lactic Acid Tolerance Training**

As discussed above it is the hydrogen ion that dissociates from the lactate that eventually leads to fatigue during high intensity anaerobic work. And that little thing called pain. Therefore lactic acid training is used to build up a tolerance to lactate both physiologically and psychologically. We do this by warming up with 5 min of easy pedaling and then increasing the tension high enough that by the end of 30 seconds of pedaling you have an extremely high build up of lactate in the legs. The tension is then decreased dramatically and easy pedaling takes place for 60 seconds. The sequence is repeated 3-4 times. After 3-4 repetitions 15-25 minutes is then needed to pedal very easily and stretch out the legs. The reason for this rest time is to recover enough so that one will be able to work hard enough to accumulate extremely high levels of lactate once again. If one were to complete 8 repetitions without any rest, repetitions 5 through 8 would not be of high enough intensity to accumulate the necessary levels lactate needed for improvement. This type of training is extremely difficult and should only be completed once per week.

Although this type of training can be ridiculously painful it can also be very rewarding.<sup>11</sup>

#### **Aerobic Threshold Training**

Although many think of hockey as being fairly anaerobic with its 40 second shifts, that is no reason to neglect the aerobic energy system. Actually, by training the aerobic system one will be able to recover much better between whistles and while resting on the bench (not to mention when the coach skates the crap out of you after an 8-1 loss). After 5 min of easy pedaling increase the tension high enough so that your heart rate is roughly 140-160 bpm (lactate concentrations in the blood should be 2-3 mmol). After 2 minutes decrease the tension and pedal easily for another 2 minutes. Repeat the sequence for thirty minutes.<sup>10</sup>

As far as periodizing anaerobic/aerobic training I suggest using the same type of step loading pattern used for the maximum strength cycle. Increase the intensity from weeks 1-3, then retreat slightly and increase the intensity again from weeks 4-6. The pattern should look something like this:

Week 1: Lowest intensity

Week 2: Lower Intensity

Week 3: Medium Intensity

Week 4: Lower intensity (same as week 2)

Week 5: Medium intensity (same as week 3)

Week 6: Highest intensity

Now some strength coaches may say that training aerobically during maximum strength training will only hinder strength gains. This may be true, however we must remember that we are training as hockey players to become stronger hockey players, not strong men to become stronger strong men. It is far better to be in good anaerobic/aerobic shape and strong, than just strong.

#### **Conclusion**

To recap we have discussed a six week maximum strength training program and a six week anaerobic/aerobic training program. Both the maximum strength training program and the anaerobic/aerobic training program consists of training three days (Mon, Wed, Fri) and (Tues, Thur, Sat) respectively. In both programs the step loading pattern should be used for weeks 1-3 and 4-6. Now for a few words of wisdom. What ever you do always, always use a spot when training for maximum strength. One can never tell when an unfortunate incident could occur. Secondly, when training for maximum strength I would (in most circumstances) pick a weight you feel confident with in terms of getting the desired number of repetitions. This will help keep confidence high, which will only aide in future lifts. Thirdly, get plenty of sleep and follow sound nutritional advice, such as you find on John's website. Well, that's it from the coach's office, and remember, you miss 99.9% of the shots you don't take.

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# DISTRICT 9 HOCKEY Strength Training

## Phase 3—triggering muscle (Power)

Monday - Plyometrics and Aerobic Conditioning

Warm-up: Jump rope ([Double rotation](#), [Double step](#), [Single hop](#), [Single step](#)) 3 min.

[Standing Broad Jump](#) 3 X 6

[Stair Jumps](#) 2 X 6

[Depth Jumps](#) (12-18 inches) 2 X 6

[Reactive Box Jumps](#) (12-18 inches) 3 X 6

[Box March \(High\)](#) 3 X 6

[Reactive Jumps Over Bench/Box](#) 3 X 6

[Box Lateral Shuffles](#) 3 X 6

**Rest Interval: 3-5 min.**

**25-30 minutes skating or roller hockey at 60-65% max HR**

Tuesday - Anaerobic Conditioning (On-Ice Sprints) (Running if ice not available) Don't skimp on the rest ratio—every sprint should be flat-out.

1. **Goal Line to Hash Marks** 3 sets

2. **Goal Line to Blue Line** 3 sets

3. **Goal Line to Red Line** 3 sets

4. **Goal Line to Far Blue Line** 3 sets

5. **Goal Line to End Goal Line** 3 sets

**Work to Rest Ratio 1:20, so rest 20 seconds for every second of sprint. Start every minute on Sprints # 1 and 2; start every 2 minutes on Sprints # 3, 4, and 5.**

**(Starts / Stops can also be used to develop stopping and starting power during this phase)**

Wednesday - Weighted Power (30% of one rep max) Accelerate through full range—rest if fatigue prevents explosiveness.

[Squat Jumps](#) w/tuck (bring knees up) 4-5 X 4-8

[Bench Press](#) 3 X 4-8

[Cleans](#) 4 X 4-8

[Push Press](#) 4 X 4-8

**Rest Interval: 3-5 min.**

Thursday - Aerobic Conditioning (On Ice) Fight through fatigue.

**15 sec. sprints (65-80% of max) followed by 30 sec. of coasting, Work to Rest Ratio 1:1 or 1:2, 3 sets of 8 reps, Each rep is 45 sec. in length (15 sec sprint plus 30 sec. of coasting) and each set consists of 8 reps (45 sec. X 8reps = 6 min.)**

**After each set a 3-5 min break should be taken for recovery.**

Friday - Dynamic (Ballistic) Power

**Medicine Ball Squat Between Leg Over Head Throws** 2-3 X 8

**Medicine Ball Squat Between Leg Forward Throws** 3 X 6-8

**Medicine Ball Side Throws** 3 X 6-8

**Medicine Ball Squat Chest Throws** 2-3 X 6-8

**Rest Interval: 3-5 min.**

Saturday - Power Endurance (30% of one rep max)

**Dumbbell [Squat Jumps](#)** 3 X 6-8(wk1), 12(wk2), 16(wk3), 20-30(wk4)

**[Bench Press](#)** 3 X 8(wk1), 12(wk2), 16(wk3), 20-30(wk4)

**[Standing Broad Jump](#)** 3 X 6-8(wk1), 12(wk2), 16(wk3), 20-30(wk4)

**Rest Interval: 5 min**

Sunday - Off **24hrs of rest is taken between workouts is crucial for recovery and to avoiding overtraining/under-recovering.**

**Warming up** is highly individual in this type of training, but 5-10 minutes of dynamic type of warm-up activities will increase nervous system stimulation without obtaining fatigue.

**Sets** need only be increased if the athlete feels the prescribed numbers are too low for maximum benefit. One must be careful here not to overtrain.

**Repetitions** do not need to be increased for Dynamic, Weighted, or Plyometric days. As you progress, don't increase reps but do attempt to do the same number of repetitions more explosively. The only time repetitions should definitely be increased is during the power endurance workouts. It is during this workout that athletes must focus strongly on blocking out the pain of lactic acid build up and concentrate on moving explosively.

**Rest intervals** are key, so don't cut them short. This time is needed for restoration of ATP/PC stores so that subsequent sets can be performed in an explosive manner.

### **Final Thoughts**

This program does not entail use heavy weights, but training for power can be extremely taxing on the nervous system, so make sure to get plenty of rest and the appropriate nutrition. Remember, the goal of training for power is to become more explosive. If you need an extra few seconds, minutes or even an extra day of rest, take it. It is far more beneficial to complete three excellent days of power training than four haphazard ones.

# Gladiator Training - Part 3

## The Power to be the Top Gun

By [Ryan Foster](#)

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[Editor's Note: Be sure to check out [Part 1](#) and [Part 2](#) of the Gladiator Training series. ]

It was bright sunny day, 29°C to be exact with a 30 MPH wind coming out of the northwest, as a cocky pilot announced the infamous words "I feel the need, the need for speed, Yowwwwwww!" And we all know what happened next. Viper took Maverick and Goose on a wild turkey hunt as Jester snuck up from behind and obtained radar lock. The wily veterans had won. And they did so as they were not only smarter in the air but also faster. In some cases, speed is the great equalizer while in others it's the undisputed dominator. Regardless of whether you're talking air-to-air combat or talking about one on one drills at the Air Canada Center, the old saying holds true. Speed kills. Since speed and power are copilots, one way to increase one's speed on the ice is to become more powerful. That is the topic of this final segment of the Gladiator Training series.

### Why Train For Power?

There is perhaps no simpler way to answer this question than by stating that training for power will help increase skating speed and speed endurance. Just as sprinting is the most crucial element to a wide receiver in football, skating is the most crucial element to a hockey player. As most of you know, if you can't skate well you can't play hockey. Sure there have been a few exceptions. Brad Marsh etched out a pretty nice career looking like a beat up Pinto in a sea of Ferraris, but there are few like Brad Marsh amongst today's NHL ranks. In fact the first thing scouts look for in a player is skating ability. Make no mistake; all of the NHL's elite players (Pavel Bure, Peter Forsberg, Alexander Mogilny, Joe Sakic, etc.) can skate extremely well. So by increasing power one should theoretically be able to increase skating speed. I say theoretically because much of skating, like many other skills in sport has to do with technique, not just power and strength. But if the technique is there and the power improves, look out.

In addition to increasing skating speed, training for power will aide in other facets of the game such as shooting, hitting, and perhaps even the most barbaric (tongue in cheek) of all acts during a game, fighting. Max strength is great, but you can't get much of a chance to show off all that strength if you're falling backwards because a more powerful player just hit you.

When speaking of power, it's also important to note that any training program should be based on training for power endurance. Since hockey is a game where shifts last between 30-60 seconds and power spurts are required at various intervals during that time, power endurance should be a focus.

So now that we have determined that power and power endurance are critical elements of hockey performance, let's take a look at how to attack these important element of training.

### The Prelude

Now that we are much bigger and stronger compared to thirteen weeks ago, it is time to put the new found size and strength into action, fast action. Since we have four weeks devoted to training for power and power endurance, I have outlined below the four methods that will be used each week. In addition we will take a look at what our anaerobic and aerobic conditioning should consist of for this all-important final 4 weeks of training before the season. Finally we will look at the program in detail including exercises, sets, repetitions, rest intervals, etc. First the methods.

### Plyometric

Plyometrics have been around for years and most of us, even if we don't realize it, have completed some form of plyometric movement in our lifetime. For instance, every time little Eric jumps down to the ground from the park bench he is doing a plyometric maneuver. Plyometric movement refers to the eccentric loading or stretching of a muscle and its subsequent (hopefully rapid) contraction; plyometrics are "ballistic movements". The quicker the eccentric loading occurs, the faster and more forceful the concentric contraction. This is known as the stretch shortening cycle and is something we athletes should take full advantage of. The stretch shortening cycle basically works as follows. As a muscle is stretched

quickly the stretch receptors in the muscle send nerve impulses to the spinal cord that immediately send back signals to the muscle dictating an immediate forceful contraction in order to prevent the muscle from tearing. We, as athletes, can take advantage of the stretch shortening cycle by doing things such as consecutive standing broad jumps, depth jumps, bounding, and reactive jumps. This type of training should be completed as explosively as possible with no rest between repetitions.

### Weighted Power

I have titled the second method "weighted power" as that describes the method perfectly. It entails using lighter than maximal loads while attempting to lift the weight as fast as possible. Scientists have known for years that lifting loads lighter than maximal as quickly as possible recruits a high number of fast twitch muscle fibers and trains the nervous system to recruit them in a synchronized fashion. Opinions have varied on what percentage of one repetition maximum is best for use in order to develop power. Wilson et al. in 1993 performed a study to determine what percentage of one repetition maximum was most beneficial for increasing an athlete's power. They found that 30% of one repetition maximum was optimal for such training. Like most aspects of training each individual will achieve the best results with slightly different loads, however for the time being I suggest starting with 30% of one repetition maximum (some athletes benefit from using up to 50% of 1RM but any more tends to slow down the movement, causing sub optimal power generation).

It is during this type of training that the previous maximal strength phase is of real benefit. The key to developing power in the weighted power method is to overcome the resistance provided by the loaded barbell (or dumbbell). The stronger one is the more forcefully one can overcome this resistance and propel the barbell upwards. However overcoming the initial resistance of the barbell is only half of the equation. Once the initial resistance is overcome the athlete must concentrate on accelerating the barbell right through the finish, not letting momentum itself finish the movement. Exercises such weighted jump squats, one leg weighted jump squats, cleans and push presses are good exercises for this particular method as they involve the prime movers most often used during hockey.

### Dynamic (Ballistic)

The plyometric method involves overcoming the weight of ones body. The weighted power method involves overcoming 30% of one's one repetition maximum. As you might have guessed, the dynamic or ballistic method falls somewhere between the two. It involves using the prime movers to propel objects such as medicine balls, surgical tubing, and track and field shots as far as possible. To do so one has to overcome the initial resistance of the object by firing as many fast twitch muscle fibers as possible and continue to do so throughout the entire movement. In contrast to the weighted power method where the barbell moves at a medium pace even though the athlete is trying to lift it as fast as possible, the resistance in the dynamic method is light enough to move the objects quickly. Often the resistance falls between 7 - 25lbs. The dynamic method uses exercises that tax the prime movers as well as the body's core. Such exercises include medicine ball overhead backward throws, medicine ball overhead front throws, medicine ball side throws, and medicine ball chest throws.

It is extremely important that repetitions for all power training methods mentioned above are performed in an explosive manner. Sets should be terminated if repetitions begin to slow (even the slightest bit) as continuing will only teach the muscles how to move slowly. Fighting through fatigue while maintaining one's speed will be the goal of the next type of training, power endurance.

### Power Endurance

Training for power is extremely important for obtaining skating speed, however it is also important to maintain that speed throughout an entire shift. That is why training for power endurance is critical. Training for

power endurance involves using loads of 25-30% of ones one rep maximum and doing 10-30 repetitions consecutively in as powerful a manner as possible. This is extremely tough to do when first tackled which is why one should start off with reps of 10 and gradually move up in number until the desired repetitions are met. The exercises used should be those that tax the prime movers and are sport specific. For hockey, this means using exercises such as barbell jump squats, dumbbell jump squats, split lunge jumps, and push presses. It is key to maintain quickness and power throughout every repetition so that the body's fast twitch muscle fibers do not fatigue and consequently recruit the slower slow twitch muscle fibers. Rest intervals and concentration are key in every set, as the speed of movement must remain high in order to develop substantial power endurance.

### **Anaerobic Conditioning**

At this point in time we should have made some improvements in our anaerobic conditioning from the bike training done during the previous six weeks. It is now time to move onto the ice for some sport specific training. Since the forward hockey stride is used most often during a game (70-80%) it is what should be used for anaerobic conditioning. Anaerobic conditioning for a hockey player is not all that different from a wide receiver in football or a sprinter in track in that sprinting is the tool used. Straight ahead, full bore sprinting; moving the feet as quickly as possible without breaking good skating form. The goal is to make each stride quick and powerful while gradually building up power endurance on the ice. During this phase of training it is crucial to get onto the ice, however if this

is not possible than skating sprints can be substituted with running sprints or bike sprints, although the carry over onto the ice will not be as beneficial as if the training were performed on the ice. As mentioned earlier the goal is to make each stride extremely powerful. This can only be achieved if the ATP/PC stores are near complete replenishment. Therefore the work to rest ratio should be no lower than 1:20. So if a sprint takes 3 seconds to complete, the rest time should be at least a 60 seconds in length.

### **Aerobic Conditioning**

The same rules apply to aerobic conditioning that applied to anaerobic conditioning in that it is crucial to get on the ice. In contrast to anaerobic conditioning, aerobic conditioning should consist of forward skating, cross overs, backward skating, as well as moving laterally. And as you may have guessed the work to rest ratio is much lower during aerobic conditioning. In fact it should be roughly 1:1 or 1:2. An example of this is skating at 65-80% of maximum for 20 seconds and than coasting/resting for another 20-40 seconds.

### **The Program**

Now let's go ahead and incorporate all these excellent techniques into one comprehensive program. If you are unfamiliar with some of the movements, perhaps you should invest in a good plyometric training book or check around the Internet for pictures. It would be an excellent investment of money.