

**THE  
HEALTHY  
BODYBUILDER  
&  
POWERLIFTER**

*Optimizing Longevity in the Iron Sports*

*by*

**Shelby Starnes & Rob Taylor**

# The Healthy Bodybuilder & Powerlifter

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*by*  
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*and*  
Rob Taylor

***Before you embark on any physical fitness program  
or diet/supplement regimen, please consult a doctor.***

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# About the Authors



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# Introduction

Bodybuilding is an extreme sport; it involves pushing human capacity to its absolute limit. As an extreme sport, bodybuilding carries with it a certain amount of risk. Every extreme sport has risk, and those that participate accept these risks as a necessary sacrifice for our love of the sport.

In every extreme sport, be it skiing, motocross, or football, we also take precautions to minimize risk; this could be as simple as an avalanche transceiver, or a helmet and padding. In bodybuilding, the sport takes place inside the body itself, and the precautions needed to minimize risk are complex.

This book attempts to address the major *known* risks associated with bodybuilding and how to test for, and minimize, those risks. This book will also try to address the *unknown* risks of bodybuilding, by teaching the bodybuilder to be as healthy as possible.

One will never remove the risk from sport, and the premise of this book is not an attempt to remove the risks associated with bodybuilding. Instead we will look at how to minimize these risks, and how to be – The Healthy Bodybuilder.

## WHY HEALTH?

Why should the bodybuilder, especially if young and already healthy, be so concerned with health? After all, nobody lives forever. It is not only self-preservation that should fuel your concern for health, but also performance. In bodybuilding, performance is directly tied to health. *The healthier you are, the more you can train, the better you will recover, the longer your career will be, and the more you will excel.*

Those who don't pay a great deal of attention to health will find their bodies burned out, their training sporadic, their motivation waning, and ultimately, their careers shortened – never recognizing their full potential. This is perhaps more true in bodybuilding than in any other sport, where today's top bodybuilders are improving and growing into their thirties and even forties.

Yet there are still other reasons to be concerned with health, perhaps even better reasons. Bodybuilding can be the fountain of youth; a sport and hobby you can enjoy into your fifties, sixties, even seventies and beyond. Do you wish to be the 50 year old suffering from heart disease, unable to exercise vigorously, facing surgeries and the possibility of imminent death? Or do you want to be in perfect health at 50 years old, as strong and active as you were at 20, working out every day and still enjoying the sport? And later, be the 80 year old who still goes to the gym every day and is able to perform the activities you desire, virile and alive? The career of the bodybuilder can lead to many outcomes, you can choose which one will be yours.

## **HISTORY OF HEALTH AND BODYBUILDING**

Bodybuilding has historically been synonymous with health and longevity. Early bodybuilders have proven empirically that they were unusually healthy. The list of early bodybuilders who lived to a very old age is extensive. From Charles Atlas who lived 80 years, to John Grimek who lived 88 years, to Reg Park who lived 79 years; these men were healthy and lived much longer than average. Not only that, they were active until the end: Charles Atlas went on his daily run the day he died, John Grimek could squat 400lbs in his late 60s, and Reg Park (who won his first contest in 1949) was still training clients just 6 years ago when he passed away in 2007.

There have been 13 Mr. Olympia winners since its inception in 1965; 12 of these men are still alive today, including the first Olympia winner, Larry Scott. Sergio Olivia, the second Olympia winner, passed away last year at 71. This is an impressive record of longevity when considering the extremes to which these bodybuilders pushed their physiques.

Today's bodybuilders are pushing the limits of muscularity, yet at the same time competing and improving into their forties. This would not be possible without a great deal of emphasis placed on maintaining health. Today we have even more knowledge about how to live healthy and this has been instrumental in allowing today's bodybuilder to grow bigger, perform better, and to continually improve throughout an even longer career.

## **ALL TYPES OF BODYBUILDERS**

There are many different types of athletes who would traditionally be considered bodybuilders. This book is not only for the competitive bodybuilder, but also for the powerlifter, the strongman, the casual weightlifter, and any athlete who tries to maximally develop his or her body; be it for sport, show, or the simple love of the iron. It doesn't matter what your current development is or what your future goals may be – this book is a guide to optimal health and thus, maximal results.

## **YOUR DOCTOR**

Your doctor is your safety net and perhaps the most important part of your formula for health. He or she needs to be someone you trust, someone who is knowledgeable about sports medicine, and someone who is willing to work with you closely and meticulously. You should see your doctor multiple times per year, preferably with bloodwork already in hand. You should also let your doctor know what your training regimen is and what supplements you are taking.

Together, you and your doctor will go over your blood test results. In this book we will show you bloodwork values to interpret within the normal ranges, but it will be your doctor who will interpret values outside the normal ranges, and who will look for signs of anything serious. While it might seem easy to play armchair doctor with the internet at your fingertips, it is not. There is no way to replace the breadth of knowledge and experience a medical doctor has, his or her guidance and watchful eye will be invaluable to your goal of optimal health.

# Cardiovascular Health

Here we will look at several conditions that stand out as the greatest risks to the bodybuilder, as well as how to test for these conditions. This is not a guide to all possible cardiovascular conditions, only the primary conditions a bodybuilder is at increased risk for.

- High Blood Pressure (Hypertension), also known as the “silent killer,” is perhaps the most common cardiovascular condition, the easiest one to detect, and the simplest one to control. Hypertension is not only detrimental to your cardiovascular system, it is also the leading cause of kidney failure in otherwise healthy adults.
- Coronary Arterial Disease (CAD) is the number one killer of men and women. This is caused by cholesterol deposits on the arterial wall (atherosclerosis). The cause of these deposits, and the corresponding restriction of blood flow, is complex and the source of some controversy – inflammation is known as one of the main culprits and cholesterol undoubtedly plays a role as well.
- Blood Disorders, specifically excessive red blood cell production (secondary Polycythemia Vera), leading to an increased chance of stroke and heart attack.

Cardiovascular health is perhaps the most important health factor a bodybuilder can pay attention to. There are some areas of cardiovascular health that can be monitored easily, and others that will require extensive testing methods. Some of the tests we will be exploring are: Blood Pressure,

Hematocrit, Cholesterol, Heart Scans, C-Reactive Protein, and Homocysteine. Most of these tests must be ordered and interpreted by your doctor, but you should know what they are and why you need them.

## **BLOOD PRESSURE**

Blood pressure has an amazing impact on overall health. High blood pressure (hypertension) is the leading cause of kidney failure in otherwise healthy people. It is also a risk factor for stroke, aneurysm, and heart failure. The bodybuilder should monitor blood pressure regularly, both through regular checkups by your doctor, and at home with an automatic blood pressure monitor. These automatic monitors are cheap and fairly reliable – every bodybuilder should purchase one. If your arms are larger than average, and they probably are, make sure you also purchase a large size cuff to go with your monitor. When you have your blood pressure taken at the doctor's office, make sure they use the larger cuff if appropriate. A cuff that is too small for your arm will cause inaccurate (elevated) blood pressure readings.

Blood pressure should be taken on a regular basis, preferably at the same time of day, when you are relaxed and not under the effects of caffeine or other stimulants. It is important to record repeated measurements over several days or weeks to obtain your *average* blood pressure, as any single reading can be significantly higher or lower than the average. When you see your doctor, it is a good idea to have a recorded list of recent blood pressure measurements with dates and times. As a precaution, you may also want to bring your home monitor with you to your doctor's appointment to test its accuracy against your doctor's readings.

Keeping blood pressure in check is an absolute must for anyone concerned with health, and for the bodybuilder who is putting extra stress on his vascular system and kidneys, it is even more important.

### [Interpreting Your Blood Pressure](#)

Blood pressure readings are expressed as a fraction with a larger number on top, and a smaller number on the bottom. These numbers represent how much pressure your heart is creating when it is contracted (top number, or Systolic) and how much pressure it is under when relaxed (bottom number, or Diastolic). The chart below shows blood pressure categories defined by the American Heart Association. It is essential that the bodybuilder maintain blood pressure values *under* 140/90, and ideally under 120/80. Blood pressure that is in the Prehypertension range may not be detrimental for short periods of time. Blood pressure consistently in the Stage 1 range is unhealthy and must be brought down. Blood pressure in the Stage 2 range is dangerous and must be addressed urgently. Blood pressure in the Hypertensive Crisis range requires emergency care immediately, permanent damage could occur over a very short period of time.

Blood Pressure Category	Systolic mm Hg (upper #)		Diastolic mm Hg (lower #)
Low blood pressure (Hypotension)	less than 90	or	less than 60
Normal	90 to 120	and	60 to 80
Prehypertension	120-139	or	80-89
High Blood Pressure (Hypertension Stage 1)	140-159	or	90-99
High Blood Pressure (Hypertension Stage 2)	160 or higher	or	100 or higher
High Blood Pressure Crisis (Seek Emergency Care)	180 or higher	or	110 or higher

## Cardiovascular Exercise and Blood Pressure

There is no greater tool for lowering blood pressure than cardiovascular exercise; no matter how hard you lift in the gym, or for how long, you will not get the same benefit. Sustained, moderately intense, cardiovascular exercise is absolutely necessary to maintain healthy blood pressure, decrease heart rate, and improve blood flow. See the section *Cardiovascular Health and Performance* at the end of this chapter for more information on aerobic exercise requirements.

## Dietary Considerations for Blood Pressure

Sodium and potassium intake can greatly affect blood pressure. Eating too much sodium or too little potassium will cause water retention and an increase in blood pressure. Body fat levels can also affect blood pressure due to the stress of excess weight.

The most effective way to determine how much sodium and potassium you should be eating is to track your average food intake and calculate your total daily sodium and potassium intake. There are several online diet trackers that will calculate your total sodium and potassium consumption based on your daily food intake. [NutritionData](#) is one of the most popular and easiest to use, but there are many others that are equally effective. Although the FDA recommends a sodium to potassium ratio of 1:2, the hard training bodybuilder will need a ratio closer to 1:1. While too much sodium raises blood pressure, too little sodium will also negatively impact performance. If you do plan on supplementing sodium for any

reason, make sure you also getting enough potassium to maintain a 1:1 ratio to avoid excess water retention.

If your blood pressure is high, the first step in most cases will be reducing sodium intake and making sure water retention isn't unnecessarily increasing your blood pressure. Also, drinking enough water is important to flush excess sodium out of the body; more on hydration requirements in the *Kidney Health* chapter.

### [Supplements for Blood Pressure: Coenzyme Q10](#)

While nothing will lower blood pressure nearly as well as properly performed cardiovascular exercise, there are some supplements that can have a positive effect. Research has proven that Coenzyme Q10 can lower both systolic and diastolic blood pressure. The most active form of CoQ10 is Ubiquinol; this is the recommended form to supplement. Studies show the most positive effects from 200mg per day, divided into two daily doses of 100mg each. Due to absorption limitations, it is important that a fat and/or water soluble form of Ubiquinol is taken.

### [Considerations for HRT Patients](#)

For patients taking Hormone Replacement Therapy, blood pressure may be increased by additional factors. Testosterone above physiological levels will increase blood pressure; it is important that you work with your doctor to maintain appropriate levels of testosterone for your age. Also, conversion of testosterone to estradiol (aromatization) at a higher rate than

normal will increase water retention and thus increase blood pressure. In some cases, your doctor may have to use an Aromatase Inhibitor (AI) to control estradiol levels. HRT patients on growth hormone replacement will also see increased water retention and higher blood pressure. Growth hormone replacement patients are very sensitive to water retention from excessive sodium intake.

### Blood Pressure Medications

There are many effective blood pressure lowering medications that can be prescribed by your doctor. However, there is no case where these medications are completely free of side effects. Most of these side effects are much worse when blood pressure medications are taken for very long periods of time. The younger you are, the more detrimental long term effects of these medications can be. There are many factors that contribute to high blood pressure, including genetic factors, but it is rare that blood pressure cannot be controlled with a combination of cardiovascular exercise and diet modification, without prescription drugs.

### Blood Pressure Control

1. Monitor your blood pressure and know your average.
2. Ensure that you are not eating an excessive amount of sodium, relative to your potassium intake, and that you are drinking enough water to clear excess sodium from the body.

3. Perform enough cardiovascular exercise to keep blood pressure in the appropriate range.
4. Ensure cardiovascular exercise is adequately intense. See the section on *Cardiovascular Health and Performance* at the end of this chapter for guidelines.
5. Reduce body fat if necessary to help lower blood pressure.
6. Supplement with CoQ10.

## HEMATOCRIT

Hematocrit is the percentage of your blood volume that is made up of red blood cells. This value will be found on your Complete Blood Count (CBC). While higher hematocrit values can mean increased oxygen carrying capacity and thus improved cardiovascular performance, values that are too high can be dangerous, increasing the risk of blood clots, leading to stroke or heart attack. High hematocrit also means the heart must work harder to pump thicker blood.

Hematocrit is an especially important blood value for bodybuilders due to high intensity anaerobic exercise, as well as certain supplements – which both have the potential to increase hematocrit.

There are several things you should know about hematocrit when going over blood work with your doctor:

- Dehydration will reduce blood volume and increase hematocrit; it is important to stay hydrated at all times. Ensure that you are well hydrated when going in for bloodwork so that this value isn't elevated due to dehydration.
- Platelet Count is another blood value on a CBC. This is how "sticky" your blood is. A high hematocrit with a low platelet count is not as dangerous as a high hematocrit *and* a high platelet count. There are many complex blood factors that come into play when determining the risk of clotting; it is important that your doctor interprets these values if anything is out of the normal range.
- Donating blood is an effective way to lower hematocrit. In general, hematocrit is lowered by 1-3 points by donating one pint of whole blood. It is important to note that donating blood temporarily increases platelet count. If your hematocrit is very high, ask your doctor if you should donate blood. In some cases, he or she may advise other protocols to manage your hematocrit.
- Generally, male bodybuilders should avoid iron supplements, as this can increase hematocrit. Also, avoid vitamin C supplements with meals high in iron content – vitamin C greatly increases iron absorption.
- Anyone living at high altitude will naturally have a hematocrit value several points higher than someone living at sea level, this is normal.
- Smoking, or anything negatively affecting lung function, will additionally increase hematocrit.

- Sleep Apnea is a serious condition that can lead to dangerously high hematocrit levels. If there is any question that you may have sleep apnea, talk to your doctor about doing a sleep study.

Besides donating blood, the best way to control hematocrit is to perform regular cardiovascular exercise. Although this may seem somewhat counterintuitive, in anaerobic athletes, cardiovascular exercise usually increases blood volume more than it increases red blood cell count, lowering hematocrit. In the untrained person, cardiovascular exercise alone may increase hematocrit; however, in the bodybuilder who has already maximized red blood cell production through anaerobic exercise, the addition of aerobic exercise will greatly increase blood volume and *lower* hematocrit. Yet another reason the bodybuilder must regularly perform aerobic exercise to maintain cardiovascular health. See the *Cardiovascular Health and Performance* section at the end of this chapter for recommendations on aerobic training.

### [Interpreting Your Hematocrit Test](#)

Hematocrit is expressed as a percentage. The average hematocrit for a male is about 45 (or 45%) and about 40 (or 40%) for a female. The normal range for males is 41-50, and the normal range for females is 35-44. Because laboratories use different testing methods, your normal range may vary slightly. Your doctor will most likely be concerned if your hematocrit is more than 2-3 points above the normal range, and he or she will probably recommend a blood donation.

## Considerations for HRT Patients

HRT patients will have to monitor their hematocrit levels very closely and may have to donate blood at regular intervals. Maintaining ideal physiological testosterone levels through bloodwork is essential to keeping red blood cell production normal. Testosterone dosages above natural levels will rapidly increase hematocrit.

## **CHOLESTEROL AND LIPOPROTEINS**

Cholesterol is an important molecule involved in the synthesis of vitamin D and many hormones, in addition to having several other important functions in the body. Most people will think of cholesterol negatively for its role in contributing to plaque buildup on the arteries (atherosclerosis), however it is actually inflammation that is the main cause of atherosclerosis, not cholesterol itself.

The lipoproteins HDL, LDL, and VLDL have an important role in controlling the transport of cholesterol. They are not cholesterol themselves – as is often thought – but instead, carriers of cholesterol in the bloodstream. When you receive a value on bloodwork for HDL/LDL/VLDL, you are actually seeing how much cholesterol is being carried by that lipoprotein. High-density lipoprotein (HDL) carries cholesterol to the liver for metabolism, therefore it is considered “good cholesterol.” Low-density lipoprotein (LDL) is able to carry cholesterol to the arterial walls, and therefore is considered “bad cholesterol.” And Very-Low-Density Lipoprotein (VLDL) is thought to have the greatest ability to contribute to

plaque formation on the arterial wall and is also considered “bad cholesterol.”

This plaque formation, known as atherosclerosis, is the leading cause of heart disease and death worldwide. Cholesterol only promotes atherosclerosis, it is not the direct cause, but it is still an important value to monitor for the prevention of heart disease. Statistically, it is the ratio of HDL to LDL that is most important factor in predicting heart disease. The lower the HDL and the higher the LDL, the greater risk a person has of developing atherosclerosis. It is recommended that you ask your doctor to test your VLDL also as this value is not always included on a standard lipid profile. A high LDL but a low VLDL may be healthy, whereas a normal LDL but a high VLDL may be cause for concern.

Although no one can give you hard and fast rules about these values, you generally want as much lipoprotein as possible carrying cholesterol *away* from the arterial wall, and as little as possible carrying cholesterol *to* the arterial wall. This means high HDL, low LDL, and low VLDL.

### [Interpreting Your Lipid Panel](#)

Your lipid panel will consist of a Total Cholesterol Level, HDL, LDL, and VLDL. Below are the levels recommended by the American Heart Association. It should be noted that because hormones such as testosterone are synthesized in the body from a cholesterol base, athletes do not want total cholesterol too low; ideally it should be around 200mg/dL.

<b>Total Cholesterol</b>	<b>200mg/dL or lower</b>
<b>HDL</b>	<b>40mg/dL or higher (men) 50mg/dL or higher (women)</b>
<b>LDL</b>	<b>100mg/dL or lower</b>
<b>VLDL</b>	<b>2-30mg/dL</b>

### Dietary Considerations

The majority of cholesterol is manufactured by the body; the remaining is from dietary sources. Because of genetic differences, some people may have the need to restrict dietary cholesterol to help lower their total cholesterol, while others can consume all they want with no issues. Bloodwork is the only way to know for sure how your diet is impacting your lipids. Generally, consuming too much cholesterol will increase your total cholesterol level as well as your LDL level. Also note that there is strong evidence suggesting refined sugars have a greater role than dietary cholesterol in raising both LDL and VLDL.

The relationship between diet, cholesterol, and atherosclerosis is the subject of major controversy within the medical field. Exercise and genetics seems to be a bigger factor than diet. Controversy aside, there is still good evidence to support that eating a diet relatively low in cholesterol and refined sugars will help optimize lipid profiles in most people.

## Supplements for Improving Cholesterol

Niacin has been proven to reduce both LDL and VLDL, while at the same time increasing HDL levels. Be warned however, that supplementation with niacin can cause a flushing effect that can be unpleasant, in addition to other possible side effects; consult your doctor before starting a niacin regimen. A niacin regimen is usually 1000mg to 2000mg, taken with food before bed. It is important to start with a lower dose (250mg to 500mg) and work up to the dosage approved by your doctor, otherwise the flushing effect (red, hot burning skin) can be intense – although harmless. Niacin can be liver toxic at high doses, and should be used with caution and under your doctor's supervision. Generally, you should be able to control lipids adequately with regular cardiovascular exercise without the added liver stress of a niacin regimen.

Red Yeast Rice is also effective at lowering LDL. This is because it contains a prescription cholesterol lowering drug called lovastatin. Because this book is about optimal health, and because this drug can have a negative impact on the liver, it is not recommended by the authors. There is also the possibility of dangerous impurities in red yeast rice. If you need to take a statin, a pharmaceutical grade drug would be safer than this supplement.

## Considerations for HRT Patients

HRT patients will almost always see lowered HDL and increased LDL after starting testosterone replacement therapy. While this can be managed through proper exercise and diet, testosterone levels that are too high and/or estradiol levels that are too low, do have a negative impact on lipids. It is

important that you work closely with your doctor to manage these levels optimally. If you use an aromatase inhibitor to control estradiol while on HRT, care must be taken not to lower estradiol too much, as this can negatively affect lipid values.

## **HEART SCANS**

The Heart Scan is the absolute best noninvasive way to detect calcified plaque buildup on the arterial wall (atherosclerosis) and early stages of Coronary Arterial Disease (CAD). CAD is the number one cause of heart attacks. While an ECG can detect extremely blocked arteries, the heart scan can detect even small amounts of atherosclerosis. It is highly recommended that anyone concerned with cardiac health have a heart scan performed.

The heart scan will give you a Calcium Score which relates to the amount of calcified plaque deposits in your heart. This information is critical in determining your chances of a heart attack and the implications of other tests such as HDL and LDL. If you have a poor Calcium Score, it is possible to improve your score through focused diet and exercise. It also becomes much more important to properly manage lipid values if you have a poor score. A good Calcium Score means less negative impact from poor lipid values. Knowing your Calcium Score lets you make important informed decisions about your health and what precautions to take.

Heart scans are commonly offered at many testing locations, usually for around 500 dollars. It is preferred that the test is done by low radiation

Electron Beam Computed Tomography (called an EBCT scanner), although Multislice Computed Tomography (called a MSCT scanner) is more commonly used; MSCT uses almost ten times the amount of radiation, and is not recommended unless you are at high risk for Coronary Arterial Disease. There are some situations where the MSCT scan provides more information and should be used in place of the EBCT scan, however for the detection of plaque buildup alone, the EBCT scanner is the ideal choice due to the much lower radiation exposure. EBCT scans are only about as much radiation as a dental x-ray.

There is no greater tool in detecting atherosclerosis than the heart scan, the information gained can help you make decisions that will have great impact on your health and longevity. This is especially true for bodybuilders with poor lipid profiles. Heart scan locations generally have guidelines for testing frequency depending on the results of your first scan. We recommend that you get an initially heart scan and then repeat every 5 years if everything looks clear.

## **INFLAMMATION**

Arterial Inflammation is thought to be the greatest factor contributing to Atherosclerosis and Coronary Arterial Disease (CAD). Inflammation factors can be monitored and controlled through bloodwork, diet, and supplementation.

## C-Reactive Protein

C-Reactive Protein (CRP) is a direct indicator of low grade inflammation, and is correlated directly to Coronary Arterial Disease. This is perhaps the single most important blood test for predicting overall cardiac health. A low CRP score is a prerequisite for cardiac health. A high CRP score must be address immediately with diet modification and/or supplementation.

Lowering this value should always be a goal for prevention of heart disease.

## Homocysteine

Elevated Homocysteine (HCy), included here although not a direct indicator of inflammation, is considered an independent indicator of cardiac risk, and some correlation between HCy and CRP has been found. Elevated HCy levels can be from vitamin B deficiency, specifically Folic Acid (B9), B6, and B12. Eating foods high in B vitamins, or supplementing with B vitamins can lower HCy levels.

## Eicosanoids

Eicosanoids are another important factor that directly relates to inflammation. These signaling molecules, which are formed from Essential Fatty Acids (EFAs), control inflammation and immune functions at the cellular level. Omega-6 fatty acid eicosanoids are pro-inflammatory, and omega-3 eicosanoids are anti-inflammatory. It is important that omega-6 and omega-3 eicosanoids are balanced in the body. By tracking your diet, and entering the foods you eat into a nutrition tracking program, you can see

exactly how much omega-3 and omega-6 you are consuming, and how much additional omega-3 you need to supplement for balanced levels. See the section below on fish oil for more information on supplementing omega-3.

### Dietary Considerations

Diets high in refined sugars and high glycemic index carbohydrates have been shown to cause inflammation. Eating complex carbohydrates and combining macronutrients to slow digestion is important in controlling inflammation. Because most diets are already overly high in omega-6 fatty acids, eating foods high in omega-3 fatty acids will reduce inflammation. Fish is the best way to increase omega-3 fatty acids in the diet. Most fish contains approximately 1g of omega-3 EFAs per 3.5 ounces.

### Supplements to Reduce Inflammation: Fish Oil

Fish Oil supplements contain the omega-3 fatty acids DHA and EPA. These are essential for reducing inflammation, as most western diets are very high in omega-6 fatty acids which are pro-inflammatory. Balancing this intake with anti-inflammatory omega-3 fatty acids is very important. Although we recommend you calculate how much omega-6 and omega-3 you are consuming in your diet, and supplementing appropriately, as a general rule of thumb you should supplement between 2 and 3 grams of omega-3 EFAs per day.

Note that fish oil supplements are not pure omega-3 fatty acids; it is important to look at exactly how much DHA and EPA is contained in each pill and take an appropriate amount to meet your daily requirements.

### Supplements to Reduce Homocysteine: B Vitamins

Deficiency in the B vitamins Folic Acid (Vitamin B9), B6 (Pyridoxine), and B12 (Cyanocobalamin) can cause elevated Homocysteine levels. Supplement these vitamins if you are not getting enough of them in your diet, or if you have high Homocysteine levels on bloodwork. Be careful, there are toxicity issues with some B vitamins. Taking too much Folic Acid (B9) can cause B12 deficiency, as these two B vitamins must be in balance. Too much B6 can cause neurological issues. B12 is probably the safest at higher doses, however there are possible interactions with some conditions. A low dose B complex vitamin is a safe way to supplement, but calculating your daily intake from foods and only supplementing B vitamins as needed is the ideal route.

<b>B Vitamin</b>	<b>Recommended Daily Dose</b>	<b>Maximum Daily Dose</b>
<b>Folic Acid (B9)</b>	<b>200mcg</b>	<b>400mcg</b>
<b>B6 (Pyridoxine)</b>	<b>50mg</b>	<b>100mg</b>
<b>B12 (Cyanocobalamin)</b>	<b>50mcg</b>	<b>100mcg</b>

## CARDIOVASCULAR HEALTH AND PERFORMANCE

Not only is cardiovascular health and efficiency a cornerstone of good health, but also a necessity for optimal performance. A more efficient cardiovascular system will improve recovery time between sets and allow you to push harder and longer in the gym. Improved circulation will increase delivery of everything muscle cells need to repair and grow; even when the body is at rest.

In order to maintain top cardiovascular shape, the bodybuilder should perform cardio at least three times per week. Recommended intensity is 70% to 80% of your maximum heart rate, and duration is 30 minutes minimum. Try to achieve your target heart rate as early as possible during your workout – you don't want to be half way through your cardio before you reach your target heart rate. Maximum heart rate is calculated by the formula:  $220 - \text{age}$ . At the end of this section there is a chart that shows the optimal training zones by age, the Aerobic Training zone of 70-80% of your maximum heart rate should be used. Don't guess your heart rate, monitor it!

## CARDIOVASCULAR HEALTH SUMMARY

- Monitor your blood pressure on a regular basis.
- Perform moderate intensity cardiovascular exercise on a regular basis.
- Supplement with the active form of CoQ10, Ubiquinol.
- Balance sodium and potassium intake.
- Stay well hydrated at all times to maximize blood volume.

- Have bloodwork done on a regular basis.
- Donate blood if necessary to control hematocrit.
- Keep lipids in range with exercise and diet.
- Have a Heart Scan performed to detect early stages of atherosclerosis.
- Check Homocysteine levels and supplement B vitamins if high.
- Supplement with quality fish oil.
- Use this chart to find your Aerobic Training zone.

% HR	AGE										
	20 <sub>age</sub>	25	30	35	40	45	50	55	60	65	70
100%	200 <sub>BPM</sub>	195	190	185	180	175	170	165	160	155	150
	V02max ( 90-100%)										
	Intense Anaerobic Training ( 80-90%)										
90%	180	176	171	167	162	158	153	149	144	140	135
80%	160	156	152	148	144	140	136	132	128	124	120
	Aerobic Training ( 70-80%)										
	Low Intensity/Fat Zone ( 65-75%)										
70%	140	137	133	130	126	123	119	116	112	109	105
60%	120	117	114	111	108	105	102	99	96	93	90
	Moderate Activity (warmup 50-60%)										
50%	100	98	95	93	90	88	85	83	80	78	75

# Liver Health

The liver is the largest and most complex internal organ. All blood in the body passes through the liver and is detoxified. The liver metabolizes most proteins, carbohydrates, and fats. It also performs drug metabolism along with a wide array of other functions.

One of the most important factors to consider about the liver is that it generally operates at only a fraction of its full capacity. Because of this you can apply a great deal of additional stress to the liver and not notice any ill effects for a long time; this does not mean damage isn't occurring. The liver can also regenerate itself if damaged, as long as it isn't damaged too much; certain types of damage cannot be repaired (cirrhosis for example).

Unfortunately, liver damage won't always show up on bloodwork. Most liver enzymes produced by liver damage clear the body relatively quickly so damage can be missed, and some liver tumors don't increase liver enzymes. Because of this, imaging of the liver is necessary.

## LIVER FUNCTION BLOOD TESTS

The liver can be stressed by various supplements, consuming large amounts of food, and even dieting. It is important that the bodybuilder have his liver functions tested several times per year as part of regular bloodwork. There are a broad range of liver functions, and full interpretation of liver

function tests is best left to your doctor. We will go over the basic liver functions tests and what they mean.

- Basic Liver Enzymes – AST and ALT are found in liver cells, that when damaged, leak into the blood and can be measured. These can often be elevated from strenuous exercise alone.
- Albumin – This protein is manufactured by the liver and low levels can indicate damage to the liver.
- Alkaline Phosphatase and GGT – These two liver enzymes are common on most liver panels (you may have to request GGT) and are important for identifying bile duct issues and gallstones. GGT is one of the best tests for early detection of liver damage.
- Bilirubin – This protein is metabolized by the liver, elevated levels can indicate many issues, including liver disease.

## **INTERPRETING YOUR RESULTS**

While it is important that your doctor interpret your results with you, here are some general guidelines. Normal ranges will vary slightly depending on the testing method used by your lab.

## AST and ALT

For these values to be even remotely accurate, you must avoid strenuous exercise for at least 3 days before the test. AST is abundant in muscle tissue, and damage to muscle tissue (as in resistance exercise) will elevate serum levels greatly. Luckily, AST clears the body fairly quickly, with a half-life of approximately one day. ALT is also elevated from strenuous exercise, but less so than AST. ALT has a longer half-life in the body, approximately two days.

Besides exercise related elevations, these enzymes are easily elevated by many things that stress the liver, including OTC medications like acetaminophen and ibuprofen, alcohol, and a host of prescription medications. Short term elevations (acute) are considered fairly normal, as long as they aren't more than twice the upper limit of the normal range. Long term elevations (chronic) are a risk factor for cirrhosis (scar tissue) of the liver, which the body cannot repair. It is important to note that liver disease is not always indicated by elevations of these enzymes.

## Alkaline Phosphatase and GGT

Elevations of either of these enzymes should be considered a risk factor for bile duct obstructions, which can lead to cirrhosis of the liver. Alkaline phosphatase elevations are relatively common and often benign, however GGT elevations are a good indicator of bile duct issues. GGT may be the most important liver enzyme for the bodybuilder to have tested, make sure it is included in your bloodwork.

## Albumin and Bilirubin

Low levels of albumin, or high levels of bilirubin, are an indicator of liver disease. It is important to consult your doctor about abnormal levels of these proteins.

## **LIVER IMAGING**

Bodybuilders, specifically, are at risk for hepatic adenomas. These are blood filled tumors in the liver that can burst and cause serious internal bleeding. Because these benign tumors often show no indications on bloodwork, it is important to have your liver imaged. Ultrasound is the most practical route for liver imaging, although it is also possible to use a MSCT scanner – as discussed in the *Heart Scan* section. Talk to your doctor about having a liver ultrasound performed. If you have a MSCT Heart Scan procedure, also consider having them scan your liver at the same time. Most MSCT Heart Scan providers offer this service.

Most bodybuilders should probably have their liver imaged once every 5 years. In the case of bodybuilders who compete frequently (once a year or more), having the liver imaged once every 3 years may be more appropriate. For high level bodybuilders competing frequently, imaging is recommended annually.

## PROTECTING THE LIVER

Besides testing for abnormalities, minimizing stress to the liver is the best way to protect it. Anything that the liver must metabolize will cause stress to some extent, this includes any foreign substance that enters the body, such as alcohol, prescription and non-prescription medications (ibuprofen and acetaminophen especially), food additives, artificial sweeteners, environmental chemicals, and much more. In fact, even things known as “liver detoxifiers” are often just one more things the liver must metabolize. Because the liver has the ability to repair itself, the best thing you can do to protect it is to *remove all stress* and let it repair. Your goal should be to minimize everything possible that places stress on the liver. If you do need to take something that stresses the liver (such as ibuprofen for an injury), it is best to use it for as short of a duration as possible. The liver will always be under some degree of stress, you will not be able to eliminate all of it, but your goal should be to minimize this stress whenever possible.

## LIVER HEALTH SUMMARY

- Have bloodwork done at least once per year, preferably twice per year, and up to four times per year if necessary.
- Have your liver imaged to screen for hepatic adenomas by ultrasound or MSCT scan every 1-5 years depending on how much stress your liver is under.
- Avoid long periods of using mildly liver toxic drugs like ibuprofen and acetaminophen.

# Kidney Health

The kidneys are the filters of the body, removing substances from the blood that are excreted in the urine. The kidneys filter over 50 gallons of blood every day. They also perform many other functions, such as fluid and electrolyte balance.

Like the liver, the kidneys generally function at only a fraction of their full capacity. Because of this, a great deal of damage can be done to them without any noticeable effects. Once the effects of kidney damage finally start to show symptoms, they are usually extremely damaged.

Although not as much so as the liver, the kidneys do have some ability to regenerate themselves if stress is removed. Monitoring kidney health is extremely important because this is one of the most common organs to fail in bodybuilders.

## WATER AND THE KIDNEYS

One of the main functions of the kidneys is to concentrate the urine and excrete wastes with minimal water loss. The more concentrated the urine must become, the harder the kidneys must work. This is why adequate hydration is crucial. If the body has excess water to excrete, the urine need not be as concentrated, and the kidneys have an easier job to do. Individual water requirements will vary greatly, and it should be noted that there is

evidence that extreme amounts of water can also be hard on the kidneys. However, a minimum of 1 gallon per day is advisable for most normal sized people. Another good rule of thumb is drinking one quart of water per 50g of protein consumed. Some people who live in very hot and/or dry climates may need significantly more, especially if they are perspiring heavily for long periods of time.

## **PROTEIN AND KIDNEYS**

One of the main functions of the kidneys is to excrete nitrogenous waste. This is a byproduct of protein metabolism. When protein is metabolized by the liver, nitrogen is produced in the form of ammonia. Ammonia is then metabolized by the liver into urea and then excreted by the kidneys as urine. This is a normal function for the kidneys, and studies have shown excess protein consumption does not damage healthy kidneys. However, because the bodybuilder is already placing extra stress on the kidneys, it is advisable to minimize the amount of nitrogenous waste the kidneys must deal with. This means not eating *too much* excess protein (some excess protein is fine), eating protein with carbohydrates (carbs are protein sparing), and avoiding large quantities of fast digesting protein consumed at one time (fast digesting protein is more likely to be metabolized into glucose). Protein that is utilized by the body for building and repair does not produce nitrogenous waste, protein that is metabolized for energy does.

## **MYOGLOBIN AND THE KIDNEYS**

Myoglobin is a protein found inside muscle cells but not generally found in the blood. When muscle cells are damaged, myoglobin is released into the blood and must be processed by the kidneys. Too much myoglobin can clog up the kidneys and cause acute kidney failure; this is sometimes seen in extremely overtrained athletes and is generally reversible. Adequate hydration during and after workouts will help the kidneys process myoglobin.

It should also be noted that myoglobin can cause a false positive for protein in the urine when tested by dipstick. If your doctor finds protein in your urine on a dipstick test, it is important that further testing be done to ensure it isn't just myoglobin. Avoiding hard training for one to two days before testing for protein in the urine can prevent this.

## **TESTING THE KIDNEYS**

Testing kidney function for the bodybuilder requires special consideration. Several testing methods are inaccurate due to the effects of weight training and increased muscle mass. Determining what level the kidneys are function at can be difficult with bloodwork alone.

## Glomerular Filtration Rate

This is the rate of filtration through the kidneys and is one of the best indicators of kidney function. Because Glomerular Filtration Rate (GFR) can be difficult to measure, another value called *estimated* Glomerular Filtration Rate (eGFR) is often used. On a standard blood panel, you will only see eGFR. Bodybuilders will usually show a low eGFR even though their actual GFR may be perfectly normal. This is explained below.

## Creatinine

Creatinine is a byproduct of creatine phosphate and is produced through muscle metabolism. Creatinine is released into the bloodstream and filtered out into the urine by the kidneys. In medicine it is assumed that most people make a fairly constant amount of creatinine. Thus, by testing blood levels of creatinine, an estimate of how well the kidneys are filtering out creatinine can be determined; this is how eGFR is derived. As explained above, it is important to note that this value is estimated, and doesn't represent your actual GFR. Bodybuilders produce a lot more creatinine than the average person due to intense workouts and higher levels of muscle mass. In order to test your *actual* GFR, the amount of creatinine in both your blood *and urine* must be determined. This is called a 24-hour Creatinine Clearance Test and it will generate your actual GFR value.

## Blood Urea Nitrogen

Blood Urea Nitrogen (BUN) is a measure of protein metabolites that must be filtered by the kidneys. Elevated BUN levels can mean several things, including a lack of proper hydration and/or excess protein consumption. Assuming healthy kidney function and proper hydration, elevated BUN is a good indicator that you are metabolizing too much protein. Protein used for protein synthesis does not elevate BUN, but protein broken down for energy does.

## **KIDNEY HEALTH SUMMARY**

- Always stay hydrated and drink an appropriate amount of water for your size, diet, and activities.
- Avoid metabolizing large amounts of protein into energy.
- Drink extra water during and after exercise to help the kidneys clear myoglobin.
- Avoid extreme overtraining.
- Have your doctor order a 24-hour Creatinine Clearance Test to find your *real* GFR. Bodybuilders will always show incorrect eGFR.
- Slightly elevated BUN in a well hydrated bodybuilder usually indicates too much protein consumption.

# Adrenal Health

The adrenal gland is part of the endocrine system that produces several important hormones. For our purposes, we will focus primarily on its production of cortisol. Cortisol is an important hormone that has both positive and negative effects. Cortisol stimulates the liver to break down protein (gluconeogenesis), it decreases muscle protein synthesis, it increases muscle breakdown, and it directly reduces the production of testosterone. Finally, it even suppresses the immune system and raises blood pressure. All these things sound terrible to the bodybuilder, however cortisol is also extremely important when needed. Cortisol increases blood sugar when levels are low, it provides vital anti-inflammatory action when needed, and it reduces stress. Cortisol is unavoidable and necessary, while chronic overproduction does have a negative effect, cortisol levels are also easily minimized. The fewer factors you have increasing cortisol, the better.

## STRESS

Stress is one of the main factors that stimulates the release of cortisol. Maintaining a minimal stress environment is crucial to minimizing cortisol secretion. Chronic stress has the potential to not only cause serious physiological changes from continually elevated cortisol levels, but also deplete the adrenal gland's ability to produce cortisol. While too much

cortisol is bad, not being able to produce enough when needed may be worse.

The bodybuilder is putting extreme stress on his or her body and this requires large amounts of cortisol in response. This stress is unavoidable as it is part of training; this makes it critical that during recovery periods (i.e. when not training) stress be kept to a minimum.

Both physical and emotional stress cause cortisol release. Physical stress includes workouts, hunger, injuries, and even dehydration. Hunger includes things like dieting, fasting, and anything that lowers blood sugar. Any kind of emotional stress, and anything that negatively affects your emotional state, will also increase cortisol.

## OVERTRAINING

Overtraining is one of the most controversial topics in bodybuilding. While there is no doubt that overtraining does exist, the line between overtraining and *undertraining* will always be the source of much debate; it will also always be both individual, and variable within that individual. Even under ideal circumstances, the bodybuilder will probably be mildly overtraining at times.

The negative effects of overtraining include increased cortisol release, which can put the body in a constant state of muscle breakdown (muscle catabolism). Chronically elevated cortisol can also lead to anxiety, sleeplessness, lack of appetite, weight loss (or lack of weight gain),

suppressed immune function, and decreased collagen synthesis – increasing the chance of injury.

Overtraining can be one of the hardest things to detect, but the signs of elevated cortisol are one of the best markers, especially sleeplessness and loss of appetite. Trial and error – with training volume, intensity, and frequency taken into account – is the way to define your training limits. But this also assumes other factors that minimize cortisol are present, such as proper nutrition, proper rest, and a generally low stress lifestyle outside of the gym.

Sometimes training and/or competition will demand periods of overtraining. These should be followed by extremely low stress periods, both in your training and your life, to allow adrenal recovery.

## **ADRENAL HEALTH SUMMARY**

- Avoid stress outside of your training program.
- When you do have increased emotional or physical stress, try to create stress free periods to allow recovery.
- Minimize overtraining and/or keep periods of overtraining short if needed.
- Periods of overtraining should be followed by minimal stress recovery periods.

# Thyroid Health

The thyroid gland's main function is to produce the hormone thyroid in response to signaling from the pituitary. Thyroid is the hormone that regulates metabolism. Thyroid hormone is produced by the thyroid gland in two main forms, referred to as  $T_3$  and  $T_4$  where  $T_3$  is the main, most active, form of thyroid and  $T_4$  is a much less active form that is converted into  $T_3$  by other organs. Thyroid production is stimulated and regulated by Thyroid Stimulating Hormone (TSH) produced by the pituitary.

Although not officially accepted by the medical community, most bodybuilders and trainers agree it is possible to increase or decrease thyroid production, and thus alter your Basal Metabolic Rate (BMR), through diet. Evidence of this effect can easily be seen in thyroid levels reflected on bloodwork. Long periods of dieting will slowly decrease thyroid production, and lower your BMR. And long periods of eating high calories and frequent meals will increase your thyroid production and result in a high BMR.

## [Interpreting Your Thyroid Panel](#)

Basic bloodwork for your thyroid functions will include TSH,  $T_3$  and  $T_4$ . Normal ranges will vary somewhat by laboratory, but you will notice a large variation within the normal range. In otherwise healthy individuals,  $T_3$  levels towards the high end of the normal range usually indicates a higher metabolism, while  $T_3$  levels in the lower end of the normal range usually indicates a slower metabolism.

Most bodybuilders who perform regular bloodwork will notice a high  $T_3$  level from frequent meals and an excess of calories, and a lower  $T_3$  level from calorie restriction.  $T_4$  will also fluctuate in the same way, however less so than  $T_3$  levels. TSH levels should be relatively low (within the normal range) when  $T_3$  levels are high normal (high end of normal range). High TSH levels combined with low  $T_3$  and/or  $T_4$  levels is usually a sign of hypothyroidism, although it can be a temporary condition after having a suppressed metabolism (dieting/competition). There are other important thyroid tests that your doctor will order if there are any real problems found with your thyroid function. Thyroid testing for bodybuilders is limited to monitoring metabolism levels and checking for metabolic damage from dieting.

## **THYROID HEALTH SUMMARY**

- Bodybuilders will have varying thyroid levels in different stages of training. Testing thyroid levels to ensure proper recovery is important.
- Most people will have TSH in the mid to low range and  $T_3$  in the mid to high range when their metabolism is fully recovered from dieting.
- Low  $T_4$  and high TSH means the thyroid gland is still trying to recover.
- Consult your doctor for values outside the normal ranges.

# Dietary and Digestive Health

Dietary and digestive health is an important topic for bodybuilders due to the unusually large amount of food they consume. Large amounts of muscle mass and frequent bouts of exercise make for a high metabolism, this requires a high caloric intake. This diet will contain a higher than average total amount of protein, carbohydrate, and fat. The impact of high levels of these macronutrients – and how to eat large amounts of these macronutrients while minimizing the negative effects – will be discussed.

- Protein digestion rate and biological value.
- Carbohydrate glycemic index and fiber content.
- Varying types of fats and their effect on digestion.

## PROTEIN

Proteins are made of amino acids; there are twenty amino acids necessary for protein building. For adults, nine of these amino acids are categorized as “essential amino acids,” because they cannot be manufactured by the body and must come from dietary sources. Non-essential amino acids can be manufactured in the body from essential amino acids.

Protein digestion and absorption impacts health and performance in two major ways. First, protein is generally more difficult for the body to

absorb and digest than most carbohydrates or fats. Second, excess protein not utilized for building and repair is metabolized into energy (gluconeogenesis).

There many myths out there about protein absorption, and very few studies to prove otherwise. To compound this problem, the studies that do take place don't account for people who regularly eat large quantities of a protein, and thus absorb them better. Bodybuilders who eat the same proteins almost daily tend to digest them very efficiently. Here are some general guidelines to protein consumption:

- In most cases, faster digesting protein is more *likely* to be metabolized into energy than slower digesting protein.
- Protein eaten without carbohydrate is more likely to be at least partially metabolized into energy; this is why carbohydrates are called protein sparing.
- Protein slows the digestion of carbohydrates, and blunts the insulin response to carbohydrates. Fat also slow digestion of carbohydrate, but less so than protein.
- For optimal health and performance, the bodybuilder tries to walk a line of always consuming slightly more protein than needed (known as a positive nitrogen balance), but not so much excess that the kidneys are under unnecessary additional stress.
- Eating more protein than you need means you must restrict calories from carbohydrates and fats; this can lead to a negative impact on performance due to insufficient amounts of these other important macronutrients.

## Rating Protein Quality

The ratio of essential amino acids in a protein source determines its Amino Acid Profile. The optimal amino acid profile for adult humans has been determined by the Institute of Medicine's Food and Nutrition Board. This "optimal profile" does not necessarily apply to athletes breaking down and building up large amounts of muscle mass, however it still applies as a general guideline.

By comparing a food(s) to this profile, one can determine its Amino Acid Score. Because some proteins are not digested completely, a rating method called the Protein Digestibility Corrected Amino Acid Score (PDCAAS) is used to rate all proteins accordingly. There are also other methods of rating protein sources, primarily Protein Efficiency Ratio (PER), and Biological Value (BV). PDCAAS is the current standard used by the Food and Drug Administration (FDA) and the World Health Organization (WHO) and is regarded as the most accurate.

Sufficient quantity of any protein containing all 9 essential amino acids will satisfy protein requirements. However if amino acid ratios are not optimal for individual needs, excess protein must be consumed in order to meet minimum biological requirements for each essential amino acid. This means metabolism of excess amino acids, putting additional stress on the kidneys.

## CARBOHYDRATES

Carbohydrates are saccharide molecules that are metabolized by the body into glycogen and then used for energy or stored. Monosaccharides and disaccharides are classified as “simple sugars,” which includes glucose, sucrose, fructose, maltose, lactose, and many others. Polysaccharides are longer chains of saccharide molecules classified as “complex carbohydrates,” these include starchy and fibrous carbohydrates found in most whole foods.

Carbohydrates can have a huge impact on health and performance; eating too much or too little will negatively impact performance, as will the wrong kinds of carbohydrates consumed at the wrong times. Carbohydrates are the preferred source of energy for anaerobic metabolism. Depleted carbohydrate stores (glycogen) will lead to decreased performance. Excess carbohydrate consumption, beyond what is needed for energy and glycogen storage, will be stored as fat.

Carbohydrate is more likely to be stored as glycogen or used for energy if it digests slowly. Fast digesting carbohydrate is more likely to be stored as fat unless glycogen levels are low or the body is actively burning them off. As discussed in the protein section, carbohydrate consumed in combination with protein and/or fat will slow digestion and decrease insulin response.

### [Insulin Resistance](#)

Insulin Resistance is a condition where cells become desensitized to insulin. This is generally from a diet that is too high in fast digesting

carbohydrates, resulting in an overproduction of insulin; cells exposed to excess amounts of insulin eventually become resistant. Insulin is necessary for shuttling both glycogen (in the form of glucose) and amino acids into cells, and because of this, it is very anabolic. The bodybuilder should always try to maximize insulin sensitivity by minimizing any insulin resistance. Utilizing slow digesting carbohydrates that minimize insulin response and combining these carbohydrates with protein and fat to further blunt insulin response is the ideal way to minimize insulin resistance. Both aerobic and anaerobic exercise will help reduce insulin resistance as well.

### Glycemic Index

Glycemic Index (GI) is a measure of how quickly ingested carbohydrates enter the bloodstream as glucose, or simply how quickly they digest. The scale is based on pure glucose having a score of 100 and fructose having a score of 20. It is important to note that any carbohydrate consumed with a protein and/or fat will have a lower glycemic index. Also, any food that *already* contains protein and/or fat will reflect a lower glycemic index score than would the isolated carbohydrate in that food. Some foods look better “on paper” than they actually are because they already contain protein and fat, while a pure carbohydrate with a similar GI would be much lower if a protein and/or fat were added. Generally, a carbohydrate with a lower GI will cause a lower insulin response.

While there are times when high GI carbohydrates are harmless (such as when glycogen stores are depleted), eating moderate to low GI carbohydrates will generally lead to increased health and performance.

## FATS

Fats are glycerol molecules with three long hydrocarbon chains connected at one end, thus the name triglyceride. If these hydrocarbon chains are all straight, the fat is considered to be saturated. If the hydrocarbon chains are bent (due to a missing hydrogen), then the fat is considered to be unsaturated. If the hydrocarbon chains have many bends in them, the fat is considered to be polyunsaturated. Saturated fats are usually found in meats and animal food sources; unsaturated and polyunsaturated fats are usually found in plant sources.

### Hydrogenated Fats and Trans Fats

Triglycerides with bent hydrocarbon chains (polyunsaturated) don't pack together as tightly as do triglycerides with straight chains. This is why polyunsaturated fats are usually liquid at room temperature, whereas saturated fats are usually solid at room temperature. The food industry will often put unsaturated and poly unsaturated fats through a process called hydrogenation, giving them characteristics of a saturated fat. This process creates a small amount of trans-isomer fatty acid (Trans Fat). Trans fat has an "incorrect" double carbon bond in one or more of the hydrocarbon chains.

While there is some controversy regarding the degree of impact trans fats have on health, enormous amounts of research shows they do have negative effects. Anyone concerned with health should avoid trans fats as much as possible. Any time you see the term "hydrogenated oil" on an ingredient list, it means trans fats have been created, and that product should be avoided.

## Healthy Fats

Healthy fats are an important macronutrient. Oftentimes an incorrect assumption that dietary fat will turn into body fat leads people to avoid healthy fats. Although fat is calorie dense, it is not more likely to be stored as body fat than any other macronutrient, perhaps even the opposite, as fat doesn't cause insulin levels to spike. As discussed in the Cardiovascular Health chapter, essential fatty acids are extremely important to eicosanoid production and overall health. Most healthy fats are high in essential fatty acids, this includes the fat found in fish, vegetables, and nuts.

In most cases, even when dieting, the bodybuilder should try to maintain a minimum fat intake of at least 20% of his or her total daily calories.

## Lowfat Foods

Lowfat and nonfat foods are a multi-billion dollar industry that has evolved rapidly in the past few decades. In some cases, it is a good idea to reduce the fat level in very high fat foods. But in other cases, where the food item doesn't have much fat to begin with, needlessly reducing the fat level further negatively impacts the macronutrient profile of that food. This often means reduced protein content and increased sugar content. Don't assume lowfat or nonfat is always better, read labels and compare. Having a little less fat isn't always worth having less protein and/or more sugar.

## **DIETARY AND DIGESTIVE HEALTH SUMMAMRY**

- Higher quality protein sources mean you don't have to consume as much total protein.
- Eat low glycemic index carbohydrates when possible to minimize insulin resistance.
- Mix protein, carbohydrate, and fats in every meal for optimal digestion.
- Avoid trans fats.
- Eat a moderate amount of healthy fats.

# Orthopedic Health

An in depth look at this comprehensive topic is beyond the scope of this book, but there are a few basic issues specific to otherwise healthy bodybuilders we will cover. These are – tendon health, joint balance, and flexibility. The bodybuilder who prevents injury by addressing tendon injury and joint balance properly is going to miss fewer training sessions and be able to lifter harder and more frequently.

## TENDINOPATHY

Tendinopathy is a common problem for bodybuilders and all resistance training athletes. Tendinopathy – meaning disease of the tendon – is a term that generally refers to the conditions **Tendinosis** and **Tendinitis**. These two seemingly similar but totally different conditions are found in combination in most weight training related tendon issues.

### Tendinitis

Tendinitis is inflammation of the tendon itself. This causes irritation as the tendon moves, further aggravating the condition. Ice and anti-inflammatory therapy are excellent for treating tendinitis. Resting the area will be required if the tendon is suffering from primarily tendinitis.

Tendinitis is usually caused by repetitive tasks, not heavy weight training, and it is not the most common type of tendinopathy in bodybuilders. If untreated over time, **tendinitis** can *cause* **tendinosis** to develop. This is further discussed below.

### [Tendinosis](#)

Tendinosis is the more common form of tendinopathy found in bodybuilders. This happens when the tendon is being damaged repeatedly before it can fully recover. As the body repairs the tendon (by laying down collagen fibers) too much of the tendon becomes newly repaired – and immature – collagen fiber. This immature (Type III) collagen will mature over time to healthy Type I collagen if it is properly stimulated. Weight training, especially slow, controlled, eccentric contractions are the best way to treat tendinosis; as long as the tendon isn't injured further by the exercise. The important factor to note about **tendinosis** is, tendons made up of type III fibers have less elasticity and are more prone to developing **tendinitis**. This means a sore tendon that may initially just have been tendinosis can develop into a case of both **tendinosis** and **tendinitis** very easily.

### [Treating the Combination](#)

Most tendinopathy in bodybuilders will be a combination of both tendinitis and tendinosis. The key is to treat one without aggravating the other. While anti-inflammatory methods and rest work well with tendinitis; tendinosis requires some stimulation to accelerate healing. Trial, error, and experience are instrumental in determining tendinitis verses tendinosis and

treating accordingly. *The key is to work the tendon without causing, or aggravating, existing tendinitis.* Severe cases that do not improve should involve professional assistance from a physical therapist.

When tendinopathy is resolved, the cause must be addressed, or it will return. Sometimes, the cause may be overworking the area, not allowing for enough rest, or simply straining the tendon. Tendon problems often originate from joint imbalance, discussed in the next section. Remember, a sore tendon probably has some degree of both tendinitis and tendinosis; treat it, don't ignore it. Tendinopathy weakens the tendon and can lead to further injury.

## **JOINT BALANCE**

Bodybuilders develop excellent joint balance as an added benefit of creating muscular symmetry, but most still have to work hard to correct minor imbalances. Every tendon requires a balanced direction of pull, and every joint requires balanced opposing musculature. Uneven pull on the tendon and uneven forces at the joint can damage tendons and cartilage. Most injuries in the gym can be traced back to a muscular imbalance as a contributing factor.

### [Antagonistic Muscles](#)

Muscles on opposing sides of the joint must both be equally developed. These are called antagonistic muscles; when one contracts, the

other must relax. For example, the hamstrings and the quadriceps or the biceps and the triceps. Also, muscles that share similar functions at the same joint must be in balance, such as the biceps and the brachialis. Pay attention to balanced muscular development on both sides of the joint; if one muscle acting on the joint is underdeveloped or falling behind, focus on that muscle until it becomes a strong part of the joint.

### Multi-Headed Muscles

Many muscles have more than two attachment points along with multiple heads. These muscles must be evenly developed in order to pull on the same tendon correctly. For example, the lateral (outer) and medial (inner) head of the quadriceps muscle must be evenly developed because they both share the same tendon at the knee, even though they attach at different points on the femur.

Working a muscle through a full range of motion with a relatively even strength curve throughout the range of motion is usually the best way to work all parts of a multi-headed muscle.

## **FLEXIBILITY**

Most bodybuilders have excellent flexibility simply from performing full range of motion exercise and always working opposing muscles –both of which promote flexibility. However, tight muscles do develop, especially during periods of rapid growth. A lack of flexibility in one muscle can

indirectly increase the chance of injury in other muscles that do not lack flexibility. When one area is tight, excess stress is transferred to a more flexible area. An example is tight hamstrings, which usually result in an overly flexible lower back that is prone to injury. It is not necessary to possess extreme flexibility, but rather balanced flexibility throughout the body.

Some exercises require a degree of flexibility to perform properly. Trying to perform these exercises without proper flexibility requires modification to the proper mechanics of the movement, greatly increasing the chance of injury. An example would be squats, where overly tight hips or hamstrings will prevent you from maintaining proper lumbar position.

The bodybuilder should improve flexibility in any overly tight muscles using range of motion exercise, dynamic stretching, and static stretching. Improving overly tight areas and keeping everything evenly flexible should be a part of your workout routine.

## **ORTHOPEDIC HEALTH SUMMARY**

- Address any form of tendinopathy immediately with the appropriate therapy.
- Maintain muscular balance and even development of every joint and muscle.
- Maintain a uniform level of flexibility; also make sure your flexibility level is sufficient for all exercises performed.

# The Healthy Bodybuilder Summary

Bodybuilding is not only one of the most extreme sports, it is also a very unique sport. There are aspects of bodybuilding that are intrinsically healthy and there are aspects that involve risk. Exercise will always promote health, and the diet of the bodybuilder is typically healthier than the average person by a wide margin. But attempting to carry abnormal amounts of muscle mass and pushing the body to unnaturally low body fat levels for competition involves risk. Between these positives and negatives, the bodybuilder has a great deal of control over exactly how healthy, or unhealthy, he or she will be.

Success in the extreme sport of bodybuilding does not involve extreme measures, it involves attention to detail and precise micromanagement of many factors. Health is one of these factors – perhaps the most important. History shows us that most bodybuilders of the past, especially the most successful ones, were unusually healthy and lived long lives.

There is another side to bodybuilding that is common among today's amateurs and those that dabble in the sport; a reckless and careless side that has a disregard for health and a “win at all costs” attitude. Ironically, this attitude ultimately backfires on these bodybuilders as they find that health and longevity are *required* to be successful in the sport.

The tools to be healthy and successful in bodybuilding are at your fingertips. Use these tools as a stepping stone to reach even higher levels of

knowledge about your body. This book is not meant to be a complete manual on how to be perfectly healthy, it is a highlight of specific *additional* factors the bodybuilder must be aware of in the pursuit of health.

Bodybuilding can be the fountain of youth for those willing to pay a great deal of attention to health. And even if you are not looking for longevity, health is still the best tool for maximal performance. The authors of this book challenge you to be – The Healthy Bodybuilder.