Eat Clean, Lean and Green!

By Dr. Jose Antonio, PhD & Sonja Friend-Uhl ACE Health Coach

1. **Eat Clean –** limit your intake of processed foods (i.e. if it is in a package, it's processed).
2. **Eat Lean –** choose protein sources that are lean (the exception is fish; eat lots of fatty fish…if you are not a vegetarian).
3. **Eat Green –** eat as much fresh fruits and vegetables as you can!

Foods You Should Eat Most of the Time (2 out of 3 meals should be 'clean')

Protein	Carbohydrate	Fat
Wild Caught Fish Local Farm Eggs (mostly egg whites; but 3-4 whole eggs/week is fine) Skinless Organic Local Farm Chicken Breast Canned Tuna (Wild Caught) Milk Protein (Whey protein, Casein protein; seen mainly in protein powders and ready-to-drink protein shakes) Almond, Cashew or Coconut Milk Lean Cuts of Grass Fed (Local Farm) Beef Rice, Hemp, or Isolated Soy Protein (in protein powders or drinks)	Fresh Vegetables and Fruits of All Varieties Dry Beans (Soaked first is best!) Steel Cut Oatmeal Brown Rice *Whole Grain Pasta *Whole Grain Bread Veggie or Rice Flour Pasta Quinoa Millet Amaranth Lentils Yams, Sweet Potatoes High Fiber Fruits *IF No Gluten Sensitivity Issues	Fat from cold water fish Olives and olive oil Almonds, Walnuts, Almond butter Flax Seed & Flax Seed Oil DHA/EPA supplements CLA Avocado Coconut Oil

Foods You Should Limit Most of the Time

Protein	Carbohydrate	Fat
Fatty meats Processed meats (Hot Dogs, lunch meats) Sulfates Whole milk & Whole Milk Products	White bread White Pasta White rice Most Cereals Fruit juice Bagels Sodas Pastries Cookies Cakes Candy Crackers	Butter Margarine Fat from cold cuts, fatty meats Fats from fried foods Hydrogenated oils or trans fats (seen in lots of packaged goods) Whole Ice cream

	Any drink that contains calories Anything with lots of sugar Anything in a package!	

Turn yourself into a professional eater

You're thinking we've lost our minds. A professional eater? Really, it's just an analogy. If you're on a full ride (e.g., track scholarship) during your collegiate career, you basically need to treat your body as your meal ticket. Train like it's your job. And at the same time, eating (or how you fuel your body) is part of that job. Just as you wouldn't fuel up a race car with cheap gas, why would you fuel up your own body with junk food? Treat your body like it's a race car. Give it the best fuel. Hence, treat eating like it is part of your job. Don't skip your meals, especially breakfast. Eat 5-6 small meals per day. Eat small meals, eat frequent meals. Grazing is better than gorging. Eat lean protein sources. Eat healthy fats. Eat unprocessed carbohydrates. Eat like it's your job!

The cheat day or cheat meal

Aha! This will be your favorite day. Pizza, cheesecake, ice cream, and a bag of chips. Yes, eat these 'junk' foods and don't feel bad about it. It'll give you a break from the monotony of eating clean most of the time. There are two ways you can do this. Some people prefer to have cheat meals; others like to have entire cheat days!

Let's say you eat 5 times per day; that's 35 meals per week. If you had a cheat day on Saturday, that would be 5 cheat meals out of 35 meals for the entire week. Then you'll have to eat like a saint the rest of the week. Probably an easier method is to have one cheat meal every day or other day. It's spread out over the week and it might seem like you're getting more cheat meals in than someone who does this on one day only.

If you're the type of person who is a perfectionist, you might find it hard to have a cheat meal. You tell yourself, I've been eating so well, training smart, running fast, and my performance is constantly improving. Why should I cheat? Well the answer is, you don't have to cheat. Psychologically, cheating gives you a mental break from having to be 'perfect' all the time. And one cheat meal per week is *not* going to adversely affect your training or performance. Our advice: have a cheat meal every now and then. Maybe it's not once a week; maybe it's once per month. But do it. You'll be happier for it!

Parties and Holidays

You're about to go home for the Thanksgiving holiday and you know what your mom has in store for you; unlimited turkey, gravy, buttered rolls, pumpkin pie, desserts, and a veritable smorgasborg of food. Should you pig out and chalk it up as a cheat day or days? Rather than being a party-pooper or the one who always has to eat perfectly, enjoy the holidays. If you want a hefty serving of apple pie, go on ahead. Thanksgiving is only once a year. Besides, it's the most celebrated day of food gluttony. So celebrate. But, before the Thanksgiving holidays, make sure that your meals are as clean as a whistle. For instance, if you know that on Thanksgiving weekend, you'll be eating non-stop from dusk to dawn, then in the preceding two weeks, you should refrain from having a cheat day or meal. Eat clean for those two weeks knowing that there's a reward when you get home for the Thanksgiving break.

What about parties? Again, depending on what stage of training you are, you can always let yourself have some fun at a party; eat chips, soda, etc. But the days prior to that, just make sure you eat clean. So it's all a matter of balancing when you eat clean and when you cheat. I guess you could live the life of perfection and never cheat. You'll be the lone soul at the dinner table on Thanksgiving insisting that you eat skinless chicken breast with broccoli. And you know what, that's no fun. And besides, it's boring.

Nutrient Timing!

If there's one thing, just **one** dietary strategy that ALL runners should utilize, it's the following:

Consume a post-workout carbohydrate-protein containing beverage immediately after training or competition.

If you forget all the rules of clean eating, if you can't figure out why eating unprocessed carbohydrates is healthier for you than Twinkies, if you would rather die in a flaming plane crash than eat "healthy," then at the very least follow the above advice.

We'd suggest getting in at least 20 grams of protein, preferably the "fast absorbing" protein such as whey mixed with some healthy, nutrient-filled carbohydrate such as bananas, mangoes or your favorite fruit. Put it in a blender, mix it, and drink it as soon as you can after training.

Now some of you might say you're just not very hungry after training. And you'd much rather sit and relax, watch videos on *YouTube* or just chat with your friends on *Facebook*. Clearly, it's your choice. But you'll be missing out on a "window" of time in which your body just craves nutrients. If you miss out on this precious window, your recovery and subsequent performance will be affected negatively.

It's All About Timing

What you've just read is the new science of nutrient timing. Scientists have figured out that when you eat or drink is as important as what you put in your body. For instance, there's research which proves that taking a carbohydrate-protein supplement immediately after training increases lean body mass more than if you wait 2 hours after exercise. And that's even if you eat the same total calories throughout the day!

That's just a glimpse of nutrient timing science. There are strategies you can use before, during, and after training to maximize performance and recovery. Let's go through each of these. Believe us, this works!

Pre-Exercise Feeding

Taking a carbohydrate-containing supplement prior to exercise has been shown to improve performance. This is actually a strategy you could use prior to a long training run or before a cross-country race. Let's look at some of the science behind this.

A study from the Georgia Institute of Technology took 12 highly trained male distance runners and had them drink either water, a 6% or an 8% carbohydrate-electrolyte drink (1 liter) before and during exercise.(1) They had them do a 15 km run. They found that the runners who took either the 6% or 8% carbohydrate-electrolyte containing drink improved the final 1.6 km of the run! Thus, it seems that the effect of taking the beverage was towards the end of the run, when you tend to be the most fatigued.

Another study by one of the pre-eminent sports nutrition scientists, Dr. Rick Kreider, looked at carbohydrate use in U.S. National Field Hockey Team members.(2) Seven members of the team were given a carbohydrate drink containing 1 g/kg of carbohydrate four times per day while seven other team members ingested a placebo for seven days of intense training. They found that "carbohydrate-supplemented group had a greater total energy intake, carbohydrate intake, and change (pre vs. post) in time to maximal exhaustion following training while reporting less post-practice psychological fatigue."

The choice of sugar during exercise

Glucose, sucrose, and maltodextrin are good sources for during exercise feeding. Fatigue is often delayed by 30-60 minutes when you consume these sugars. Interestingly, fructose ingestion is to be avoided because it may cause gastrointestinal distress. Clearly, taking carbs prior to exercise could be of benefit. Right before a long training run or hard intervals on the track might be the best application of this strategy.

What should I take during a training run?

The answer? If you run longer than one hour, a sports drink is better than water. But a sports drink with protein is better than a 'regular' sports drink (that contains only carbs, electrolytes, and water).

In one study seven well-trained male cyclists exercised at either 45 or 75% VO_2 max while receiving a placebo, a 10% liquid carbohydrate supplement (3 x 18 g/hour), or a solid carbohydrate supplement (2 x 25 g/hour). (3)

They pedaled for 124 minutes and then did a second set for 190 minutes followed by a ride to exhaustion at 80% VO_2 max. The time to exhaustion for the liquid (233.4 min) and solid carbohydrate (223.9 min) trials did not differ; however, both carbohydrate-eating groups lasted longer than the placebo (202.4 min). So in this case, it may not matter what kind of carbohydrate (solid vs. liquid) you ingest, but it clearly is better than taking nothing.

Even though this study was in cyclists, the same principles apply to runners. However, newer research shows that having protein (even a little amount) added to that sports drink is even better! Athletes rode 29% to 40% longer when consuming the CHO+P (Carbohydrate + Protein) beverage (e.g. Accelerade) than the CHO beverage (e.g. Gatorade). The CHO+P group also had less muscle damage. The study's scientists concluded that "a carbohydrate beverage with additional protein calories produced significant improvements in time to fatigue and reductions in muscle damage in endurance athletes."(4)

You better take a post-workout carbohydrate-protein beverage!

This is one of the best pieces of dietary advice. We highly recommend it! Even if you have no appetite, you better get some nutrients in your stomach. Here's some evidence to back it up.

A study from the great state of Texas (University of North Texas) compared the consumption of a carb-protein beverage (Endurox R4; 53 g carbs, 14 g protein, 1.5 g fat, added vitamins, minerals, aminos) versus Gatorade (21 g carbs, zero protein or fat) immediately after exercise (2 hours of biking at a moderate intensity) and then again at 2 hours post-exercise.(5) The researchers found that 1) time to exhaustion was 55% greater in the carb-protein group, and 2) the amount of muscle glycogen that was stored was 128% greater. According to these researchers, "…recovery supplements should be consumed to optimize muscle glycogen synthesis as well as fluid replacement." Other studies have found similarly good results! For instance, a study by Roy et al. showed that "post-exercise supplementation improved time to exhaustion during a subsequent bout of endurance exercise."(6)

Recovery after exercise is one of the keys to a long and healthy running lifestyle. For those of you who are talented enough to make a living at it, it's absolutely critical that you optimize your recovery via the correct supplementation. If you're just a recreational runner, it's still important for helping you feel better.

In essence, these are the key points to consider for post-workout recovery.

1. Restore Fluids and Electrolytes – this is why it's best to consume a beverage rather than whole foods.
2. Replenish Muscle Glycogen – that's why you need carbs. And that means simple sugars or high-glycemic carbs! This is the one time you want to eat the high-glycemic stuff.
3. Repair Skeletal Muscle Fibers – that's why you need to consume protein and amino acids.

Bottom Line

Prior to running, consume a high-glycemic carb (any of the race gels will do) 5-10 minutes before the event. Make sure you experiment with this during training first. Don't try this at a race until you've seen how your body responds during practice (this applies to ALL nutritional suggestions). During exercise, it might help offset fatigue if you consume a sucrose, glucose, or maltodextrin containing drink (any of the sports drinks might help) whereas fructose is to be avoided; a sports drink with added protein is best during exercise. Right after training or competition, try to get in about 250 calories (carb-protein combo is best). This will translate into speedier recovery.

Nutrient Timing – Easy Checklist for Pre, During, and Post-Race Nutrition

Rule #1 – **NEVER TRY A NUTRITION OR SUPPLEMENT STRATEGY FOR A RACE IF YOU HAVE NOT YET TRIED IT DURING TRAINING.**

Pre-Race
3 or more hours prior to the race
Eat a low-glycemic, low-fat, low-protein, low-fiber meal.
Example 1: half a banana with a teaspoon of peanut butter
Example 2: ½ cup of oatmeal with blueberries on top and half-cup of milk

Example 3: 1 pancake made with oat bran, oatmeal, and egg whites. (use honey or stevia for sweetener if desired)

15 minutes or less prior to the race
Consume a high-glycemic carbohydrate, drink fluid or use a gel washed down with about 4 oz of water to quench thirst (don't overhydrate yourself)
Examples: Accelerade, Cytomax, Enduromax, Perpetuem, Accel Gel, Hammer Gel, GU

During the race
If it is less than 60 min in duration – water
If it is more than 60 min in duration – sports drink with protein (Enduromax, Perpetuem, Accelerade); 2nd best option is a standard sports drink such as Gatorade or Powerade

Post-race
Consume a post-workout carbohydrate-protein shake IMMEDIATELY AFTER THE RACE!!!
Examples: Recoverite (Hammer Nutrition), ARM (Max Muscle), Enduromax Recovery, Gatorade Recover, Whey Protein powder mixed with OJ, 16 oz of Chocolate Milk, etc.

Supplement Strategies

Level 1 – Beginner

- Take one multivitamin daily (e.g. Vitacell by Max Muscle, Mega by GNC, Centrum, One-a-Day, etc)
    - For women, take a multivitamin that contains iron
    - For women, take a calcium supplement (1000 mg/day) if you do not consume dairy foods regularly.
- Consume a post-workout protein-carbohydrate shake immediately after training or races
- Consume a sports drink during training (e.g. Enduromax, Accelerade, Gatorade, etc.)

Level 2 – Intermediate

- Take one multivitamin daily (e.g. Vitacell by Max Muscle, Mega by GNC, Centrum, One-a-Day, etc)
    - For women, take a multivitamin that contains iron
- Consume a post-workout protein-carbohydrate shake immediately after training or races (100-350 calories) Recoverite (Hammer Nutrition), ARM (Max Muscle), Enduromax Recovery, Gatorade Recover, Whey Protein powder mixed with OJ, 16 oz of Chocolate Milk, etc.
- Consume fish oil (2 grams daily); alternatively, eat fish 2-3 times per week
- Consume branched-chain amino acids (5-10 grams daily)
- Consume caffeine (5 mg per kg body weight) 30 min prior to training.

Level 3 – Advanced

- Take one multivitamin daily (e.g. Vitacell by Max Muscle, Mega by GNC, Centrum, One-a-Day, etc)
    - For women, take a multivitamin that contains iron
- Consume a post-workout protein-carbohydrate shake immediately after training or races (100-350 calories) Recoverite (Hammer Nutrition), ARM (Max Muscle), Enduromax Recovery, Gatorade Recover, Whey Protein powder mixed with OJ, 16 oz of Chocolate Milk, etc.
- Consume fish oil (2 grams daily)
- Consume branched-chain amino acids (note: leucine is especially important) (5-10 grams daily)
- Consume caffeine (5 mg per kg body weight) 30 min prior to training.
- Consume beta-alanine (3-6 grams daily; take in 3 to 4 divided doses [e.g. consume 800 mg, three to four times daily with food]).
- Consume glutamine post-workout (5-10 grams)
- Consume a pre-workout ‘cocktail’ of carbohydrate and protein or amino acids (e.g. mix 1 small teaspoon of whey protein with your favorite fruit juice and consume it 15 min pre-workout).

Why Low-Fat Diets Will Hurt Your Running

(parts of this were excerpts from 'Fast Track' by Suzy Favor-Hamilton and Jose Antonio, Ph.D.)

Low fat diets are sure-fire way to ruin your health, your looks, and your performance, period! Not eating fat, especially the healthy kinds called MUFAs and PUFAs, is a huge mistake. MUFAs and PUFAs are short for monounsaturated and polyunsaturated fats, respectively.

So what are these healthy fats that you need to eat? Nuts of all kinds (e.g., cashews, almonds, peanuts [though technically it's a legume not a nut]), fish fat (e.g., eat fatty fish such as salmon), and olive oil (e.g., use olive oil-based dressing).

If you eat these 3 foods which have the right fats, you'll be much healthier, and in the long-run (pun intended), you'll be a better athlete.

Why should you eat healthy fats?

- The "healthy fats" aren't stored as body fat as easily as the unhealthy fats such as the saturated variety.
- You can eat more fat, still have a six-pack, and have more energy.
- These fats are good for your heart!
- Fats are a good way to get needed calories when you're training heavily.
- Besides protein, fats are needed by your body! If you don't eat enough of the essential fats (linoleic and linolenic acid), you'll feel lethargic and unhealthy.

So if you're one of those who lives the "low-fat" lifestyle, STOP! Fat is not the enemy. Not enough fat will make your hair brittle, your skin dry, and your moods…well, moody! Fat is needed for energy, hormone production, cell membrane structure and function, and a host of other very valuable things. Let's go over the different kinds of fats so that you can figure out which fats to limit and which fats to consume. By the end of this, you'll be a fat expert!

Three Main Kinds of Fat

The 3 main types of fatty acids are saturated, monounsaturated (MUFAs), and polyunsaturated (PUFAs). A saturated fatty acid has the maximum possible number of hydrogen atoms bonded to every carbon atom. Hence, it is "saturated" or completely filled with hydrogen molecules. On the other hand, a fatty acid with one double bond is called "monounsaturated" because there are some "missing" hydrogens.. Fatty acids having more than one double bond between carbon molecules is polyunsaturated. (See Figure 1). All fat in foods have a combination of the three for the most part. What's different is the percentage contribution from each.

Figure 1: Chemical Structure of Fatty Acids

Saturated Fat (i.e., saturated fatty acid)	Unsaturated Fat (i.e., unsaturated fatty acid)
H H | | C - C | | H H	H H | | C - C | | H H
Carbon-Carbon Single Bond	**Carbon-Carbon Double Bond**

Fat Facts – The Bad

Trans and Saturated Fats

These two fats are a deadly duo. If you enjoy living, I'd suggest you limit your consumption of these fats. An easy way to figure out if a fat is saturated is this. Saturated fats are solid at room temperature. So that delicious morsel of fat from that pork chop is probably high in saturated fat. *Trans* fat (also known as *trans* fatty acids) are made when food manufacturers turn liquid oils into solid fats. However, a small amount of *trans* fat occurs naturally in animal-based foods. Just like saturated fats, trans fats are not your best friend.(7) They can elevate the 'bad' cholesterol (LDL) and thus increase your risk of heart disease. Next time, read a food label. If it says "partially hydrogenated" or "hydrogenated" then there's trans fats in it. You'll find trans fats in foods such as margarines, cookies, snacks, fried foods and even peanut butter. (See Table below).

<u>Foods that Contain Bad Fats</u>

Butter
Margarine (especially the harder varieties)
Crackers
Cookies
Snack Foods
Baked Goods
Anything Made with "Partially Hydrogenated Vegetable Oil"
Certain Cuts of Beef (e.g. hamburgers)
Pork
Chicken Skin
Whole Milk
Whole Cheese

Does this mean that you should eliminate these foods completely from your diet? No. First of all, it's just not practical. And secondly, certain foods such as dairy and meat contain naturally occurring trans fats. For instance, beef is a great source of zinc, iron, and protein. Thus, eliminating beef from your diet isn't the best option; instead, consume beef once or twice a week (rather than every day). And then focus on the leaner protein sources (e.g., skinless chicken) or the healthy proteins with fat (e.g., salmon) most of the time.

Fat Facts – The Good

The MUFAs and PUFAs

Researchers have known for many years that high fat intake, at least in the form of olive oil, does not have any apparent negative health effects. Furthermore, we know that monounsaturated fats are less likely to be stored as fat. So keeping that svelte physique is not a problem if you eat the good fats. For instance, in an eight week study done on mice, scientists found that *non-exercising* mice fed the beef fat gained more fat than those fed a monounsaturated fat.(8) So what's good for your pet mouse must be good for us, correct? Well in this case, yes.

MUFAs are healthy fats found in nuts, avocadoes, and oils. Olive and canola oil are greater sources of MUFAs. According to Chris Lydon, M.D., author of Look Hot, Live Long, she states that "unsaturated fats can help reduce circulating triglycercides and decrease your risk of cardiovascular disease, stroke, obesity, and diabetes!" For example, a 30-week study in which subjects consumed lots of peanuts, which is high in MUFAs, lowered serum or blood levels of fat (specifically triglycerides) and reduced cardiovascular disease risk.(9)

Table - A Brief List of Some Darn Good Fats!

Food	% PUFA	% MUFA	% Saturated
Salmon	45	38	17
Herring	27	47	26
Walnuts	56	28	16
Cashews	6	70	18
Macadamia nuts	10	71	12
Almonds	17	78	5
Peanuts	29	47	18
Canola oil	37	54	7
Olive oil	8	75	16
Avocado	10	70	20

PUFAs represent quite a varied number of fats. Most Americans get plenty of linoleic acid (an omega-6 PUFA) but usually not enough of linolenic acid (an omega-3 PUFA). Linoleic acid is found in corn, cottonseed, and soybean oils whereas linolenic acid is found in high concentrations in walnuts and flax, along with some in soybean oil. Thus, some PUFAs are more beneficial than others. And then there are the omega-3 fats found in fish oil or fat (e.g.,

eicosapentanoic acid or EPA, docosahexanoic acid or DHA). These fats are great for you; yet, most of you would rather stick a nail in your thumb then eat fish. Most of us tend to eat too much of the omega 6 fats found in vegetable oils at the expense of not enough omega 3s. You should eat a 1:4 ratio of omega 3s to 6s. Yet most of you probably eat closer to a 1:20 ratio; meaning you consume 20 times more omega 6s than 3s. So if in doubt about the kinds of fat to eat of the PUFA variety, do the following: eat fish. And if you don't like fish, add some flax oil to your protein powder and get your good fats that way. Fish is such a great source of fat (and protein) that it deserves special mention.

Somethin' Fishy Here…

Fish is one of the best foods you can eat, period! The protein is great and the fat has tremendous health benefits. The omega 3 fats found in certain fish (for example salmon) are something that no athlete should be without. Why are these so important? It's these tongue-twisters: eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Greenland Eskimos who eat lots of fish, more fish than a starving shark, have a lower incidence of heart disease, arthritis, and psoriasis. Many have attributed this to the large quantities of fish fat they consume. The beneficial effects of fish fat are numerous; however, with regards to muscle, fish fat's anti-inflammatory role may be of benefit to injured muscle. Why is this good? Inflammation is a normal and necessary component of skeletal muscle adaptation to intense exercise. Take some fish fat, or better yet, eat lots of fish, and perhaps you'll speed up your post-exercise recovery process. The best sources of EPA and DHA are the cold-water fish such as salmon, sardines, mackerel, herring, trout and pilchards. EPA and DHA fatty acids make up 15-30 per cent of the oil content of these fish. And unlike chicken, you want to eat the skins of these fish.

Another cool thing with EPA is that it helps prevent muscle wasting with certain diseases. This doesn't mean you should wait until you're wasting away before you visit the local fish market. On the contrary, what it does indicate is that fish is a potent health food. According to sports nutritionist, Douglas Kalman, M.S., R.D. of the Miami Research Associates, "Fish is the best source of the omega 3 fats, DHA and EPA; and it would behoove all runners to consume fish regularly." In summary, fish fats can do some amazing things (see Table below).

Table - Health Benefits of Fish Fat

- ✓ Treatment with EPA improved blood vessel function in individuals with heart disease. (10)
- ✓ EPA and DHA can reduce risk of death from heart disease.(11)
- ✓ EPA can reduce injury to the heart.(12)
- ✓ EPA and DHA can lower blood fat (triglyercides).(13) (14)
- ✓ Besides the wondrous benefits of fish fat, the protein in fish is excellent was well. There's no single food that provides health and fitness related benefits as well as fish.

Just the Fat Facts

Here's an easy to follow summary on fat.

1. Eat fish fat once a week; they lots of the healthy PUFAs (omega 3s).
2. Use olive oil based salad dressing; the MUFAs are great for you.
3. Eat nuts; they have lots of the healthy MUFAs.
4. Fat should make up roughly 30% of your calories. Don't follow a low-fat diet!

5. Limit intake of saturated and trans fats (basically avoid processed foods). Perhaps eat red meat a twice per week; Eat whole eggs every other day.
6. If you are thinking of trying CLA, MCTs, or diacylglycerol to see if it helps you, talk to a sports nutritionist first.

Protein to Power Your PR

(*parts of this were excerpted from 'Fast Track' by Suzy Favor-Hamilton and Jose Antonio, Ph.D.*)

If you're like most runners, you've probably been taught the importance of eating carbohydrates. You need it for energy. On the other hand, protein has sort of taken a back seat to carbohydrate. In fact, it's our experience that many runners subscribe to the many myths surrounding protein intake. Protein is bad for your kidneys. Not true. Too much protein is bad for your bones. Not true. I might get too big, like a bodybuilder, if I eat a lot of protein. Not true. And so on.

Rule #1 – Never ever ever ever skimp on protein…NEVER!
Rule #2 – Always obey rule #1.

Here's why dietary protein is so important. Your body is made up mainly of two things: protein and water. Proteins are part of your muscles, bones, cells, enzymes, antibodies, blood, organs, etc. Even though the primary function of protein is to provide the needed amino acids for maintaining the health of our organs and tissues, the need for this macronutrient is elevated if you're an avid exerciser.

Why should runners eat more protein?

One reason: Recovery! We know some of you might think that you'll get big muscles that'll slow you down. Now if you quit running and started bodybuilding, then yes, you would get bigger. But running is a catabolic activity. Meaning, your body's adaptive response to distance running it is to get smaller. Smaller and lighter runners tend to be the fastest as well. You need to have healthy muscles to perform at your best. Each time you run, you cause tremendous muscle protein breakdown.

For instance, when was the last time you did repeat strides or speedwork on a downhill incline? You probably got very sore 1 or 2 days afterward. Right? Well, that delayed-onset muscle soreness (also known as DOMS) is due to microtears in your muscles. You've literally torn some of your muscle fibers into little bits and pieces. In order to fix your muscle fibers, you need to give them the building blocks to do that. That's where amino acids or protein comes in. Without the protein, you'll have difficulty recovering. Keep in mind that eating carbohydrates facilitates recovery as well; albeit in a different manner (see Ch 9 on Carbohydrates for more details).

How much protein should runners eat?

Put it this way, mixing rice and beans isn't going to do it! And that ½ glass of skim milk in the morning isn't enough. A cup of skim milk has roughly 8 grams of protein. If you're a 120 lb runner, that means you should be drinking 15 cups of skim milk to meet your daily protein needs! Now mind you, that's if your only protein source is skim milk. Of course, you'll be eating other foods. But this gives you an idea of how much you need to consume to meet your daily requirements.

As a runner, you need approximately 1.5 to 2.0 grams of protein daily per kilogram of body weight. But since most of us don't like working in kilograms, we generally recommend you eat 1 gram of protein per pound of body weight daily. That's slightly higher than the 2.0 g/kg/day recommendation. But it's easier to remember. And don't believe the naysayers who claim that all that protein is harmful to you. Nothing could be further from the truth.

Is 'too much' protein harmful?

Protein intakes as high as 1.3 grams of protein per pound of body weight have been shown to have no effect on kidney function.(15, 16) In fact, Darryn Willoughby, Ph.D., an Associate Professor of Exercise Physiology states that "there's absolutely no evidence that consuming protein at levels greater than the RDA has any harmful effects in normal healthy adults." Another concern is bone health. Does eating a lot of protein compromise your bone mineral content? Yes, it is possible that too little protein causes long-term harm to your bones!(17)

Which protein sources are best?

Milk

There's more to milk than just using it to dip Oreo cookies! Milk is a complete protein and therefore contains all of the essential amino acids. Generally we'd recommend you consume whole milk if you're the kind of person who skips meals or eats little fat. However, if you eat clean (and follow our advice), than skim milk should suffice.

Beef

Don't let the fat in beef scare you. In fact, there's a huge difference in fat content between different cuts of beef (see table below).

Fat Content in Beef

70% lean, 30% fat (ground beef)
80% lean, 20% fat (ground chuck)
85% lean, 15% fat (ground round)
90% lean, 10% fat (ground sirloin)

A simple method for remembering which beef source has the least fat content is to remember that those at the beginning of the alphabet (ground **B**eef) have the most fat and those at the end of the alphabet (ground **S**irloin) have the least.

If you remember one thing about beef, it's ZIP. ZIP stands for zinc, iron, and protein. Beef has lots of all three.

Nutrients in Top Sirloin Beef

6 oz. Serving – trimmed of fat and broiled
326 calories
51.6 grams of protein
11 mg zinc
5.7 mg iron

Also, *lean beef* is a healthy protein choice. For example, one study published in *Nutrition* looked at overweight women who exercised and consumed a restricted calorie diet with lean beef or chicken as the main protein source. Both groups lost similar amounts of weight, body fat, total cholesterol and LDL cholesterol (the bad cholesterol).(18)

Chicken

Chicken is a great protein; similar to beef, the fat content of chicken can vary dramatically especially if you eat the skin. For instance, a 100g serving of light meat chicken with skin contains 222 calories and 10.85 grams of fat compared to 173 calories and 4.51 grams of fat if you remove the skin. That's more than double the fat if you eat the skin. Eating chicken as part of a well-rounded diet can help decrease total cholesterol and LDL cholesterol.(19) We'd recommend you remove the skin. Also, white meat has less fat than dark meat. However, if you eat little fat, try to eat the dark meat chicken.

Nutrients in Light and Dark Meat Chicken

Dark meat – 1 cup (chopped up), cooked, roasted, meat only (no skin).
287 calories
38 g protein
14 g fat

White meat – 1 cup (chopped up), cooked, roasted, meat only (no skin).
242 calories
43 g protein
6 g fat

Eggs

Some experts consider the amino acid profile of eggs to be the best of all food sources. Eggs are a rich source of thiamine, riboflavin, pantothenic acid, folic acids, vitamin B12, biotin, vitamin D, vitamin E, and phosphorus. Despite the fact that egg yolks have a bad reputation, it's not entirely deserved. In a study from the Journal of the American College of Nutrition, they examined 27,000 individuals(20) and found "the daily nutrient intake of egg consumers was significantly greater than that of non-consumers." That is, the egg consumers had a greater daily intake of vitamins B12, C, E, and A. Interestingly, individuals who ate four or more eggs daily had lower blood cholesterol levels than those who ate one egg or less daily. Not only is egg protein great but it's very affordable. In a dozen eggs, you get 80+ grams of protein for less than a dollar!

Macronutrients in an omelet (3 large egg whites, 1 large whole egg)

Calories – 206
Protein – 23 grams
Carbohydrate – 2 grams
Fat – 11 grams

Fish

Fish is a complete protein that many would rate as the single best protein food source. Why? Eating fish has some amazing benefits. Particularly, the *healthy* fat in fish (eicosapentanoic acid and docosahexanoic acid) is something that you won't find in our other proteins. Fish improves your mood, is great for your heart and is an effective anti-inflammatory nutrient. Just

one serving per week will confer these benefits; however, more frequent consumption is even better.

Meal Replacement Powders

Sometimes you don't have time to fix a 'real' meal. So the best alternative is to drink a protein powder or meal-replacement powder. Most of these mixes are high in protein, have moderate to no carbohydrate, and have very little to no fat. They use three main protein sources: whey, casein, and soy.

Whey

Whey is a complete protein and is particularly high in the branched-chain amino acids (leucine, isoleucine, and valine) and glutamine (an immune-boosting amino acid). Whey is considered a 'fast' protein.(21) If you eat a serving of whey on an empty stomach, levels of blood amino acids peak about 1 hour afterwards and return to baseline by 3-4 hours. Thus, whey is a very anabolic protein (i.e., great for muscle building or recovery). In fact, combining whey protein with a high-glycemic carbohydrate (e.g., maltodextrin, glucose, and sucrose) may be the ideal post-exercise meal.

Casein

Casein is the "opposite" of whey. Casein, a 'slow' protein, has a lower anabolic effect (31% versus 68%) when compared to whey. However, casein has a very profound anti-catabolic effect; meaning that casein inhibits protein breakdown.(22) Because casein is digested slowly, it produces a slow but steady rise in amino acids. Blood levels of amino acids peak 1 to 2 hours after eating casein (but they don't get as high as when you eat whey). But, blood amino acid levels stay elevated for up to 7 hours. Casein is a great protein to take before going to bed. Because it's absorbed slowly, you'll get a steady flow of amino acids into your body. That's good for recovery.

Soy

Soy Isolate is the best non-animal source of protein. Though soy is not commonly consumed by Americans, there are various soy products (e.g., soy milk, soy-based protein powders) at your local health food store. Soy protein contains potent anti-oxidants that provide significant health and anti-cancer benefits. This may be due to the presence of isoflavones, saponins, phytic acid, and other phytochemicals. One recent study found that a soy-based meal replacement formula lowered body weight, fat mass, and LDL cholesterol."

Comparison of Some Popular Meal-Replacement Powders

Brand/Product	Calories	Protein	Carbohydrate	Fat
EAS Myoplex Powder (1 packet)	270	42 g	23 g	3.0 g
GNC Meg-MRP (1 packet)	280	40 g	22 g	3.5 g

Garden of Life (Vegan) (2 Scoops)	280	34 g	30 g	4.0 g
Max Muscle A.R.M. (Recovery) (2 scoops)	250	28 g	32 g	0.5 g

How many protein-containing meals should I eat?

As a general rule, try to consume a lean protein source 4-6 times daily (or every 3 hours). If you don't have time for a 'real' meal, try a protein bar or a meal-replacement shake. It's especially important you get protein (and carbohydrates) immediately after you run.

References

1. Millard-Stafford M, Rosskopf LB, Snow TK, Hinson BT. Water versus carbohydrate-electrolyte ingestion before and during a 15-km run in the heat. Int J Sport Nutr 1997;7:26-38.
2. Kreider RB, Hill D, Horton G, Downes M, Smith S, Anders B. Effects of carbohydrate supplementation during intense training on dietary patterns, psychological status, and performance. Int J Sport Nutr 1995;5:125-35.
3. Yaspelkis BB, 3rd, Patterson JG, Anderla PA, Ding Z, Ivy JL. Carbohydrate supplementation spares muscle glycogen during variable-intensity exercise. J Appl Physiol 1993;75:1477-85.
4. Saunders MJ, Kane MD, Todd MK. Effects of a carbohydrate-protein beverage on cycling endurance and muscle damage. Med Sci Sports Exerc 2004;36:1233-8.
5. Williams MB, Raven PB, Fogt DL, Ivy JL. Effects of recovery beverages on glycogen restoration and endurance exercise performance. J Strength Cond Res 2003;17:12-9.
6. Roy BD, Luttmer K, Bosman MJ, Tarnopolsky MA. The influence of post-exercise macronutrient intake on energy balance and protein metabolism in active females participating in endurance training. Int J Sport Nutr Exerc Metab 2002;12:172-88.
7. Nelson GJ. Dietary fat, trans fatty acids, and risk of coronary heart disease. Nutr Rev 1998;56:250-2.
8. Bell RR, Spencer MJ, Sherriff JL. Voluntary exercise and monounsaturated canola oil reduce fat gain in mice fed diets high in fat. J Nutr 1997;127:2006-10.
9. Alper CM, Mattes RD. Peanut consumption improves indices of cardiovascular disease risk in healthy adults. J Am Coll Nutr 2003;22:133-41.
10. Tagawa T, Hirooka Y, Shimokawa H, et al. Long-term treatment with eicosapentaenoic acid improves exercise-induced vasodilation in patients with coronary artery disease. Hypertens Res 2002;25:823-9.
11. von Schacky C. The role of omega-3 fatty acids in cardiovascular disease. Curr Atheroscler Rep 2003;5:139-45.
12. Chen H, Li D, Roberts GJ, Saldeen T, Mehta JL. Eicosapentanoic acid inhibits hypoxia-reoxygenation-induced injury by attenuating upregulation of MMP-1 in adult rat myocytes. Cardiovasc Res 2003;59:7-13.
13. Grimsgaard S, Bonaa KH, Hansen JB, Nordoy A. Highly purified eicosapentaenoic acid and docosahexaenoic acid in humans have similar triacylglycerol-lowering effects but divergent effects on serum fatty acids. Am J Clin Nutr 1997;66:649-59.
14. Raastad T, Hostmark AT, Stromme SB. Omega-3 fatty acid supplementation does not improve maximal aerobic power, anaerobic threshold and running performance in well-trained soccer players. Scand J Med Sci Sports 1997;7:25-31.
15. Bolster DR, Pikosky MA, Gaine PC, et al. Dietary protein intake impacts human skeletal muscle protein fractional synthetic rates after endurance exercise. Am J Physiol Endocrinol Metab 2005;289:E678-83.
16. Poortmans JR, Dellalieux O. Do regular high protein diets have potential health risks on kidney function in athletes? Int J Sport Nutr Exerc Metab 2000;10:28-38.
17. Kerstetter JE, O'Brien KO, Insogna KL. Dietary protein, calcium metabolism, and skeletal homeostasis revisited. Am J Clin Nutr 2003;78:584S-592S.

18. Melanson K, Gootman J, Myrdal A, Kline G, Rippe JM. Weight loss and total lipid profile changes in overweight women consuming beef or chicken as the primary protein source. Nutrition 2003;19:409-14.
19. Scott LW, Dunn JK, Pownall HJ, et al. Effects of beef and chicken consumption on plasma lipid levels in hypercholesterolemic men. Arch Intern Med 1994;154:1261-7.
20. Song WO, Kerver JM. Nutritional contribution of eggs to American diets. J Am Coll Nutr 2000;19:556S-562S.
21. Beaufrere B, Dangin M, Boirie Y. The 'fast' and 'slow' protein concept. Nestle Nutr Workshop Ser Clin Perform Programme 2000;3:121-31; discussion 131-3.
22. Boirie Y, Dangin M, Gachon P, Vasson MP, Maubois JL, Beaufrere B. Slow and fast dietary proteins differently modulate postprandial protein accretion. Proc Natl Acad Sci U S A 1997;94:14930-5.