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The Think Muscle Newsletter publishes the latest news and research on exercise physiology, dietary supplements, performance enhancement, lifestyle management, health & nutrition, and bodybuilding & fitness. The newsletter is dedicated to providing accurate and unbiased scientifically based information.

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Message from the Editor in Chief: In This Issue

Hey folks, it's that time again. Time for what? The **Summer Olympics** of course! On August 13th, coming to a channel near you in all its socio-athletic-political glory, the summer 2004 Olympic games will kick off with the completion of the torch relay during Opening Ceremonies in Athens Greece. We take a look at some key dates for the Olympic-Lifting events as well as some drug testing issues.

Speaking of drug testing, we'll also explore the latest method of performance enhancement, '**gene doping**.' It's science without the fiction and the doping control authorities are scrambling to find a way to stop it.

Finally I address a question that is brought up time and time again, that of **changing your training according to your diet**. Tune in below to get the whole scoop.

Speaking of scoops, don't forget to support your local ThinkMuscle Newsletter by visiting the [HSN store](#). In order to keep the content of the newsletter free from the bias of greedy advertisers, we rely on ThinkMuscle readers for our support. The only claim that I

make about any product that I make is that it contains the highest quality ingredients available, that it meets label claims for potency, and that the prescribed use of all HSN products will produce the same effects observed in peer-reviewed independent research of those ingredients.

So, no magic bullets, no miracle hormone pretenders, no fraudulent claims, just the facts from a source you can trust. That's just the way we do things. Of course, we lose a great deal of business to other supplement companies who don't hold to these standards. But we feel, in the end, it serves both the consumer and HSN better to just be honest about all this stuff and let the chips fall where they may.

Anyway, thanks for listening and I hope you enjoy this issue!

As Always,

-bryan

2004 Summer Olympic Games in Athens Greece

Although the ThinkMuscle newsletter seems also to only be published every four years, the focus of this issue isn't my publishing schedule, but instead the pinnacle of athletic competition, the Summer 2004 Olympic games. On Monday July 26th, 2004 the Olympic flame will stop overnight in the city of Florina, Greece after 60 days of traversing the globe.

Of particular importance to ThinkMuscle readers are the weight lifting events. There will be 260 lifters participating in Athens at the Nikaia Olympic Weightlifting Hall (NIH). The NIH, an area in the southwest of the Attica region, consists of a main Indoor Gym building with a capacity of 5,100 seats.

Weightlifting is very popular with the Greeks and the Hall was one of the first projects to be planned and supported for the 2004 Olympic Games by the General Secretariat of Sports. It includes additional areas for warming up, resting, changing, training, hygiene-medical care and rooms for the athletes, as well as additional rooms for security, press, spectators' services and recreation.

The Olympic Lifting events will take place August 14th through the 25th. Unfortunately, most networks in the United States cover very little of the Olympic Lifting events. If you're lucky you might be able to catch one or two highlights on a late night rebroadcast. If not, I'm sure there will at least be some controversy going on about "he said", "she said", who failed the drug test, yadah, yadah, yadah, blah, blah, blah. Be sure and check your local listings for exact times.

I would like to add that the Paralympic Games will be going on in September. The Paralympic weightlifting events will also be held at the well equipped Nikaia Olympic Weightlifting Hall. Paralympic athletes compete in Powerlifting rather than the traditional Olympic lifts. Athletes compete in the Bench Press on a specially designed bench enabling them to be strapped down securely on the bench. An athlete's "official assistants" give the lift off. The athlete must complete his or her attempt within two minutes. Athens expects 240 lifters, both men and women. You can check out the 2002 records comparison between non-disabled and disabled competitors here: http://www.paralympic.org/sports/sections/pw/comparison_non_disabled_disabled.pdf

For any of you who plan on competing in Athens it would be a good idea to have read the rules before you go. For this reason I'm giving you a link...just so there are no excuses and complaining come race day.

http://www.wada-ama.org/docs/web/athens_2004/ioc_anti-doping_rules.pdf

And for those of you who don't use drugs but are really curious about what you've been missing, here is a link to the anti-doping regulations.

http://www.wada-ama.org/docs/web/standards_harmonization/doping_control/athlete_guide_2004.pdf

Gene Doping

Recent headlines sweeping across the bodybuilding world identified a so-called "myostatin baby" in Germany. This baby, born with two defective myostatin genes, is already showing significantly more muscle mass than children his age with normal myostatin genes.(1)

For those who have not yet heard about Myostatin (A.K.A. GDF8), myostatin is a protein produced by the body that *prevents* muscle growth. To find out more about this mighty gene check out Elzi Volk's article on [Myostatin](#). Though only time will tell, everyone in the sporting world will be watching to see if he will indeed turn out to have a comic-book hero type physique without ever lifting a weight. And if so, will he have enhanced athletic abilities as well?

Speaking of enhanced athletic abilities, the list of drugs an athlete might use to improve his performance is long and diverse. Far from being a modern strategy, "doping" as a means of increasing performance, is as old as competition itself. Drinks and potions of various kinds have been used for thousands of years in many different cultures in an attempt to improve upon normal human physical capacity. Now, in the 21st century, we enter a new era of performance enhancement. In the lab we call it genetic engineering. In sports, we call it "gene doping". (2)

What is Gene Doping

I'm sure most of you are familiar with what a gene is. Basically, a gene is a blue print for a protein. Each cell of your body contains all the genetic blue prints for every protein your body makes. There are estimates of anywhere from 30,000 to 100,000 genes in the human body. Most experts agree that the number is probably closer to 30,000. Each gene can code for one or more proteins. There are an estimated 10 times as many proteins as genes, so you can see how complicated things can get.

The standard definition of 'gene doping' is, "the non-therapeutic use of genes, genetic elements and/or cells that have the capacity to enhance athletic performance." By various means of introducing the desired gene into the body, an athlete can increase the abundance of a desirable protein, or decrease the levels of an undesirable protein. In this way he can enhance important systems and/or pathways in the body and increase his or her physical capabilities.

Despite the complicated nature of the human genome, researchers have already identified several genetic components involved in muscle mass and athletic performance.

Muscle mass is the obvious one. As mentioned above, myostatin is a prime target for increasing an athlete's muscle mass. Other ways of increasing muscle mass and strength include IGF-1 and perhaps more specifically, mechano-growth factor (MGF).

Perhaps less obvious but potential areas of gene doping include erythropoietin to enhance the oxygen carrying capacity of the blood, and even Leptin to alter body composition.

How is it accomplished?

One way to hijack a cell's genes is to take a modified virus (i.e. a recombinant adeno-associated virus), directing over-expression of the desired gene. The viral DNA originally in the virus is removed along with anything that might trigger an immune response. DNA coding for the desired protein (e.g. IGF-1, MGF, erythropoietin, leptin, etc) is then put into the virus along with a promoter gene to ensure high rates of transcription. Then you simply "infect" the athlete with the engineered virus.

Other potential methods include:

- direct injection of DNA into the muscle;
- insertion of genetically modified cells;
- introduction utilizing a modified virus.

It sounds simple on paper, but the technology is quite complicated and it has taken many years to get to a point where it can be used effectively.

I'm sure many of you are wondering whether any athlete has successfully altered their genes or not. At this point I would seriously doubt any athlete has even tried it. Most trainers and "gurus" aren't even aware of the technology at this point, let alone the athletes. Unless of course they are ThinkMuscle.com readers in which case they heard about this back in 1998 when I reported on the [findings](#) of Elisabeth R. Barton-Davis from the Department of Physiology, University of Pennsylvania School of Medicine. She

and her colleagues were able to demonstrate that by injecting a virus modified to infect muscle with the IGF-1 gene, a mouse could live throughout its entire life without losing an ounce of muscle. Not only did they not lose any muscle or strength as they aged, but the mice actually grew muscles that were ~15% larger and stronger than age matched control mice.(3)

Is there anyway of detecting it?

At this point, it's safe to say nobody is gene doping just yet, and even if there were, no one would be the wiser because there is really no means by which to test for it. Nevertheless, in an attempt to stay one step ahead of the inevitable, the World Anti-Doping Agency (WADA) has already asked scientists to help find ways to prevent gene therapy from becoming the newest means of doping or, at least if they can't prevent it, to try to figure out a way to test for it. [Note: See the end of this article for a list of WADA's prohibited substance and methods list.]

Of course, just because you can't test for it yet, doesn't mean you can't get caught. Take for example the current poster boy of the bodybuilding supplement industry, Victor Conte and his so-called "BALCO Labs". Because he seems to have lacked an ethics gene, he and every athlete he has ever worked with is now on the hot seat for accusations of performance enhancing drug use. So, even if an athlete were to find a scientist and lab willing to perform gene doping, you would eventually get caught or at least accused of cheating when the authorities came snooping around. And believe me, after the whole Balco Labs fallout and Victor's plea to start giving names instead of going to jail, the authorities are going to be doing more and more snooping.

Potential side effects

Of course there are "potential" side effects. Any time you mess with your genes, you risk side effects. This is why nature has taken such care to minimize the impact of random mutations by inserting a kill switch, so to speak, into our DNA. When a gene is being read and an error is found it will automatically stop production of that particular protein. If the error in the DNA is bad enough, the cell will literally self-destruct.

However, occasionally the kill switch doesn't work. When the DNA doesn't trigger self-destruction of the cell, the cell often becomes a cancer cell. I think we all have been impacted in one way or another by cancer so there is no need to elaborate on its detrimental effects.

Short of cancer, an athlete will still run the obvious risk of throwing his bodily systems out of whack by jacking up one system over another. In the end, it is likely that athletes would require medications to "normalize" their body after having altered their DNA for athletic competition. As far as the young boy mentioned earlier in this article with the mutated myostatin gene, only time will tell whether he will experience any side effects other than a bodybuilder-esque physique.

Closing Comments

As long as there is athletic competition, there will continue to be competitors that try to cheat. Cheaters don't change, only their methods do. It will be interesting to see how this new method of enhancing the body's physical capabilities plays out. Will scientists soon perfect gene doping? Will the governing powers-that-be be able to keep up with the dopers and expose them? After decades of "doped" World Records will athletes be able to continue to break records without doping of some kind? And finally, will people continue to be entertained by athletes that can no longer achieve *new* heights of athletic prowess? I guess time will tell.

References:

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2. Unal M, Ozer Unal D. Gene doping in sports. *Sports Med.* 2004;34(6):357-62.
3. Elisabeth R. Barton-Davis*, Daria I. Shoturma, Antonio Musaro, Nadia Rosenthal, and H. Lee Sweeney. Viral mediated expression of insulin-like growth factor I blocks the aging-related loss of skeletal muscle function. *Proc Natl Acad Sci U S A* 1998 Dec 22;95(26):15603-7

*Structure of the Prohibited List

The List is composed of four sections:

1. Substances (S) and methods (M) prohibited in-competition*

- S1. Stimulants
- S2. Narcotics
- S3. Cannabinoids
- S4. Anabolic agents
- S5. Peptide hormones
- S6. Beta-2 agonists
- S7. Agents with anti-oestrogenic activity
- S8. Masking agents
- S9. Glucocorticoids

M1. Enhancement of oxygen transfer

M2. Pharmacological, chemical and physical manipulation

M3. Gene doping

2. Substances and methods prohibited in-competition and out-of-competition*

- S4. Anabolic agents
- S5. Peptide hormones
- S6. Beta-2 agonists
- S7. Agents with anti-oestrogenic activity
- S8. Masking agents

M1. Enhancement of oxygen transfer

M2. Pharmacological, chemical and physical manipulation

M3. Gene doping

3. Substances prohibited in particular sports

- P1. Alcohol
- P2. Beta blockers

P3. Diuretics

4. Specified substances

Some of the substances listed in this section are particularly susceptible to unintentional anti-doping rule violations because of their general availability in medicinal products.

Training Issues While Dieting

Everyone who sets a goal to “look better” soon finds himself or herself confronted with two ambitions. Gut buff on the one hand, and get cut on the other. In this article we’ll explore the dilemma faced by all those who want it all.

There are primarily two things that effect how we look in the mirror, how fat we are and how muscular we are. We focus on these two things because ultimately we have control over them. We can change how muscular we are by training with weights. We can change how fat we are by eating less and moving more. The problems start when we get impatient and try to get bigger and leaner at the same time.

To put on muscle we need to create an anabolic environment inside our bodies. This means plenty of nutrients, calories, and a weight training routine specifically designed to build muscle. Most people have no problem with this until they realize that they would look much better if you could actually see all the muscle they are trying to build. So they then begin to scheme and conjure up ways to fool Mother Nature. The thinking goes, if I could just lose fat without sacrificing anything in the process... that would be great.

Historically these crafty plans to fool our bodies involve special diets. Now, being a physiologist I’m not going to say that all diets are the same, or that there aren’t “easier” ways to diet under certain circumstances. But I will say that most people get way too caught up in the scheming side, and not nearly committed enough to the practical side. In the end, for all their obsessing, few people experience better results on esoteric dieting plans than those who simply “cut back” a little and bump up the cardio. Why? Because the body is designed to survive, to endure, to adapt to whatever the environment throws at it. Not only that, but it is designed to survive by staying the same amidst changing environmental conditions and challenges. Just think what would happen if “cyclical” changes in the availability of food or food groups sent pushed your body composition dramatically in one direction or another? Think on that for a moment. In the real world (the one in which we all live) it doesn’t happen.

There is an understandable question however that is often posed, or more accurately, supposed. It is supposed that if the diet changes, the training must change accordingly. This is a false assumption, and you know what they say about assumptions, they make “umptions” out of you and me...or something like that. Anyway, there is no reason to change your training unless your goals with respect to your muscle have changed.

It should come as no surprise that the body can independently regulate fat and muscle. Fat is a fuel, muscle is a tissue or structural component of the body. The body can't draw and store "tissue" such as muscle tissue like it can fat. So, the body will release and store fat on a daily basis while leaving muscle tissue alone. The two are only related by the way that both diet and exercise effect hormones. These hormones then might go one to effect fat or muscle or both.

Bottom line: You must do everything you can to preserve muscle while dieting. The best way to do that is to train in such a way that creates the most potent anabolic stimulus. This means training heavy with adequate frequency. Regardless of the diet you choose, your training must be geared towards growth!

Considering that Hypertrophy-Specific Training (HST) is the most efficient means of creating an anabolic stimulus, the question often arises if and how one should adjust their training when on a diet. As the body of this article attests, one need not adjust their training based on their diet. However, there are definitely periods during an HST cycle where the growth stimulus peaks. This would be the safest period to cut calories in a more dramatic fashion as apposed to more moderate periods during the diet.

As far as diet goes, there are any number of options. You can use high-carb/low fat, a 40/30/30 approach, or of course the newly discovered low carb route. Any diet that cuts your calories below maintenance will work.

I am often asked about cyclic ketogenic diets, particularly Lyle McDonald's [Ultimate Diet 2.0](#). Though I will let Lyle speak for himself, I will say that [HST](#) can be used with UD 2.0, the only drawback being that you will not acutely adjust your training to deplete glycogen stores.

Once again, without trying to speak for Lyle, one reason he recommends a training plan specific to the UD 2.0 is because the diet entails phases of depletion and replenishment. This being the case the training volume and weight loads will be adjusted according to the UD 2.0 plan. Now, although HST does not take into account any period of depletion (HST is "hypertrophy"-specific), it will still maintain a powerful anticatabolic stimulus during all phases of the diet.

Reader Survey

Tell Us What You Think?

1. Message from the Editor in Chief:
 It was good.
 It was okay.
 I didn't like it.
 I'm not interested.

2. 2004 Summer Olympic Games

- It was good.
- It was okay.
- I didn't like it.
- I'm not interested.

3. Gene Doping

- It was good.
- It was okay.
- I didn't like it.
- I'm not interested.

4. Training Issues While Dieting

- It was good.
- It was okay.
- I didn't like it.
- I'm not interested.

5. What type of articles would you like to see in the future? (Check all that apply.)

- Anabolic Steroids and Pharmaceuticals
- Anti-aging medicine
- Body Transformation
- Children's Health and Nutrition
- Competitive Bodybuilding
- Diet and Nutrition Reviews
- Dietary Supplements
- Exercise Physiology
- Fitness Competitions
- Fitness Psychology
- General Health Topics
- Lifestyle Management
- Men's Health
- Powerlifting
- Seniors Health Topics
- Sports Specific Training
- Women's Health and Nutrition

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I hope you have enjoyed the latest issue of the Think Muscle Newsletter.
Suggestions? Comments? Questions? I'd love to hear them!

Best regards,

-bryan

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