**Q: When you speak of oxidative squats and benches, are you hitting higher volume through reps or sets? Say 2-3x12-20 or more of a 5x5 with a (5/1/X) tempo? I’m just curious about your rep scheme.**

A: It depends on what source you are prescribing to when detailing out methods to improve the oxidative capacity within the muscle.

Some say 3-6 sets, 2-5 series. Some say 3-5 sets, 8-12 series, etc.

The loads are generally consistent: 40-70%

Some sources state to usage of tempo, but everyone states the time of execution needs to be between 40-60 seconds with 40-90 seconds of rest.

The main points:
1) volume is high
2) intensity is dependent upon external loads
3) no relaxation between reps. keep constant tension on muscle.
4) time is key, but you essentially will take most sets to failure.
5) tempo isn't as important, but can help monitor progress from workout to workout.

This work is very hard, but crucial for most sports. This doesn't mean it has to be performed via strength exercises though. Other means of exercise can improve the oxidative capacity at the muscle. Look at tempo runs for example.

I had an athlete that did nearly 40,000 lbs of work in the bench press, and it took his aerobic capacity score from 114 to 98. So, you can see there is a high aerobic demand as we would expect.

**Q: I would define energy system training as using training means designed to increase biological power. Specifically I was referring to the development of such biological characteristics such as the CNS, metabolism, hormone system, ANS and such. The block would be designed for myself and I play rugby. I play at inside or outside center. At this stage it is difficult to know exactly how long the block will consist of because the dates for the season have not been set but I would estimate that the block will last around 9 weeks. Without a wide range of diagnostic tools I’m unsure to say where the weakest link in the performance chain is but I would suspect it would be the CNS.**

A: First and foremost, I would make sure you have a healthy/ready foundation to build on. Meaning, your ANS is in balance, hormonally you are normal, etc. Now, without diagnostic tools, you could consider the following symptoms for an overreached/overtrained PNS, SNS:

**PNS**:
Observation: Impaired performance, lack supercompensation, depression, **apathy**: sleepy, constant weight, Low resting heart rate, low blood pressure, suppressed HR exercise profile, suppressed lactate exercise profile, suppressed neuro-muscular excitability (decreased broad jump/vertical jump performance)

**ANS**:
Observation: Impaired performance, lack supercompensation, restlessness, **irritability**, weight loss, increased resting heart rate, increased blood pressure, retarded recovery

**Hormonally**, you could get a full-panel test (free test, test, cortisol, etc). There is a place here in Beaverton, OR (ZRT Labs) that will allow you to order a kit for either saliva or blood testing. If you really care, it wouldn’t hurt.

**CNS**: stop watch test? (Compared to best if you have data)
**Neuromuscular**: SLJ, vert, etc (compared to best if you have data)
**Cardiac**: resting HR, HR during certain training loads. i.e. 200 strides / minute on an elliptical typically produce a HR response of 108 bpm. If you get on it on a particular day after and you get a higher HR response, it may suggest cardiac fatigue, which may indicate ANS issues (but not always based on our experiences)
**Metabolic** Field tests, laboratory testing, etc
Etc …

Based on testing, what values are ideal (from your understanding, your experiences, from research, from coaches) for these systems? How important are certain motor qualities (MxS, strength-speed, speed-strength, speed, endurance, etc)? How do you rate with these? How are your capacities? Is your aerobic system poor? If so, perhaps you need to focus on oxidative work? How about your glycolitic capacities? There are so many questions that need to be answered Junior before any discussion of programming and sequencing. Unfortunately, I am not in a position to write a block of training for you. You can contact Mark at our website if you are interested in a service like this. I am willing to answer questions that are more specific though.

One way you may consider is:

**Weeks 1-2**:
Capacity development (general sense – weights, jumps, sprints)
Low volume of skill development (capacity emphasis)
**Weeks 3-4**:
Power and/or Capacity development (specific sense – rugby specific drills in conditions that develop the appropriate system(s))
Low volume of general strength work (power and/or capacity – depending on weakness)
**Weeks 5-7**:
Power development (general sense – weights, jumps, sprints)
Low volume of skill development (power emphasis)
**Weeks 8-9**:
Capacity development (specific sense – rugby specific drills in conditions that develop the appropriate system(s))
Low volume of general strength work (power /or capacity – depending on weakness)

**Q: A while back you answered some questions regarding the power and capacities the energy systems. I don't know why but I am still having some trouble wrapping my head around all of it. I have been going over Issurin's 2 books because there are some tables and charts regarding this topic, and in the glossary there are definitions, which are basically the same as what you mentioned before. From the book, aerobic power is the max amount of oxygen one can use in a defined period of time. So just for clarification, because it seems like lots of places jumble up "power" and "capacity," a vo2 max test would test aerobic power, correct? Because of the time component? The next question I have is in terms of actually training for and testing the "power and capacity" of each system. In the book, "capacity" is referred to as "the ability to sustain fatigue" using the respective energy system. If that is all it is, how would you accurately test for it, because I would assume there might be many other factors concerning fatigue on any given day, such as sleep, eating, etc.? Also, in training, would training the power of an energy system also improve the capacity? I can see how training the capacity might not carry over to the power as much because of the reduced intensity, but for power to capacity what would the carryover be? also, I don't know any specific tests for determining the power/capacity of a certain system, but as an example, consider using a timed running test like as far as you can run in a given amount of time. Because of the timed component, this would test the "power" of the system, correct? But with this, would an improved score on the test also point towards an improvement in the "capacity" as well, because the person was better able to "sustain fatigue" and therefore run further? I hope these questions make sense. Thanks in advance for your help**

A: Vo2Max test aerobic power? - Yes

Their physiological readiness will absolutely affect the test(s), hence why testing can give you false readings if you do not appropriately account and monitor fatigue. Unfortunately – due to certain environments and logistical reasons – tests must go on, but one needs to be aware of the decrease in accuracy.

For instance, if you look at the RAST test, it will give you a power index, mean power index, and fatigue index. The fatigue index is a determination of anaerobic-glycolytic capacity. The power index is the anaerobic-alactic power. Some soccer clubs use this test, but how much value it is for soccer is debatable. I personally would find/develop tests for measuring anaerobic-alactic & aerobic capacity for them.

Developing the capacity of a certain system will enhance the power as well. Remember, when training for capacity, you are developing the appropriate “substances” to allow for the body to essentially have a larger engine. The larger engine itself and by the work you performed to create this larger engine will indeed give more power, but you do specific power related work to optimize the engine you developed. Increasing capacity – buying a new engine for the car. Will probably be more efficient, go faster, better fuel economy, etc. Increasing power – taking the car to get “tuned up” to optimize the engine you have.

Power to capacity? Depends. Some workloads may be developmental or stimulative. If the workload on a particular power session is high enough, it may end up enhancing (developing) the capacity as well. Now if this is a good thing or a bad thing, this is another topic by itself. Most of the time, it depends on the current state of the system you are trying to enhance power to. Sometimes power work can stimulate the systems enough to "hold" its capacity. Given enough time though, the capacities will drop, regardless the amount of power work you perform.

A test that is governed by time does not make it a “power” test. I would recommend you pick up **Atko Viru’s *Biochemical Monitoring of Sport Training*** for more insight on this. It’s available on this site.

**Q: I am a little unclear as to what parameters are necessary to cause hyperplasia of the mitochondria in slow twitch muscle. I thought an example was the "40 sec on, 40 sec off" in Mark's log but then I read that the aim of that training was to induce hypoxia. I was under the impression that a hypoxic state meant that the anaerobic threshold had been exceeded and mitochondria were actually being destroyed. I would really appreciate it if you would help to clear up my misunderstanding. Thanks very much for the time and effort you put into posting on this website.**

A: You are putting the working musculature in a local hypoxic state. This sounds contradictory when speaking of developing mitochondria, but with ST fibers, the act of stimulating ST hypertrophy will in turn develop more oxidative material along with it.

Going above AT is dependent upon more than "being hypoxic".

We have had many athletes perform this type of work, and their heart rates never go past AT.

When Mark performs this type of work, his working heart rates are about 20-25 beats off his AT.

**Q: You had said to just ask if anyone had a question regarding aerobic development with your football players, so I am going to ask. What kinds of specialized preparatory and developmental means would be used with your guys while staying true to the aerobic development range?**

A: I will only comment on the quarterbacks, as I was in charge of their development.

 The specialized preparatory drills were either performed outside on the turf or inside near the weight room. All developmental work was done outside.

**For the quarterbacks, here are a few movement examples that were focused on with the specialized preparatory and developmental drills:**

1) 3, 5, 7 step drop
2) Planting
3) Throwing
4) Stepping out from the center

Some focus areas only had either developmental or preparatory drills. For example, we did not utilize developmental drills for throwing since we did not have different weighted balls, nor is it allowed by the NCAA to utilize a game ball during strength & conditioning sessions.

 **Some example preparatory drills:**

**Throwing:** OH MB throws (differing directions), cross slams, rotational throws, etc.
**Drop steps:** Lateral runs (various distances, we used mainly in extensive tempo)
**Step out from center:** MB rotational throw from stance, hip abduction+ER with bands from stance

**Some example developmental drills:**

**Throwing:** None that we could use
**Drop steps:** Bands around waist
**Pocket actions:**Various forward, backward, lateral jumps

From an aerobic development standpoint, the means changed as fall camp neared. A combination of linear runs and lateral runs for moderate speed aerobic development (extensive tempo) were used early on. We then moved onto a combination of lateral runs for moderate speed aerobic development and linear sleds for high-speed aerobic development. After our runs, we performed various circuits of calisthenics, and preparatory drills. I can expand on the week’s layout if you call, as this obviously is vague.

The inclusion of specialized developmental drills was introduced before the 4th of July week at low volumes. These were combinations of drop sets, pocket actions and various runs. All were six seconds in duration. These were exclusively used the last three weeks of training before they reported to camp.

All aerobic work was performed with heart rate monitors on.

Leroy, this should give you an idea how to formulate exercises for all positions. If not, either write back in, or call.

**Q: I want to thank you for taking your time to answer my question regarding elastic-strength influence during a squat jump preceded by a dip and without. Myself, and many others, appreciate the thoughtful answers and insights you and the other Q&A Team Members give. It is great to have this type of resource for us up and coming physical preparation coaches (hopefully) and the rest of the population. With the crazy amount of nebulous information regarding training floating around, it is a savior to have you, the Thinker, and others to shed light on these topics.**

**Alright here is my question regarding non-impact plyometrics. I’m not sure in what capacity you work with injured athletes, I’m sure you are much more involved than most strength coaches, but I wanted to know if this was a viable method for minimizing deconditioning injured athletes, used appropriately of course? I see too many sidelined athletes doing too little during recovery and have lost a lot in terms of physical preparation. It seems that with knowledge and a little imagination, these would be a great alternative to impact plyometrics.**

A: With an injured athlete, a few things that run through my head are:

1. Do I (as the coach) understand the injury?
2. What is the biodynamics of their sport, and how does this injury limit them?
3. What phase of training are they in now?
4. Within that training phase, what is the biodynamic emphasis? Looking along the general to specific spectrum.
5. Within that training phase, what is the bioenergetic demands being emphasized?

Then, my movement inventory will be modified to the answers I received from the above.

You still never lose sight of their strengths and weaknesses. Their injury is just another variable you need to equate for. That is all.

The main thing is attempting to keep all systems involved as much as you can without jeopardizing the recovery process of the respective injury. So if that involves non-impact types of movement, then go ahead. Just make sure there is rationale for its prescription.

**Q: I was wondering if you could clear up some questions about the oxidative squats that you and Mark have described. First of all, if both oxidative squats and something like continuous running at AT both develop oxidative capacity of the muscle, what are the advantages/disadvantages of each? It seems like with the oxidative squats there could be much more fatigue/soreness involved post training which could maybe hinder subsequent sessions, couldn't it? I would intuitively think that continuous running would be much easier to recover from, but I am not sure because I have never done oxidative squats.
Also, you mentioned in another post that, even though you are putting the muscle in a hypoxic state, stimulating hypertrophy of ST fibres will in turn develop more oxidative material with it. That makes sense, but if these sessions are essentially going to failure, how do you keep yourself below AT and out of glycolitic working conditions(which would stimulate FT fibres, correct?)? I am just asking because when I think of going to failure I think of lots of lactate in the muscle, which would mean above AT would it not?**

A: *First of all, if both oxidative squats and something like continuous running at AT both develop oxidative capacity of the muscle, what are the advantages/disadvantages of each? It seems like with the oxidative squats there could be much more fatigue/soreness involved post training which could maybe hinder subsequent sessions, couldn't it?*

I’m not going to lay out every possible advantage and disadvantage. The majority of times, advantages/disadvantages are dependent upon the situation. One simply needs to be cognitive of their situation, address if there is a need for any work, and determine how the dynamics of the planning change with the inclusion of it.

Continuous running, intervals, etc. are well documented with their advantages and what they accomplish. They have probably been explained thoroughly on this website by The Thinker and Mark. If you cannot find the answers to your question, I would recommend you read Charlie’s work with his rationale with his tempo run utilization. There are different adaptations based on the different work zones. Look at all variables within the method and it will dictate the response one will receive from it.

Strength training for the slow fibers will lead to an improved “potential capacity”. There will be an enhancement to the amount of oxidative enzymes within the fibers that are built via the strength training, but there are better different methods (such as tempo runs, continuous runs) that will take that potential capacity, and “fill” those fibers up with more oxidative enzymes.

As a coach, you need to decide whether the focus will be more on biochemical capacity or fiber hypertrophy. The training methods will then be decided on this decision.

Yes, the strength training sessions will cause DOMS, but as the novelty diminishes, sessions are kept somewhat frequent, the soreness generally will not occur anymore. Initially, it’s huge for some, and marginal for others. That itself needs to be accounted for.

*That makes sense, but if these sessions are essentially going to failure, how do you keep yourself below AT and out of glycolitic working conditions (which would stimulate FT fibres, correct?)?
I am just asking because when I think of going to failure I think of lots of lactate in the muscle, which would mean above AT would it not?*

Keen, I’m going to ask you to do some more investigation with this because this has been covered in the past. One thing…simply the presence of hydrogen ions does not mean you are above anaerobic threshold. What would be some of the things that allows one to stay under AT with this work, and others not?

 **About the whole Mike Boyle and aerobics thing...
It was actually already discussed on his forums.
--
mboyle

Bill - great stuff. As you probably know I am completely "anti-aerobic" and have gotten excellent results with no aerobic training to speak of with any of my athletes for years now. Can you put your thoughts in a more concrete manner? What should an athlete be able to do as far as duration? How long should they be able to do it for (weeks)? I think the theory is interesting.

MB
--
prperformance

I would respectfully disagree that you are “anti-aerobic,” but rather you’re anti-steady state.

Your interval case study itself was very aerobic based on the most recent understanding of energy systems. What most people perceive as being anaerobic is much more aerobic than previously thought.

This link provides a nice update…

http://www.vcaa.vic.edu.au/vce/studies/physicaledu/EnrgSys.pdf

You’ll notice that at 75 seconds of activity, the primary energy system source is aerobic.

I don’t think you can generalize programming considerations without context. Some athletes don’t need to do any steady state work to increase cardiac output as they have sufficient capacity naturally or have done enough of such work in the past. Some may need 4-6 weeks of it to achieve the adaptations desired.

As far as parameters for interval training, testing provides clues as to whether the power (Power = rate of energy production) of a dominant energy system or its capacity (ability to sustain energy output in the specific energy system) needs to improve.

Dominant energy systems will vary by sport.

For instance, American football is ATP-PC + Aerobic
Hockey is more glycolytic depending on length of the shifts.

In the case of energy system power, you’d use heart rate as your gauge for recovery for intervals as greater recovery is needed to allow repeated efforts at maximal rate of energy production.

After developing energy system power, then capacity of the system is trained with incomplete rest intervals. Optimum depends on the athlete and the sport in question.

The higher the intensity of the interval, the shorter the duration to achieve development and the shorter the residuals. For instance, anaerobic-glycolytic power has about a 2-3week +/- a few days window for training and for residual effect before it declines significantly (due to the decline in glycolytic enzymes) and needs to be trained again.

Oxidative adaptations have a longer training period and residual of about a month +/- a couple weeks. So you can superimpose training effects to optimize performance depending on the sport and the needs of the athlete.

The adaptations would typically be arranged by longest to develop to shortest. Cardiac output takes longer (as does maximal strength) and last longer, ATP-PC capacity takes less time with a short residual.

Application of these sequential development concepts may not apply to athletes of lower development as they are training all means concurrently, but you can certainly manipulate variables to emphasize more specific adaptations.
-----
Looks like Mr. Boyle just doesn't understand the concept of "aerobic"
Any extra thoughts?**

A: Michael,

I don't know if it is necessary to discuss interactions that happen on Mr. Boyle's pay forum. But from the video itself, and this piece you provided, I still believe his understanding of the aerobic system is weak. Like I said before, perhaps there is additional material he has provided that proves this point wrong, but I have yet to be supplied this material.

Regarding your statements, there are a few things I would like to point out.

- Sometimes capacity must be developed before power, then you can go back to capacity (if that is required of the sportsman)

- Your residuals I believe are from Issurin's. Regarding the glycolytic residual, this I believe is correct and I have seen this in other literature as well. This adaptation goes along with the aerobic mechanisms at the myocardium as well. Regarding the aerobic residuals, this would not be the case at the muscular level. Also, residuals are dependent on the level of preparedness the athlete is as well. Don't just rely on charts for this information.

**Q: If you don't mind, I have a few random questions. If you don't want to answer them all, I understand.

1) What is specifically "activating" mitochondrial biogenesis?
2) In a post awhile back, you talked about ROS (free radicals) causing mitochondrial death. Can you expand on that for me?
3) Are there other mechanisms for the death?
4) When is your block periodization book for powerlifters going to be done?**

A: 1) Look into AMPk and CaMK

2) This might not be totally correct in this presentation, but you surely could find out with the information provided.

This and #3 are related to much decreased blood pH (higher H+ ions).

High ROS concentration --> mitochondrial membrane permeability and cytochrome C leakage into the cytosol --> C-C interacts with Apaf-1 --> make dATP --> dATP is the first step in reactions that end with cell death (apoptosis) \*this is rather a new understanding for myself. If anyone sees error with this, write in.

3) Look into the calcium pathway.

4) No idea my man. It’s being worked on. It’s a slow process.

Let me know if you have other questions. Fill me on what you find out as well if you decide on looking into this further.

**Q: I just read about hot and cold contrast showers in Matt Wenning's recent article and I'm interested in finding out how that helps with recovery.**

A: Below is an article by Patrick Ward. I'm posting this as his comments in the article mirror mine as well.

One thing I will mention as I have mentioned this before, do not simply utilize "recovery" tools for the sake of using them. Their applications should be based on the biological state of the athlete, and their potential role in assisting the adaptations you are going after within the training cycle/block/period. Use them when you need them. Don't simply use them to use them. That is misguided, and follows the general kitchen sink approach many people take when it comes to recovery method prescriptions.

 *Contrast therapy has been used as a method of recovery in athletics for a significant period of time.

This type of therapy alternates between the application of hot and cold in a repetitive fashion, with the theoretical goal being to enhance recovery, decrease delayed-onset of muscle soreness (DOMS), enhance blood lactate removal, and improve various other markers of inflammation.

Application of Hot and Cold
When using contrast therapy, several factors must be taken into consideration:

-The temperature of the hot and cold plunges
-The duration of time that one spends in the hot and cold plunge
-The number of times one should alternate between hot and cold
-Which intervention - hot or cold - should begin and end the therapy
-Method - some may choose to just place one body part into the hot/cold plunge (IE, lower leg or forearm), while others may choose to do a full body plunge or just a plunge up to their waist. Additionally, some studies didn’t use a plunge, but rather alternated between hydrocollator (hot packs) and ice packs.

Many coaches and athletes probably have their favorite way of applying contrast therapy; however, the research seems to be up in the air as far as the best way to go about managing hot and cold.

In studies, the duration of time in the hot and cold tended to vary from 1min hot:1min cold all the way up to 10min. hot:1min cold. The common trend seems to be to have the cold interval shorter than the hot interval, with a majority of the studies using 1min. for the cold plunge.

One study used 5min hot:5min cold. The cold intervention, however, was with an ice pack (rather than a cold pool) and the temperature was not noted in the study - this is important to note, as 5min. in an extremely low temperature cold plunge may not be well tolerated by the athletes.

The total duration of time that the athletes spent performing contrast therapy in studies varied. This would alter the number of times athletes alternate between hot to cold, depending on the duration of time spent in the hot and cold. Overall, total duration varied from as low as 6-minutes, all the way up to 31-minutes of contrast therapy.

The temperature of hot and cold was different amongst studies as well.

The temperature during the hot intervention varied from 38° C up to 75° C (100.4° F up to 167° F). It should be noted that the 75° C was applied via hydrocollator pack with a terry cloth and two layers of towels used to protect the subjects from excessive heat. The highest temperature used in a study where subjects were submerged up to their waist was 42° C (107.6° F).

For cold interventions, temperatures ranged from 8° C to 15° C (46.4°F to 59° F).

Starting with hot or cold differed amongst studies, with the majority of the studies electing to begin with heat and end with cold.

Enhancements in Recovery
Studies on contrast therapy have found that this intervention has been shown to change subcutaneous tissue temperature - possibly suggesting enhancements in peripheral circulation and cutaneous sensation. However, no studies to date have shown actual changes in intermuscular temperature.

One study showed significant fluctuations in blood flow during a 20min contrast therapy session, where changing from hot to cold showed decreases in blood flow and vice versa when going from cold to heat. Additionally, when looking at blood marker changes, contrast therapy was shown to reduce creatine kinase (a marker of inflammation) and blood lactate concentration at a similar rate as active recovery, when compared to passive recovery following training. These findings may suggest that contrast therapy has a potential benefit to athletic recovery.

Finally, following exercise, contrast therapy was shown to decrease girth measurements, increase joint range of motion, and improve perceptions of soreness.

Conclusions
Anecdotally, athletes and coaches have used contrast therapy as a means to enhance recovery following training and competition.

While studies on contrast therapy are limited and their quality has been questioned, the take home points for me are:

Athletes perceive less soreness following contrast therapy. The mind is incredibly important, and if this method makes athletes feel less sore and more relaxed/recovered, then its use can be validated in my book.*

 *Both contrast therapy and active recovery have been shown to improve markers of inflammation following exercise when compared to passive recovery. This information is potentially beneficial, as active recovery - while helping to get athletes moving and improve recovery - is still dependent on the athletes performing exercise (even if it is low-intensity), which may add more joint stress to an athlete who is slightly overtrained. Further, for athletes who are in the middle of a long season, the use of contrast therapy may be more appealing (psychologically) than trying to go out and get in another workout/training session (again, even if it is low-intensity).*

 *Hopefully future research will look more closely at this method of recovery to help athletes and coaches come to conclusions about the best ratio, total duration, and application of contrast therapy.*

**Q: I read some of Mark McLaughlin, Thinker, and your responses, and I'm still confused by alactic capacity. Can you define it and possibly give an example of how to train it?**

A: Alactic-anaerobic capacity (taken directly from Zhelyazkov and Dasheva) is the following:

"Indicator for the capacity - this is the total work output that can be provided by one or another source of energy. Its particular criteria are:

For the alactic capacity- the magnitude of the oxygen debt and the total CP stores in the muscles. "

How you train this depends on who’s information you are pulling from. I’ve seen multiple sources that summarize the training parameters to training alactic capacity.

In a nutshell (across multiple sources)
Training intensity: high to maximum
Duration of set: 6-20 seconds.
Rest between sets: 10 seconds to 2 minutes
Number of sets: 4-12

What you need to keep in mind when looking at these tables/charts is to look at the context of the movements they are basing this information on. Running, jumping, swimming, etc? Is jumping at maximal efforts for 10 seconds the same as sprinting at maximal efforts for 10 seconds? Absolutely not. Consider the movement you want to perform with this type of work.

This type of work would be for those that need to execute alactic efforts over the course of the entire game/activity/fight/etc. Ultimately it’s used to increase the WORKING ability of the alactic system. Think sustained.

Here are some examples of work (not considering phase of training, movement requirements, etc). This is a Yuri derivative.

Jump Squats:
10 seconds, 10 seconds rest, repeat 5-10 times.
Active rest, 5-8 minutes
Repeat for desired sets.
Depending on height of jumps, load, speed of transition, etc you may be between 5-8 jumps per set.

Also, depending on the training parameters, you can get a great deal of aerobic capacity development as well -- especially to the fast oxidative fibers. This work, depending on the context of course, can have a profound development on the aerobic system.

Think of repeat sprints using a sled or a hill, while maintaining a heart rate under anaerobic threshold.

Say you perform 30 sprints that are in 30yds in distance. Depending on the sled load, speed of athlete, hill incline, etc, it may take 4-6 seconds? You go again when you HR is say 15 beats below AT.

This activity will mobilize the alactic system, but it also mobilizes the aerobic system during the recovery processes, thus developing the oxidative potential of the fast oxidative fibers. So, the work bleeds across and develops/stimulates/no effect/negatively affects the alactic and aerobic systems.

**Q: I have tried to find the answer to this on my own, however many texts/literature lack some context and it is difficult to get a direct answer for something, without a direct question sometimes.

I wanted to know why you tell people to avoid going over the AT, and I would also like to know the benefit of cardiac restorative work, what is happening in the body briefly that makes this work so advantageous.**

A: The avoidance of going over anaerobic threshold is dependent upon the training effect you are pursuing. If you are attempting to improve the oxidative qualities of the musculature, you would want to be slightly (2-3bpm) above AT and below AT.

Chronically exposed to environments above anaerobic threshold can lower the efficiency of aerobic metabolism, but can enhance aerobic power (aka cardiac power), and glycolytic power and/or capacity under the appropriate conditions.

Cardiac (or low intensity aerobic) work can/may assist in multiple ways. Without diving into a lot of the mechanisms, or providing a thorough list, here are some examples.

--Low intensity exercise improves immune function. One mechanism may be in t-helper cells.
--Like massage and the lymph system, there may be some enhanced lymph drainage through rhythmic low intensity exercise.
--Low intensity exercise can lower cortisol levels
--Improve/strengthen parasympathetic tone, thus improving your ability to shift back to parasympathetic dominance after sympathetic loads/stress. This also improves your ability to not rely on higher-ordered organic systems to handle the adaptation responses to particular stressors.
--Etc

Crawl around on Pubmed and look into it more. There has been a lot of research with immune function and it's responses to things like Tai Chi, and Yoga. This work also seems to bleed over to low intensity exercise.

Look at the SYSTEMS you want to influence first, and then see how they are stimulated. I would recommend you purchase: Why Zebras Don't Get Ulcers by Sapolsky.

Don't stay at the superficial level. Keep digging for the information you desire. It may come up in a place you wouldn't have even thought of looking.

**Q: I would really like to see how a powerlifter at PTC would train. Perhaps Landon Evans? It would be cool to see a powerlifter utilizing the omega wave and such.**

A: For the last 3 weeks, I've been heavily (2-5x/day) monitoring my state using the Omegawave. I just finished my 5 week accumulation block (2 lower/2 upper sessions, 2 cardiac efficiency development sessions). I'm currently trying out some new sequencing for my transmutation blocks and keeping a close eye on a few things:

1) Autonomic state
2) Resting omega potential
3) Resting HR
4) Energy indices (aerobic, anaerobic-lactic, anaerobic-alactic)
5) High/Low/Very Low cardiac frequencies
6) Blood pressure (non-Omegawave)
7) Autogenic training influences

This block will be only 2 weeks in length.

Goals:

1) Improve relative strength with minimal lifting sessions
2) Improve cardiac output
3) Continue improving recovery capacities

Weekly calories right now are 21,100 that are placed throughout the week depending on session. I should note that I'm currently working with Borge Fagerli.

Once I'm finished with this transmutation block, I'll post more. Currently my weekly outline is as follows:

**Sunday**:
Cardiac efficiency development: 45-60 minutes

**Monday**:
80%/85% (week1/week2 respectfully) (front squat/bench/deadlift) 2/3 weekly volume applied to those lifts.

HR monitor on:
Glycolitic work after with 70-75% loads: 20-30 working reps. usually 2-3 exercises
Glycolitic depletion work w/ 30-40% loads: 3-6 sets, slow tempo (kb squats, push-ups, etc) Usually 2-3 exercises

**Tuesday**:
FT mitochondrial biogenesis work
20-30 reps
5 seconds on
HR < AT

**Wednesday**:
Same as Sunday
Very light lifting. Nothing hormonally or neuromuscularly taxing.

**Thursday**:
Same as Sunday

 **Friday**:
1/3 of volume in s/b/d
1/2 of volume with glycolitic work with higher and lower intensity work

**Saturday**:
Same as Tuesday

Few quick notes on what the Omegawave has showed from yesterday to this afternoon.

Yesterday before my lifting, my autonomic was balance, but in generally, I was not ready for maximal volume or maximal intensity work. Given none of the work I had planned fell into those categories, I decided to lift.

My resting omega potential was 43.1 mV. Optimally ready.

**Immediately (1hour) after my Monday session**:
Unstable adaptation to stress
Low functional reserve
Significant fatigue, recovery or recuperation activities are preferred
Resting HR: 89
Moderate sympathetic hypertonia
Regulatory mechanisms are in a state of tension

**Last night (8 hours after lifting)**:
Stable adaptation to stress
High functional reserve
Cardiac system is reasonably ready for any kind of activity
Resting HR: 67
Moderate parasympathetic hypertonia
Cardiac system is reasonably ready for any level of activity

**AM, before Tuesday session**:
Stable adaptation to stress
High functional reserve
Cardiac system is reasonably ready for any kind of activity
Resting HR: 56
Moderate parasympathetic hypertonia
Regulatory mechanisms are within the normal range

**30 min after session**:
Satisfactory adaptation to stress
Moderate functional reserve
Incomplete recovery, no activity of maximal volume or maximal intensity
Resting HR: 77
Autonomic balance within norm
Regulatory mechanisms are within the normal range

**3 hours after session**:
Satisfactory adaptation to stress
Moderate functional reserve
Slight fatigue, Cardiac system is not ready for activities involving high volume of maximal or high intensity
Resting HR: 82
Amptonia
Regulatory mechanisms are mobilized
Omega Resting Potential: 36.0 mV – optimally ready

**5 hours after session**:
Stable adaptation to stress
High functional reserve
Cardiac system is reasonably ready for any kind of activity
Resting HR: 71
Moderate parasympathetic hypertonia
Cardiac system is reasonably ready for any level of activity

Energy indexes: (tested after Tuesday session -- 3 hours after session)
Aerobic index: -2
Anaerobic index +1
Alactic: no change

I don't think this block is optimal by any means for absolute strength development. But for what I want it to accomplish, I think it will be just fine.

After this, I'll jump back into a 3-4 week accumulation block, then go into a 3 week transmutation block to really focus on pushing up my strength.

**Q: I have a couple of quick questions regarding your transition from PTC to your new college S&C position.

1. I assume you no longer have access to an omega wave so do you asses athletes readiness based of HRV and neuromuscular tests (ie vertical jump)? Any other tests/measures you use?

2. Now that your time with your athletes is limited by the NCAA do you have your athletes that need more cardiac work perform this work on their own time?

3. What means do you use for aerobic development? (I imagine weighted step ups/lunges and sled sprints would be hard to program in a group setting)

thanks for your time and good luck this year.**

A: 1) ithlete (www.myithlete.com) – HRV monitoring tool. Stopwatches, jump heights, throw distances, etc all serve as my neuromuscular readiness gauges. Heart rate monitors and athlete’s avg HR with X activity, recovery times, etc are my energy system readiness system gauge (particularly for the aerobic system)

2) Some have, others never. Depends on the athlete’s schedule. This does not count toward the training hours, so they can do this as much as they want, but busy schedules usually trump extra cardiac (low intensity aerobic) work.

3) The activities are either specialized developmental, or preparatory. I only work with football and basketball right now. If you are interested in those sports, and a particular position – ask.

 To give a quick background, I’ve been around nearly every sport in some capacity during my 7 years as a coach. My coaching philosophy is governed by the sciences of human performance, biological individuality, and interactions with countless sport and physical preparation coaches. Currently, my coaching duties are mainly involved with speed & power athletes. This includes such sports as American football, basketball, and I even consult for the sport of powerlifting.

Back in 2005, I attended a Yuri Verkhoshansky conference, and that was my first introduction to HRV as an athletic assessment tool. The tool that was being presented was the Omegawave system which is based out of Portland, Oregon. The system originated from leading edge Soviet science research of the 1970s that was generally unknown in the West. At the time, I believe the general consensus among the coaches thought the product was voodoo, but with my early background in engineering, it actually made sense to me. Since then, through validated research, and practical experience, I know that HRV is very real.

From an adaptation standpoint, our bodies have evolved hierarchical rules to deal with challenges from our environment, and the status of the autonomic nervous system (parasympathetic – rest/recovery, and sympathetic – fight or flight) often acts as an early indicator before other more serious symptoms manifest themselves. HRV is our tool to monitor our ANS to gauge the readiness of our athletes. Gives us some indication if our body is ready to support high training loads, low intensity loads, or is it over-stressed, sluggish, or mal-adapting to previous training. Theoretically, this should allow for more positive adaptations, thus yielding in a higher biological power.

One problem I see with the speed & power sector is some coaches think that autonomic nervous system monitoring is only useful for endurance athletes, and that monitoring the ANS for speed & power athletes is wasteful since there is not a ton of research validating its use with those types of athletes. If there would be a greater understanding of physiology on their behalf, they would immediately understand that it’s quite useful, and definitely can help you gauge the adaptive processes of the entire organism since the cardiovascular system interacts closely with all other organs and systems in the body. If there is a "kink" in one or more of those interactions, there will be some sort of disturbance in the CVS, thus influencing the state of the ANS.

In conclusion, I believe that all sportspeople should have assessments and that HRV is an important one. Without regular assessment, athletes are just accepting workouts and training blind, assuming they are getting better but certainly not progressing in the fastest way from A to B, which is where we all want to get to in the end.

**Q: A while back you answered some questions regarding the power and capacities the energy systems. I don't know why but I am still having some trouble wrapping my head around all of it. I have been going over Issurin's 2 books because there are some tables and charts regarding this topic, and in the glossary there are definitions, which are basically the same as what you mentioned before. From the book, aerobic power is the max. amount of oxygen one can use in a defined period of time. So just for clarification, because it seems like lots of places jumble up "power" and "capacity," a vo2 max test would test aerobic power, correct? Because of the time component? The next question I have is in terms of actually training for and testing the "power and capacity" of each system. In the book, "capacity" is referred to as "the ability to sustain fatigue" using the respective energy system. If that is all it is, how would you accurately test for it, because I would assume there might be many other factors concerning fatigue on any given day, such as sleep, eating, etc...? Also, in training, would training the power of an energy system also improve the capacity? I can see how training the capacity might not carry over to the power as much because of the reduced intensity, but for power to capacity what would the carryover be? Also, I don't know any specific tests for determining the power/capacity of a certain system, but as an example, consider using a timed running test like as far as you can run in a given amount of time. Because of the timed component, this would test the "power" of the system, correct? But with this, would an improved score on the test also point towards an improvement in the "capacity" as well, because the person was better able to "sustain fatigue" and therefore run further? I hope these questions make sense.**

A: Vo2Max test aerobic power? - Yes

Their physiological readiness will absolutely affect the test(s), hence why testing can give you false readings if you do not appropriate account and monitor fatigue. Unfortunately – due to certain environments and logistical reasons – tests must go on, but one needs to be aware of the decrease in accuracy.

For instance, if you look at the RAST test, it will give you a power index, mean power index, and fatigue index. The fatigue index is a determination of anaerobic-glycolytic capacity. The power index is the anaerobic-alactic power. Some soccer clubs use this test, but how much value it is for soccer is debatable. I personally would find/develop tests for measuring anaerobic-alactic & aerobic capacity for them.

Developing the capacity of a certain system will enhance the power as well. Remember, when training for capacity, you are developing the appropriate “substances” to allow for the body to essentially have a larger engine. The larger engine itself and by the work you performed to create this larger engine will indeed give more power, but you do specific power related work to optimize the engine you developed. Increasing capacity – buying a new engine for the car. Will probably be more efficient, go faster, better fuel economy, etc. Increasing power – taking the car to get “tuned up” to optimize the engine you have.

Power to capacity? Depends. Some workloads may be developmental or simulative. If the workload on a particular power session is high enough, it may end up enhancing (developing) the capacity as well. Now if this is a good thing or a bad thing, this is another topic by itself. Most of the time, it depends on the current state of the system you are trying to enhance power to. Sometimes power work can stimulate the systems enough to "hold" it's capacity. Given enough time though, the capacities will drop, regardless the amount of power work you perform.

A test that is governed by time does not make it a “power” test. I would recommend you pick up **Atko Viru’s *Biochemical Monitoring of Sport Training*** for more insight on this. It’s available on this site.

**Q: For your basketball players during the off-season I am wondering how you plan their glycolytic power and capacity (if any) work along with their alactic and aerobic system? Also for the football linemen what are some of the specialized alactic power exercises you have them do? Is your overall training plan similar to the The Thinker's?**

A: I can only speak about the guards; which consisted of 7 players at the time.

I was given 10 weeks.
1) 10 weeks - training
2) Boot camp
3) Preseason practice began

There were some weeks thrown into the mix where the guys were allowed to go home for a period of time.

From an energetic standpoint, outlined below was the primary focus.

Primary:
Phase 1: Low/moderate intensity aerobic capacity
Phase 2: Aerobic power
Phase 3: High intensity aerobic capacity
Phase 4: Glycolytic at times, but I would sense more aerobic due to the impression my guys gave about the difficulty level. This was out of our control.

From a biodynamic standpoint, as practice neared, the movements deployed became more specific.

Phase 4 was during a "boot camp" period. We rarely saw the guys. 2x/week. But my focus changed when they saw me. More regenerative in nature.

re: football

I didn't work directly with the lineman, but as camp neared, their energetic development consisted of more specific movements. I don't know them off the top of my head.

Generally, Thinker and I share very similar mindsets when developing the sportsmen.

**Q: What methods do you use for aerobic development with your basketball players?**

A: We have done bike sprints for longer duration for cardiac power.

We have done bleacher sprints under AT that last 4-5 seconds and performed at maximal intensity.

We have done slow tempo / moderate load squats.

We have done various specialized developmental drills on the court.

We have done low intensity aerobic work on elliptical or via calisthenics and weight circuits.

etc ...

All of these were done at or below AT besides the cardiac power work.

**Q: First of all, thank you for taking the time to talk to me before when I had questions about Block Periodization and using it for my own programming and for my athletes.

Second, I noticed you said "residual block" when dealing with individual blocks, the question was about maintaining the gains from block to block without any loss in progress from the prior block.

What exactly is a residual block? My thinking is that it is a short cycle of using the previous block, albeit in a lower volume, during the current block to maintain the previous blocks' progress.

For example:

(for simplification)

Explosiveness block (4-6 weeks): 3x3 lifts with accessory and 5x5 plyo

Residual block (1-2 weeks in explosive block): 5x5 lifts with 3x3 plyo.

Catch where I am throwing this? Is that the basis of it (simplified) or am I totally off base in my thinking?**

A: They are short blocks that are included strategically to prolong the residual effects from the preceding block(s).

The time when you include these blocks is dependent upon the qualities residual duration.

The amount of work you perform in these blocks is dependent upon the amount of work the athlete was undergoing in the preceding block that was emphasizing it. Developmental and stimulatory workloads can vary greatly.

Take a look at either:

Issurin, VB. Generalized training effects induced by athletic preparation. J Sports Med Phys Fitness. 2009. 49:00-00.

or

[Block Periodization](http://www.elitefts.com/view/?sp=2766)

for more information

**Q: I read you utilize an intermittent fasting approach. Is it the leangains or eat-stop-eat approach? What do you eat before your workouts? Would it be possible for you to lay out a sample training and non-training day for me? I'm currently trying the leangains approach.**

A: I follow more of a leangains approach in terms of my eating windows. Additionally, I usually always train with only an EAA product and eat a very large meal post workout.

Again, before workouts, I drink around 10-15g of EAAs.

Example of training day (~330-350g carbs, ~200g protein, 50-60g fat)
10:30am, 10-15g EAA
12:00pm: 180-220g carbs, 80-100g protein, 10-20g fat
~5-7:00pm: 80-120g carbs, 60-80g protein, 10-20g fat
8:00pm: left over macros, mainly protein and fat

Example non-training day (~150-180g carb, ~200-220 protein, ~60-70g fat)
12:00pm: ~100g carbs, 80-100g protein, 10-15g fat
~5-7:00pm: ~50g carbs, 80-100g protein, 20-30g fat
~8:00pm: left over macros, mainly protein and fat

Sometimes on non-training days, I will eat at 12:00, then eat again around 7:30-8:00.

From a workout standpoint, if I were to be utilizing higher volumes I would eat a little carbs before the workout. A piece of fruit usually does the trick. But as of late, my volume has been moderate, so EAAs are just fine.

These numbers are from the last time I calculated/documented everything. I haven't done this for a while though. I've weighed food long enough to gauge what I'm eating. I let the mirror, scale, and strength levels gauge how things are going. Very flexible, but it’s been working great. If I were to begin dieting, I would resume calculating everything though.

**Q: What multivitamin do you recommend?**

A: It depends on the context ... as with everything right? Environment (i.e. sun exposure), lifestyle (smoker, drinker), type of workouts, diet content, etc

I think most multivitamins are not the greatest. I think the types of vitamins and minerals they use are generally poor/low quality/bio-availability. But if your diet is poor to begin with, then they probably will help somewhat.

Even considering supplementing vitamins/minerals will be debated forever. I guess it depends what side makes most sense to you. There are some tests you can get done to see if you are "deficient" in certain things. But again, what is deficient? These are things I don't know. I would suggest further investigation on your end.

If your diet is rich in vegetables, fruits, fats, proteins then I think your bases are covered for the most part.

Athletes that are working out a lot may want to consider adding in additional B-vitamins, and zinc/magnesium supplement, as well as Vitamin D (depending on sun exposure). Obviously a good ACES protocol may help immune function.

If you’re really health conscious, probably over-think things, want to be **possibly** on the safe side, etc (like me) you could look into things like:

Vitamin A complex (mixed carotenids)
Vitamin D (preferably D3)
B-Complex (good amount of P5P and good type of B12 and not going crazy on the others.)
Vitamin C
Vitamin E (all 8 isoforms)
Mineral complex (vit k, cooper, zinc, etc)

I personally use:
Jarrow Formulations: Jarrow Pak Plus (1 pack/day - I take the CarotenALL, GammaE, B-Right, and 1/2 of the mineral balance in the AM, and the other 1/2 of the mineral balance in the afternoon or PM)
Jarrow Formulations: B-Right (2-4 capsules / day -- depending on energy levels and workout context)
Carlson Labs Solar Gems D3 (2000IU / pill) (2 caps/day - not outside much, not sunny, 1 cap/day -- outside more, and sunny)
Jarrow Formulations: FamilE (1 cap AM)
Millennium Sport Technologies: ZMK (4 caps before bed)
Vitamin C - generic (500mg / capsule - 2-6x / day -- depending on vegetable and fruit types and intake)

Essentially it's an ACES (vit a,c,e, selenium (which is in ZMK)) + B Complex + D3 + minerals "stack".

The only multivitamin I think is worth anything is AOR's Ortho-Core. It’s pretty expensive though. But it's not 10000000% of everything either -- which is good. Even though I have more products in the above list, I pay less/serving. I don't remember the $/day anymore...did this a while ago.

Another thing to possibly consider...
A friend awhile back mentioned to me to consider only going 5 on, 2 off with my fat soluble vitamins. So I take everything M-F, and only take B-Right and Vitamin C on weekends.

I would recommend you spend the majority of your money on good food before you spend money on a good stack or multivitamin. The synergistic effects of certain vitamins/minerals in food will always trump vitamins/minerals by themselves.

**Q: Are you still using intermittent fasting and if so how do you structure it around you work day? Also, when counting macros, do you count the fat in protein foods, carbs in protein foods, carbs in fat sources etc...?**

A: Typical work day w/ no class:

Wake-up @ 4:45am
Coffee (dark w/ splenda) @ 5:15am
Work @ 5:30am
Groups (FB & MBB): 5:45-8:30am
Work on whatever is needed: 8:30-10:30am
Begin drinking EAA @ 10:15am
Workout: 10:45-12:00pm
Largest meal: 12:30pm
Then work until 5-6pm? All depends
Eat last meal at 7:30pm with wife

My meals are rather large. 2 meals, I get it all in. My training does not suffer. I'm not big on large amounts of volume, but even when I'm in phases of training that pushes the volume, I will drop 10-15g of dextrose or waxy maize with my EAA or have some fruit. Does just fine.

If a food has a particular macronutrient in it, it gets counted. I know some only count particular macros in certain foods, but this limits my food options. I tend to eat very nutrient dense food the majority of the time, but I do NOT limit myself on what I want to eat. None of that clean or dirty food nonsense.

Eating more frequent doesn't make you more dedicated. My nutritional clients will attest to that one!

**Q: My question pertains to a LeanGains approach. When determining daily caloric amounts (fat loss phase), does one want to stay in a deficit for both training and non-training days, only reducing the deficit on training days? Likewise, when in a lean gain phase, have a surplus on training and non-training days but decrease the surplus on non-training days? I realize the amount of surplus/deficit depends on the individual. Is that correct?**

A: For body fat decrease you obviously need a deficit. But, don’t go too crazy on off days or low intensity aerobic training sessions. Adaptations are still taking place on these days and they still need raw materials for synthesis purposes.

An example that one could do is 10-15% above maintenance on training days, then 20-25% below maintenance on off days.

Let’s say maintenance is 2000 calories.
3 days of intensive weights: 2200 @ 10% above
4 days of off / low intensity aerobic training: 1600 calories @ 20% below maintenance

2200\*3 = 6600 calories
1600\*4 = 6400 calories

Maintenance @ 7 days: 14000 calories
Total calorie deficit / week: 1000 calories.

Now this deficit may not be enough for some. Especially for those that are really overweight. Adjust based on the situation.

For LBM gain, I like about a 1000-1500 weekly caloric surplus to begin with. Always focusing on getting stronger.

**Q: I want to be able to give solid advice to my clients on healthy eating without any BS. The more I research the harder it is to find real evidence of the claims being made out there.

Clients ask me if they should eat all organic, and what fruits and veggies have the highest nutrients. When I research these things I can't find one answer, I just want a resource of real world nutritional info that is up to date and not trying to spread their own opinions.

Too many articles are based on one study or one paper and they tell you that this is how it is, when it might not be. It’s very hard to find good solid nutritional data on what healthy humans really need.**

A: Well, I commend you for wanting to provide your clients with quality information.

I’m not necessarily a guy that thinks you should consume all organic foods. Nor do I think you should just buy the cheaper conventionally farmed counterpart.

There is research that shows the organic food vs. the conventional version yields a higher nutrient values, and there is research that shows the opposite. So to me this doesn’t really play a large part in my decision making when choosing foods. Simply going in the market and only purchasing organic is not needed in my opinion.

As you mentioned, there are articles, and even organizations that subscribe to a handful of studies that support their beliefs. Unfortunately most turn their heads the other way when research counters their beliefs. It’s convenient for them. The problem though is people cannot sell or promote the idea of, “It depends.” Certain hyped up or “different” ideas may work for some, but not others in regards to health promotion, performance enhancement, etc.

Few things my wife and I consider when we purchase our food.

1) Is it locally grown (vegetables & fruit)? After moving back from Portland where local food is extremely abundant, we try to support local when we can. Most locally grown foods (that I’m aware of) are farmed with zero pesticides, or very minimal exposure. Plus, the actual taste of local (in our opinion) is superior.

2) Pesticide exposure. There are some foods that are typically treated with larger amounts of pesticides than others. Consider an apple vs. pineapple. Conventional farmed apples are generally more exposed to pesticides, while pineapple is not. So we choose to buy organic apples, and save our money by buying conventionally farmed pineapple.

3) Buy in season. It will usually be cheaper too.

4) When it comes to beef, we try to pick the highest quality beef. This is mainly to satisfy our senses. Wal-Mart beef vs. local grass-fed beef is no comparison in regards to taste. Also, we prefer non-hormonal/antibiotic beef.

Regarding the pesticide/hormonal/antibiotic issues, there are individuals/organizations that say they are harmful, and others say they are not a threat. You and your clients need to research yourself, and then decide what you subscribe to. We treat it as a precautionary deal. If ends up not causing any problems, well then I’m out a few bucks. Where we save the most though to allow for our more expensive grocery bill is that we rarely go out to eat. We enjoy cooking, plus it allows me to control my macronutrients a lot more.

Re: what healthy people need?

Honestly, just eat whole foods, eat your produce, ensure proper protein intakes, get in your EFAs, drink your water, be active, limit stress, etc.

Then start considering organic foods, grass-fed beef, etc. Look into mineral balance tests, hormonal tests, food allergy/tolerance tests, post workout nutrition, supplements, etc. This stuff is down the food chain. Not at the top.

If they are eating 1-2 servings of produce a day, why try to change their buying patterns? The problem that needs to be changed is the amount they are eating. Help them change that first. Look up the food chain. Most people are concerned with issues that are not really relevant to them in the first place. It’s just like people chugging down supplement powders and pills, yet they’re smashing the KFC and Dairy Queen.

**Q: I am 28 and was just told by my doctor to take cholesterol meds (statin). I was also told this about 8 yrs ago and I never took them consistently. I definitely eat better than the average person, stay under 13% year round, and workout consistently (powerlifting and kb swing/BW circuit for conditioning).

Do you feel like taking these meds are a must or do you know of any effective natural methods of lowering cholesterol?

Should I add in more regular cardio?

I would also like to get your opinion on the correlation between cholesterol and heart disease.

I have a strong family history of high cholesterol and my numbers are...

total 283
trig 48
HDL 81 (way above normal for good also though)
LDL 192**

A: Sorry for the late reply.

First off, I’m not a doctor or a RD. This is simply based on my limited research in this area as this somewhat of a concern of mine due to a heavy family history with high cholesterol.

--Diet high in carbohydrates? Particularly high in processed carbohydrates? Drop that immediately. Stick with whole/real foods.
--Try a wheat free diet. Dr. Davis in Wisconsin has shown some promising labs after the removal of wheat from one’s diet.
--Don’t pay too much attention to high polyunsaturated sources of fat. Stick with certain types of saturates (i.e. coconut oil), and monounsaturates (i.e. avocado, olive, etc). Not all fats are created the same. For instance, they’re numerous different types of compositions of saturates composed of differing acids, which have different physiological effects on the body
--Consider adding in more low intensity aerobic training.
--Getting leaner may help. 13% via what method? Most methods are all suspect. Don’t rely on these much, unless you can get a 4-comparment model done if you want some reasonable accuracy.
--Do not eat “low fat”
--Get your plasma 25-hydroxyvitamin D (25-OH-D3) tested. Get this in a good healthy range. Some cardiologists that are little more progressive like to see 65-80 ng/ml ranges. I use D Drops form Carlson’s. 2,000 IU / drop. 365 drops/vial. Great option.
--Consider taking an iodine supplement if your diet is void in iodine. Kelp from NOW Foods is a good choice.
--Take your fish oil from fish that live in cold temperatures, not that garbage overpriced Lovza rx. This is more important for TG levels. But, increases in TG levels and with VLDL levels (from carb heavy foods (refined)) can convert large LDL to small LDL. They do some of the same negative things to HDL as well.
--Do you know what your LDL pattern A, and LDL pattern B was? This is important as pattern A is not as atherogenic. I don’t remember if pattern A and B are synonymous with large and small particle sizes. Look it up, see what you find out.
--How about your HDL patterns? HDL2 is most protective; HDL3 seems to be the least.
--Consider taking glucose disposal agents (ALA, Chromium, etc) with your carbohydrate meals.
--Policosanol
--Niacin
--Cocoa
--I don’t think you should believe in the eat whole grains rx most people give. This is not a good suggestion for all people. Can be for some, but not all.

I haven’t taken the time to read his latest publications, but Chris Masterjohn seems like a knowledgeable in the biochemistry department when it comes to what effects cholesterol.

**Q: I'm in the process of gathering information on block periodization to try and program my own training cycle and I think I've managed to scratch out a lot of the guiding principles but I have a few specific question I am hoping you could help with.

- Typically how are the workouts set-up during a transmutation block? 3x/week, hitting a main competition lift accompanied but an opposite (upper or lower) assistance lift? For example, SQ workout: SQ, Floor Press, SQ assistance? Am I even close?

- During accumulation blocks, is the second upper body day based on the bench press as well? Same volume and intensity considerations as the first bench workout of the week?

I realize these questions will be answered in the manual, but if you could give me a push in the right direction I'd be very grateful.**

A: There are no governing templates that you MUST follow during particular phases within a block sequence.

The idea with block sequencing is to sequence the motor qualities appropriately to ensure the highest motor potential when it counts.

How you sequence your exercises is ultimately up to you as there are no RULES per say, but since there is plenty of literature available regarding sporting specificity I would recommend you subscribe to the principle of dynamic correspondence, and Bondarchuk's exercise qualifications.

For example, as you get closer to the contest, you will be performing more competitive exercises that adhere to a higher degree of specificity that is governed by the principles of dynamic correspondence. You wouldn't be concentrating your efforts with box squats with no gear 3 weeks out if you are a multi-ply lifter that must squat to competition depth without a box would you? No.

Let’s say you have 10 weeks to get ready. Let’s use the multi-ply bench press as the competitive exercise.

You may sequence your exercises like the following:
10: bench press (low emphasis)
9: bench press (low emphasis)
8: bench press with shirt (low emphasis)
7: bench press with shirt (low emphasis) + raw 3 board (high emphasis)
6: bench press with shirt (low/mod emphasis) + raw 3 board (high emphasis)
5: bench press with shirt (mod emphasis) + raw 3 board (high emphasis)
4: bench press with shirt (high emphasis)
3: bench press with shirt (high emphasis)
2: bench press with shirt (high emphasis)
1: Meet week

Emphasis can be viewed in many ways as well -- loading, frequency, ratio between the movement itself and the stressors of other movements that are exercised during the same workout/microcycle, etc...

This does not even discuss loading, frequency, session stressors, weekly stressors, unloading periods, block lengths, block goals, the amount of stress per block you want to elicit, orthopedic considerations, equipment availability, etc

But as it points out, you start with a less specific movement at the beginning, and you begin over the weeks becoming more specific—as governed by dynamic correspondence— with your training.

**Q: During an accumulation phase, should your main lift need to increase each week or will an increase in volume of accessory work prepare the body enough for the transmutation and realization phases?**

A: Many paths to Rome my man.

When I first start out working with people, I generally start at a lower working %, and a higher volume. As the weeks go on, it looks like a linear setup with the competitive movement. But this does not mean you cannot perform some very low volume of a slightly higher % of the competitive lifts. I have also raised the volume while concurrently raising the intensity of the competitive lifts during accumulation. I have also kept the volume static throughout all the weeks, and simply raised the intensity. There are no rules Jeff.

During accumulation, the inclusion of the competitive lifts is to maintain efficiency. You do not want to make these lifts your emphasis, but you must not dismiss them completely. Your specialized-preparatory lifts can be handled and should be used with higher volumes, and can be used with higher intensities.

Make sure before you head into transmutation and realization is that you are prepared the appropriate energetic systems, and ensure you have sequenced in appropriate movements beforehand to ensure a higher movement proficiency. If you don't do this, your body will be "lost".

**Q: I just to know what is the meaning of the term 'work capacity' in powerlifting? I keep reading Dave’s stuff about how you should increase work capacity slowly, but what does he mean? And how is work capacity increased?**

A: In powerlifting, the term 'work capacity' seems to have been bastardized. It seems synonymous with the term GPP, things like tire flips, sledgehammers, and other random assortment of exercises. This is not the case.

Raising 'work capacity' is simply enhancing one's ability to perform physical work.

But, what limits this?

Largely determined by one's bioenergetic (aerobic/anaerobic-lactic/alactic) capacities, and the functional state of the cardiovascular system.

In most powerlifters (especially the ones I work with) generally have poor cardiovascular function, and poor aerobic qualities. Addressing this does not mean run around with the prowler until you puke though, or login to Crossfit's website and perform their WoD. Most of these activities are not suitable due to the high strain on an already poorly developed CVS, and high strain on their anaerobic-lactic energy system. Granted, aerobic and alactic systems will be "touched," the actual develop of these systems is far from optimal.

I don't know what Dave means by raising work capacity slowly. I would guess he suggests that if you are concurrently still trying to develop maximal strength. If you perform too much CVS and aerobic related work, there could be a negative interaction, thus slowly development of maximal strength.

Personally, I generally recommend those that are intermediate/advanced lifts to take a 3-4 week period to address these issues, while performing small dosages of maximal strength work for maintenance purposes.

**Q: I've started intermittent fasting and I've found that it fits in my schedule very well and I’m seeing pretty good results so far, but I have 2 questions. First, do you recommend fasted training even without a BCAA/EAA supplement? I'm a broke college kid and honestly can't afford it. Or in this case would I be better off eating before instead of training fasted? Secondly, would my results be as good with one large meal directly post-workout and a smaller one about 3 hours later (so about a 4 hour eating window) as opposed to the 8 hour window you use, assuming I’m still getting all my macros in? Just as background I’m 18, 5'10" 200 at about 12% BF looking to cut without losing an appreciable amount of muscle or strength.**

A: I don’t recommend training completely fasted. The upregulation of protein synthesis with during workouts with aminos is clear. Since leucine is the primary amino acid we are concerned with due to its stimulation of mTOR, you simply need 2.5-4g of it. So, analyze the amino profile of whatever protein supplement you want to use instead of BCAAs or EAAs and just ensure you are getting in 2.5-4g of leucine. Now, BCAA or EAA supplements may appear expensive, but look at how many workouts it will serve; quite a few! Considering 1 scoop of BCAAs will yield 2.5g of leucine, and each bottle generally is 90 servings, 90 workouts will last 22 weeks if you work out 4x / week. 30 weeks if you work out 3x / week.

You could also change your workout schedule. Eat to break your fast, wait, then train, and then eat afterwards. No need to supplement anything.

The longer fast (smaller eating window) is not necessary. I believe the leangains approach is setup on a 16 (fast) / 8 (feed) guideline due to protein synthesis curves – assuming your last meal before the fast is comprised of such to allow for slower digestive rate with a moderate amount of protein. Check out Martin’s site more for more information.

**Q: Do you adhere to Prilepin's table when determining sets/reps for your main lifts? It appears that you use the low end for squat/DL and a bit higher for bench press but I didn't know if this was a coincidence or not.**

A: I have that table burnt into my memory. I refer to it when I plan, but I’m not married to it like I was back in the day.

As I planned for the week; I wanted to acquire the following number of lifts (NL) in the squat, bench, and deadlift movements at a RPE of 8, and using 75% with my specific lifts.

Totals:
Squat: 25-30
Bench: 40-45
Deadlift: 30-35

Reality from Week 1:
Squat: 27
Bench: 44
Deadlift: 37

I planned to get at least 30-40% of my specific lifts in that total.

Here is what happened.
Squat: 44%
Bench: 27%
Deadlift: 32%

So, the next two weeks will look like this:

Week 2:
Number of total lift goals:
Squat: 20-25
Bench: 35-40
Deadlift: 25-30

Percentage of specific lifts: 40-50%:

RPE Avg: 8-8.5

 Week 3:
Number of total lift goals:
Squat: 15-20
Bench: 30-35
Deadlift: 20-25

Percentage of specific lifts: 50-60%

RPE Avg: 8.5

Ask the weeks progress, the emphasis of specific lifts rise.

When I go into the session, I know what I would LIKE to accomplish, but depending on my readiness, I may go do more or less. You can witness this with the percentages of specific lifts from week 1, as well as the number of lifts with all lifts combined.

**Q: Thanks for the thoughtful and long response to my previous question. I guess my next question would then be how do you determine the total weekly NL at said percent/RPE for each lift? Is this based on personal experience or a specific system of training (i.e. compared to Sheiko which has a certain NL at a given percentage based on qualification)? Also, why the quick shift from accumulation to transmuation? Thanks for your time, just trying to understand your methodology.**

A: Few considerations:

- Volume considerations from previous blocks that I have performed.

- Orthopedic considerations with my back. It is not bothering me, but I have scaled down the volume from previous blocks to accommodate this. Plus, when performing squats and sumo deadlifts, the upper leg/hips/low back dynamics are very similar, thus the volume collectively is lower.

- I'm putting an emphasis on my pull and bench.

- Trial and error.

The plan was designed before week 1 of my accumulation block started. What happens 2 weeks, 3 weeks, 4 weeks, etc after that is anyone's guess. After 3 weeks, I felt ready. Instead of taking my usual 7-8 day unloading period, I took 5 days. Without going into all the specifics in the past 3 blocks, they were collectively preparatory for my current block than anything else. Body fat reduction, hypertrophy, improvement of aerobic capacities, mobility, cardiac efficiency, etc.

The NL are inverse of the intensity of the specific lifts and RPE prescriptions for the general-specific lifts.

**Q: I'm just curious as to how improving the oxidative capacity of the slow twitch fibers helps to heighten your ability to perform the powerlifts. Would this work be appropriate for a weightlifter or powerlifter who is already at the upper end of their respective weight class.**

A: Great question.

Right now, my main goal is not necessarily to DIRECTLY improve the powerlifts. Simply building up the foundations (i.e. accumulation-like characteristics)

The work I'm performing right now is to induce hypertrophy of both fast and slow fibers (improving oxidative and glycolitic material), and placing a great deal of stress on my hormonal system.

Now, the NEED for oxidative capacities for powerlifting is probably some of the lowest amongst all other sports. But this does not dismiss their development. If I can improve my capacities at all levels (hormonal, protein resynthesis, autonomic function, cardiovascular/muscle systems, energy production (mitochondria), etc), I will be a better prepared for more intensive training (more volume, higher intensities, longer durations, higher frequencies, etc) that will require a high level of capacity.

The oxidative squats and benches are just one part of the equation. Just recall from the statement above, their benefits are small, but they are a part of the performance chain (cardiac, energy systems, CNS, neuromuscular, ANS, hormonal, immune, cardiopulmonary). Every sport has different requirements (i.e. sprinters CNS preparedness and readiness is more important than a marathon runner – football player’s hormonal development is less important than a powerlifter or a weightlifter, etc…)

All of my training is being monitored through the Omegawave to dictate the lengths of blocks. Unfortunately this past week has been very hectic, so I unloaded my hormonal work and will restart tomorrow.

**Q: In the accumulation phase for your front squat and deadlift, how frequently was each exercise performed? In Jeremy Frey’s log, it appears he squats twice a week and deadlifts every other week in the accumulation phase and I was wondering if you did something similar. Thanks for your comments; it’s great to have you and Mark here. Keep posting as much as you can!**

A: During my last accumulation block it was setup as follows:

Bench Press:
Session 1: 2/3 volume
Session 3: 1/3 volume

Squat:
Session 2: all volume

Deadlift:
Session 4: all volume

Say for the bench press, given X intensity, I prescribed 30 total repetitions for the week. Session 1 I performed 20, session 2 was 10.

During that last block, my squat and bench press volumes were the same, but I lowered the deadlift volume some.

During my current block of training, I will not deadlift. I will continue to perform supportive lifts though.

**Q: I would really like to see how a powerlifter at PTC would train. Perhaps Landon Evans? It would be cool to see a powerlifter utilizing the omega wave and such.**

A: For the last 3 weeks, I've been heavily (2-5x / day) monitoring my state using the omegawave. I just finished my 5 week accumulation block (2 lower/2 upper session, 2 cardiac efficiency development sessions). I'm currently trying out some new sequencing for my transmutation blocks and keeping a close eye on a few things:

1) Autonomic state
2) Resting omega potential
3) Resting HR
4) Energy indices (aerobic, anaerobic-lactic, anaerobic-alactic)
5) High/Low/Very Low cardiac frequencies
6) Blood pressure (non-omegawave)
7) Autogenic training influences

This block will be only 2 weeks in length.

Goals:
1) Improve relative strength with minimal lifting sessions
2) Improve cardiac output
3) Continue improving recovery capacities

Weekly calories right now are 21,100 that are placed throughout the week depending on session. I should note that I'm currently working with Borge Fagerli.

Once I'm finished with this transmutation block, I'll post more. Currently my weekly outline is as follows:

**Sunday**:
Cardiac efficiency development: 45-60 minutes

**Monday**:
80%/85% (week1/week2 respectfully) (front squat/bench/deadlift) 2/3 weekly volume applied to those lifts.

HR monitor on:
Glycolitic work after with 70-75% loads: 20-30 working reps. usually 2-3 exercises
Glycolitic depletion work w/ 30-40% loads: 3-6 sets, slow tempo (kb squats, push-ups, etc) Usually 2-3 exercises

**Tuesday**:
FT mitochondrial biogenesis work
20-30 reps
5 seconds on
HR < AT

**Wednesday**:
Same as Sunday
Very light lifting. Nothing hormonally or neuromuscularly taxing.

**Thursday**:
Same as Sunday

**Friday**:
1/3 of volume in s/b/d
1/2 of volume with glycolitic work with higher and lower intensity work

**Saturday**:
Same as Tuesday

Few quick notes on what the Omegawave has showed from yesterday to this afternoon.

Yesterday before my lifting, my autonomic was balance, but in generally, I was not ready for maximal volume or maximal intensity work. Given none of the work I had planned fell into those categories, I decided to lift.

My resting omega potential was 43.1 mV. Optimally ready.

**Immediately (1hour) after my Monday session**:
Unstable adaptation to stress
Low functional reserve
Significant fatigue, recovery or recuperation activities are preferred
Resting HR: 89
Moderate sympathetic hypertonia
Regulatory mechanisms are in a state of tension

**Last night (8 hours after lifting)**:
Stable adaptation to stress
High functional reserve
Cardiac system is reasonably ready for any kind of activity
Resting HR: 67
Moderate parasympathetic hypertonia
Cardiac system is reasonably ready for any level of activity

**AM, before Tuesday session**:
Stable adaptation to stress
High functional reserve
Cardiac system is reasonably ready for any kind of activity
Resting HR: 56
Moderate parasympathetic hypertonia
Regulatory mechanisms are within the normal range

**30 min after session**:
Satisfactory adaptation to stress
Moderate functional reserve
Incomplete recovery, no activity of maximal volume or maximal intensity
Resting HR: 77
Autonomic balance within norm
Regulatory mechanisms are within the normal range

**3 hours after session**:
Satisfactory adaptation to stress
Moderate functional reserve
Slight fatigue, Cardiac system is not ready for activities involving high volume of maximal or high intensity
Resting HR: 82
Amptonia
Regulatory mechanisms are mobilized
Omega Resting Potential: 36.0 mV – optimally ready

**5 hours after session**:
Stable adaptation to stress
High functional reserve
Cardiac system is reasonably ready for any kind of activity
Resting HR: 71
Moderate parasympathetic hypertonia
Cardiac system is reasonably ready for any level of activity

Energy indexes: (tested after tuesday session -- 3 hours after session)
Aerobic index: -2
Anaerobic index +1
Alactic: no change

I don't think this block is optimal by any means for absolute strength development. But for what I want it to accomplish, I think it will be just fine.

After this, I'll jump back into a 3-4 week accumulation block, then go into a 3 week transmutation block to really focus on pushing up my strength.

**Baseball player update**

Catcher
Age: 21
Height: 6’ 4”
Weight: 200lbs
Body fat via skinfold: 12.7% Looks 15-16%

Quick summary:
- He just got into town. 1 week ago
- Coaches told him to not train for 2-3 weeks
- No previous injuries
- Has played baseball as a catcher since the age of 12
- Left knee is slightly dull. No real pain, but is noticeable.
- Internal rotation is poor ~ – throwing arm
- Positive pec minor tightness
- Lat length is fine
- Scapula movement looks normal, strength is poor. Hard to stabilize
- Rotator cuff strength is poor
- Ankles seem locked. Suggested to see a PT for this. Massage and some SMFR has helped, but will try to get it checked out.
- Hip external rotation is poor
- Hamstring length is of poor. 45’ w/ straight leg test and 90/90 test.
- Great McGill torso score
- Standing resting HR: 64-65
- Omegawave test tomorrow (HRV, Metabolic, Omega, No neuromuscular until knee & ankle are cleared)
- Trigger points: a lot, no need to list them all here.
- Etc …

Current workout layout:

Exercises: 6-8
Duration: 3-6 rotations
Heart Rate: 120-150
Rest: 0

Exercises include dynamic stretches, single leg activities, trunk (isometric holds, isometric holds w/ upper body or lower body movement), rotator cuff movements, scapula stabilization movements, etc

He has 8 total modules built for him currently that are full body + torso, upper body + torso, and lower body + torso. These are based primarily on the assessment, and for preparation purposes for the upcoming block of training.

There is extensive stretching and SMFR after workout. Some light massage is administered to areas that are not targeted with the stretching and SMFR work.

He is training 6 times / week.