



INNERVATION
TRAINING:

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SMARTER HYPERTROPHY TRAINING

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1.

HOW IT ALL
GOT STARTED

I first picked up a weight in the 1970s, and I more or less started with powerlifting techniques; those got me nowhere. Eventually I started more traditional hypertrophy training, with higher rep ranges, more isolation exercises, bodypart splits, and that kind of thing.

I didn't know anything about program design, but I at least started to make real progress in my physique.

I won my first bodybuilding show in 1983. I still wasn't that good at program design, and I didn't understand the science, but I had – at the very least – some decided opinions about what worked and what didn't. Some of these opinions were *wrong*, but a lot of them later turned out to be right. With more experience, I could also see patterns in what worked and what didn't.

I won more contests and I started making a name for myself. This culminated in my being the only Canadian selected from applicants from 24 countries to be sent to Los Angeles and be one of the experts at the prestigious “Joe Weider Muscle Camp” in 1989. People came from all over the world to attend.

What got my brain going about all this “Innervation Training Methodology” was a moment in 1989, at Muscle Camp in California.

A PhD in Kinesiology was giving a lecture to everyone. This was a guy considered to be a top mind in biomechanics, or something or other. He was lecturing a room full of top bodybuilders, and the staff at Muscle Camp the kinds of guys you see all over supplement ads and on the covers of magazines.

The PhD made a comment about how incline flys could not work the chest. I remember Renel Janvier put up his hand and said incline flys were his favorite exercise for chest work

Here's the thing: Renel was a well-known IFBB Pro, and he had an amazing, well-developed chest. Like, you'd think the guy had giant dictionaries implanted there. Whatever he was doing... *it was working.*

But this expert in biomechanics and kinesiology completely shot Renel down. He scoffed at what Renel had said, and brushed him aside with a kind of "just a dumb bodybuilder" look. Nope, sorry, he said, it was just not "possible" for incline flys to work the chest; because of the sheer biomechanics of the movement, incline flyes "couldn't" work the chest, and they would always hit the shoulders instead. He said it was impossible and that Renel was "mistaken." Flat out "wrong" he said.

This infuriated me!

Everyone wants to use science to shoot down the "dumb" bodybuilders. But – strictly speaking – they're not using science. They're using *scientism.*

Sometimes science doesn't have as many answers as we think it does. We over-interpret the data.

The principles and methodology of innervation training show that Renel was right, and that there are valid, sound scientific reasons for why he was right.

You see, Renel had a lower threshold for motor unit activation in his chest; he could do a movement like incline flys and still get those type 2b motor units firing in his chest, especially if he concentrated. If you accept the role of the central nervous system in muscle innervation, this makes perfect sense.

Training isn't just about the biomechanics of a movement, combined with the load. *Sorry, but that is simplistic.*

Resistance training is also a **neural event**. There is *more* at play than "biomechanics plus load."

I repeat: there is *more* at play than biomechanics plus load. Before resistance training is a muscular event, it is a neural one, involving your brain and the rest of your central nervous system (or CNS).

The mind-muscle connection is real. The central nervous system can recruit motor units from one muscle or another, based on the fatigue of the

muscles, the types of motor units in the muscles, the mind-muscle connection and the concentration and intent of the lifter, and based on the anatomical leverages *of* that lifter. Most importantly, the ranges and planes of motion a muscle is working in can have varied effects from one trainee to the next.

That's what innervation training is all about!

It's about taking advantage of these things, and using program design to play to a lifter's strengths, work around their weaknesses (and/or develop those weaknesses over time), and – ultimately – **sculpt a well-balanced and aesthetic physique.**

When you understand the principles of innervation training, you will understand why the metaphors that old-school bodybuilders use – when they talk about “sculpting” a physique, just as Michelangelo would “sculpt” a statue with ideal Grecian proportions – are actually perfect ways of describing what goes on at the macro level of program design, and the micro level of individual reps execution and training.

This micro level of reps execution is what we refer to as intensity, and what Dr. Hatfield called “every inch or every rep of every set” training.

Whether you want to step on stage, prepare for a photoshoot, or you just want to look good naked, innervation training is the smartest, most efficient way to get you there.

Let's begin.

2.

THE PRIMER

Why “innervation”?

What separates “innervation” training from regular bodypart training?

The key is the emphasis on **training as a neural event**, so that your focus should be on innervating the muscle, and recruiting and activating more muscle fibers—especially those type IIb motor units that are more difficult to activate.

You also want to focus on the pump. The more advanced trainees can *feel* which muscles are being activated. More advanced trainees can even change which muscles are activated by concentrating on them (yes, this might subtly and imperceptibly affect the movement, technically speaking, but it’s not observable; it’s something you can really only experience).

This affects:

- **How you train** (i.e. you should be focusing on the mind-muscle connection, and you should hopefully be aware of *which* muscles you’re attempting to innervate in a given exercise)

- **How you design your training programs** (i.e. your program should take into account your leverages, which muscles tend to take over for other muscles in certain planes and ranges of motion, where you need development, your workload capacity, etc.).

The goal – especially in the early years of training – is establishing **grand neurological patterns** to working muscles.

This takes place over time, and that means *years*.

You don't do it in six weeks with the one magic training program that somehow produces a balanced, aesthetic physique for every single trainee on the planet. Different trainees will have different needs, based on what their lagging body parts are, their level of development, their workload capacity, and so on.

Think of it like building a highway. The grand neurological patterns are the highway. That highway comes first. You generally do it with big compound lifts. As you get more advanced, you move on to more isolation exercises, and start noticing what muscles activate for what exercises. This is akin to adding collector lanes, off-ramps and that kind of thing *to* your highway, to better strengthen the connection between mind and muscle.

Maybe when you try to work your chest with flies, your shoulders take over. You

do flys flys and more flys, and nothing. Your training programs need to account for that; you wouldn't just "do a bunch more chest exercises." In this specific case, we first need to make sure the technique is even right (it's often not), but then look at why this is happening. E.g., does the trainee just lack the ability to recruit the motor units in his/her chest? (Do their triceps also take over when they bench? Hm..)

Or maybe this person just has a weird body, such that a certain kind of fly will almost always recruit the shoulders. Maybe it's a combination of these things.

Part of the difficulty, for a coach, is in identifying when this is happening, or – even better – *preventing* it, by knowing ahead of time what will and won't work for a given trainee.

Frankly, young or newbie trainees have no idea what's being innervated, or what is taking over for what. They have no efficient mind-muscle connection, really. For everyone of average genetics, the mind-muscle connection a learned skill, one that you earn from training and concentrating during train.

I repeat: the mind-muscle connection is a skill you build over time. By no coincidence, your physique builds along with this skill.

For example, look at younger pictures of Arnold and then compare them to him in his prime. This is a cause-and-effect maturation of the mind-muscle connection.

This is why a good coach looks at the body type of the trainee (do they have short limbs or long limbs? How big are their hips? etc.) and watches out for cues like “I really felt it in my ____ when I did it this way,” as well as a host of other subtle cues in feedback from the trainee about what’s happening in their body.

This feedback is not isolated solely to what they feel in the weight room. It can relate to soreness, stress, lethargy, sleep, their ability to recover, lifestyle factors—almost anything.

You can’t separate “training” from the rest of your life.

3.

THE KEY TERMS

INTENSITY

Intensity is the ability to come as close as you can to your maximum workload capacity. Intensity is a learned skill. If you stick with it, then five years from now you will be capable of more intensity than you are now.

Take an experienced lifter and a newbie lifter. Have them both perform a dumbbell curl with a 20-lb. dumbbell. Even though the more experienced lifter *could* successfully perform the rep with much more weight than the inexperienced trainee, even when they're both using the same 20-lb. dumbbell, the more experienced lifter can do it with more intensity.

This is one reason why as a lifter becomes extremely advanced, they *have to* lower the weights they work with. They are better at working out with more intensity, and this needs to be factored into their need for recovery.

“Intention” is important here. Think of **intensity**'s etymological link to **intention**. They both come from the Latin *intentio*, meaning a kind of stretching out, straining, exertion, or effort. With intention, the exertion or stretching out is of the mind. In intensity, it is a raw exertion—you might say it is the manifestation of the intention.

WORKLOAD CAPACITY

Workload Capacity is the ability of a trainee to tolerate a workload.

Dr. Mauro Di Pasquale uses it almost as a synonym for endurance. There are different types of workload capacity. An endurance runner has a certain kind of workload capacity; a bodybuilder has another. If your goal is bodybuilding, you want to develop your workload capacity *for bodybuilding*. Not just raw or limit strength, but what Scott has taken to calling strength density—strength that lasts through a high-volume workout.

If you give a newbie trainee a training program that has the volume a pro bodybuilder uses, you'll accomplish nothing, because the trainee doesn't have the workload capacity to deal with that volume. That volume is "junk" volume.

"More" is not always optimal.

Optimal is optimal!

HIGH-THRESHOLD MOTOR UNITS

Motor units are types of motor neurons that attach directly to your muscles. A motor “unit” actually includes neuron and the fibers attached to that motor neuron. Every motor neuron is attached to fibers of a single type: type I, type IIa, type IIb.

The “high-threshold” ones are the motor units that are *hardest* to recruit. The threshold is *higher*, so these units are harder to recruit and engage. The “**size principle**” states that motor units are recruited in order of smallest to biggest, because this is efficient. If you’re only lifting a pencil, your body doesn’t need to recruit all your fibers. However, for hypertrophy, we want the biggest, so we need enough intensity to activate them.

Experts used to think getting past this threshold was all about load, but, as it turns out, it is actually the intensity of the contraction that matters, and the **intention** to contract the fibers as fast as possible—and this is possible with lighter weights, and it has to do with the mind-muscle connection.

The issue in proper program design is to create enough intensity to “get at” the higher threshold motor units—the ones controlling those Type II B muscle fibers we want in order to induce hypertrophy. But as above, note that intensity is learned *over time*. Program design also takes this into account.

EXCITATION THRESHOLDS

Beyond the threshold of the individual motor unit, there are also excitation thresholds in the CNS (or, possibly, the “PNS,” or peripheral nervous system). **Pinning these down, and the mechanisms by which they work, is much, much trickier.**

In textbooks, the CNS is often portrayed like a circuit board. That’s a useful metaphor, but it over-simplifies what’s really going on. Pinning down cause and effect ain’t easy, in short. (In the words of a neurosurgeon Mike spoke to about this, “Well, think chaos theory. It’s more like a non-linear chaotic system.”)

Much of this is genetic.

Think about Renel, whom I mentioned earlier. Renel had lower excitation thresholds for activating the high-threshold motor units in his chest – at least in the range and plane of motion for low incline flys. That is why *he* could “love” doing incline flys for his chest, even if others have trouble feeling them. For him, they were a great exercise for activating the high-threshold motor units in his chest, even though he would have been using far less weight than he would for, say, bench press or incline press.

MAXIMUM VOLUNTARY NEURAL ACTIVATION

The keyword here is **voluntary**. It is the limit of your ability to do what you *choose* to do. This is about getting more effective recruitment by mentally engaging with the working muscles.

Literally, “mental intent” can directly influence muscle recruitment. This can’t be measured inside the weight room, but it can be observed and felt by the trainee.

Most people cannot do this, and most trainees never get to this level of training intensity and maturity, but it should be the goal of every bodybuilder. This is an adaptive process of the nervous system to training and it takes place over *years*.

Note that in *The Abel Approach*, instead of “**Maximum Voluntary Neural Activation**,” the term I use more often is **Maximum Voluntary Contraction**, or **MVS**. You can think of it in terms of the voluntary neural activation “causing” the maximum possible voluntary contraction. That’s not 100% literally true, but it gets the gist across. Some of the research refers to similar ideas as the “Total Activation Potential” of the muscle fibers.

FUNCTIONAL DIFFERENTIATION AND SEGMENTED UTILIZATION OF MUSCLES IN ACTION

The central nervous system is responsible for recruiting muscles, and it won't do this strictly according to what we call the biomechanics of a movement, because biomechanics often ignores the role of the CNS.

The CNS will recruit muscle fibers according to which fibers have a favorable line of action from its perspective, based on those excitation thresholds I talked about earlier. However, which muscles are considered to have a “favorable” line of action can change if some of your muscles are tired, if certain muscles are more or less developed, and according to your training background and genetics.

This is why some trainees *think* they're doing an exercise to work their chest — because hey, that's what that little biomechanics chart on the walls *says* they're doing — but in reality their shoulders are taking over. (Or vice versa, depending on the exercise and the trainee.)

This is also why a proper consideration of ranges and planes of motion in exercise selection is so important, and also why there's a certain amount of individualization to all this. This is also the point where small tweaks (aka the art of “tweakology”) can make a big difference for a trainee.

4.

TRAINING TAKEAWAYS

[the stuff you can do RIGHT NOW]

These are all things you can begin doing immediately, at your very next training session!

So, the methodology and principles are all fine, you say, but what should a trainee do *right now*? Here we go:

Tip: First of all... you need to *stick to your programs!*

If you're on a hypertrophy training split, you need to be on it for ***at minimum 8 weeks.***

In order for your body to experience a real adaptation to the program, that's how long it takes **at the very minimum.** Don't just jump immediately to what you think might be "better" because you read it online or in some magazine.

Your body doesn't just adapt to individual exercises. It adapts to training programs as a whole. The mastery phase of a program doesn't begin until at least several weeks in, and you want to milk the mastery phase for all it's worth!

““ A collection of exercises does not automatically equate to an effective workout... and a collection of workouts does not automatically equate to an effective program! ””

Tip: Your focus should be on the mind-muscle connection.

Your goal is to train the muscle, not the movement.

There are *some* exceptions, as some programs take advantage of *some* lower-rep ranges to “surf the strength curve.” Also, functional training, or my MET training, might put a *bit* more focus on the movement.

Sometimes!

An exhaustive list of exercises and what muscles “should” be activated for each exercise, weighed against which nearby muscles may commonly take over, would result in a giant encyclopaedia. For right now, you need to at least *be aware* of what muscles you’re working, or “trying” to work. We call this this “*target training.*”

This means you need to learn the exercises!

Tip: Read all you can. Always **be aware** of what muscles you're working, for each and every rep.

That info is out there, but partly it can only be learned in the doing — in the weight room itself. Yes, *learn the biomechanics* of the exercises, but also be aware of individual leverages (how short limbs vs. long limbs will affect an individual exercise, etc.) and try to be aware of what's happening during each rep. This is a subjective assessment, but it is important.

Just as Renel did above, learn to “feel” your muscles working, and then get them to work the way you want them to work! This is a workout skill that takes years to accomplish.

You won't be able to “feel” muscle innervation at first. Your goal is to *get there*, to *learn* to feel it. That takes time: think of it like a baby learning to walk.

You will likely *start* to first “feel” innervation in a few of your most “responsive” bodyparts, because that's where you have the motor units with the lower activation thresholds.

Tip: Your goal is increased intensity.

Remember, this is not just a subjective assessment of how hard you “tried” to workout today versus yesterday (although certainly that is an important internal cue). This is also a skill your body learns; a more experienced trainee has a body that is capable of more intensity.

“More weight” is not the same as “more intensity.” Forget about how “much” weight you lift, **and start focusing better on how you lift it!**

Anything that “gets in the way” of intensity is not helping you. This means focus on a pumping cadence, but **don’t “count” your tempos**. That’s an “outside in” approach, when you’ll get a better mind-muscle connection working from the inside out.

Tip: Use a proper warm up so that you can actually *achieve* higher intensities during your work sets.

If you want to get the most out of your workout, you need to be warmed up. Warm ups aren't just about "not getting injured." They're about getting your muscles (and your brain) ready for innervation and overload.

I recorded two separate (free) videos on warm-ups for *The Hardgainer Solution*, but they are 100% applicable to my other training programs.

The videos are available free on Youtube, at these links:

Part 1: <https://youtu.be/EHJFV13Njsk>

Part 2: <https://youtu.be/wHXYvxAU-Hw>

Those videos above include bits on unloading the knees, but here is a video specifically on unloading the knees for the squat:

https://youtu.be/_mQsVp5TWnk

And here is one on unloading the knees for lunges:

<https://youtu.be/7Qn1qivYELE>

Tip: Aim or try to feel intensity even during the beginning reps of a set, not “just” the final reps.

One concept (among many) we did not cover here is **TEP**. This is **Training Efficiency Percentage**.

It is the number of reps in a set that force an adaptive response. Put another way, when an experienced lifter does a set of 10, every rep is intense, right from the get-go.

When a newbie lifts, the first 5 reps feel like nothing, and it’s only the last few reps that force an adaptive response.

For now, your goal is to *try* to feel that intensity, even during the early reps of a set. You won’t be able to do it at first, but that’s the goal.

Interesting Side Note: TEP is one reason why an intermediate lifter and a more experienced lifter can do the exact same program and get a completely different experience out of it. Indeed, with my clients, sometimes a trainee will go through a program, then do a few more programs, and – after the course of *years* – they will come back to that program and do it again.

Tip: Focus on the internal cues, not the external ones.

For individual reps, forget about fancy tempos and focus on a pumping cadence.

For rest times, forget about what the clock on the wall says, and judge your own readiness. Can you execute the reps? Are your muscles ready? Are you out of breath, or just have some slightly elevated breathing? (Generally, you want just slight oxygen debt before your next set, but this changes from program to program.)

Forget the weight on the bar for awhile, and focus on how good your mind-muscle connection was. Don't log only the weights you lifted. By itself, this tells you nothing. Focus on the experience of those reps.

How tired were you at the end of the set? Or the end of the workout?

Did one exercise feel better than another? Did one produce a better mind-muscle connection in the targeted muscle?

Start paying attention to these things.

Tip: Always use the full range of motion for the muscles you are targeting. Muscles are only fully innervated if you do so!

Remember this key tenet of Innervation Training:

Muscles stretched with resistance receive the most overload, and the degree of stretch determines the intensity of contraction.

...obviously this means *learning* what the full range of motion for a given working muscle is!

Sometimes (this is rare, mind you), trainees go too far.

For example, on a Bicep Curl, if you elongate the arm too much at the bottom, you'll take the tension off the bicep itself. On a Leg Press, if you bunch up your legs too much at the bottom of the rep, you can put your back in some danger. (Again, I want to emphasize that "not enough" range of motion is far more common than too much, what with trainees doing little "inch ups" for the Leg Press, and things like that.)

Tip: Pre-load the muscles with resistance.

This relates to the points above about full range of motion and knowing what muscles you're working.

But there are other takeaways, related to using proper form so that the targeted muscle is the one that actually gets pre-loaded.

Here's a specific example:

If you're doing bicep curls, you can perform a normal bicep curl (palms up, supinated grip) *or* a hammer curl (palms facing your body, neutral grip, like holding a hammer) but you probably don't want to switch between the two grips within a single rep, as many trainees tend to do. Trainees will use the hammer grip when the dumbbell is at their side, but then twist it to a palms-up or supinated grip *as* they curl it.

In most cases, this is sub-optimal. The different grips use different muscles, so if you have a hammer grip at the *start* of the rep you've pre-loaded one muscle, only to then switch partway through the rep.

In this case we're talking about the biceps brachii and the brachioradialis. Yes, these muscles tend to work in concert and support each other, so an advanced trainee can perform it this way. But it's best to know what you're targeting, why, and how. That's what "target training" is often all about.

Tip: Fight your body's natural inclination to make things easier.

Your body naturally *wants* to take advantages of levers, fulcrums, gravity, momentum and so on. Your goal is to fight this so that you can get muscles to put out maximum effort.

Once again, this means NOT focusing on how much weight you lift, but focusing instead of getting the most out of the load you are using, and possibly lightening the load in order to feel the proper resistance through the full range of motion!

Tip: You can prevent some of the above problems by switching from dumbbells to cables.

For example, tricep kickbacks are terrible, because of the way gravity works. You're not getting resistance throughout the movement.

However, use a cable instead, and suddenly you've got tension going throughout the full range of motion.

Tip: Always use a “pumping cadence”

Always use a **pumping cadence**, but NO “counting” your tempos or anything. A certain kind of tempo or rhythm will come naturally, but not because you’re keeping track or counting inside your head.

Tip: Leave your ego at the door.

It’s not about how much you lift.

I repeat: it’s not about how much you lift. It is about how you lift it.

Tip: Really ask yourself: could I get “more” out of this set with the current weight?

You want to add weight on the bar. You’re hitting your reps.

But: be really, really honest here (and see above about ego)

If you were to stay at the current weight for just a bit longer, could you get “more” out of your sets? Could you get more intensity, more explosion and control and pumping cadence? Have you sacrificed some of that unnecessarily in order to reach “exactly” however many reps that little piece of paper says you should get? What happens if you don’t sacrifice these things?

Tip: Watch the movie *Pumping Iron* (1977)

If you want to see what I mean about ALL of this, go watch the movie *Pumping Iron—right now!* Consider it “Physique Sculpting 101.”

At the time of writing this, *Pumping Iron* is available on Netflix, at least in the US and Canada. You can buy or rent the digital version on Amazon, or get the physical DVD or Blu-ray from there as well. There’s a great training sequence about 40 minutes in, comparing Arnold and his friends and Lou Ferrigno. (Watch some of the background people, the non-bodybuilders in Lou’s gym for examples of what *not* to do!)

You can also find the training montages from the film on Youtube. Just search “Pumping Iron training,” and try to ignore the terrible music that’s often been added. Watch the cadence, the full range of motion, and the intense focus on the muscles—every part of the rep is getting squeezed for all it’s worth.

No, you won’t get the science, but you’ll see how it’s done in the real world. (You don’t technically “need” to know the science to get more out of your training.)

5.

THE BODYPART BREAKDOWN

[Tips to better feel each bodypart]

THE BODYPARTS

Legs

Go for full range of motion, and forget how much you're lifting.

Consider much higher rep ranges. Literally, this means 20+ reps in a set. This is sometimes safer with a leg press, relative to say a full squat, although both these exercises are great.

Generally, stay away from the rep ranges below 10 for most isolation exercises like leg extensions.

Back

Row, row, row your back. Row it, don't throw it!

You'd be amazed how often your body wants to recruit other muscles and use momentum and torque. (Just the other day I had a trainee doing a bit of a *calf raise* on his one-arm dumbbell rows, creating torque and taking load off of his backs and lats.)

Pumping Iron actually has a great example "rowing it" without throwing it for cable row.

For pulldown movements, try thinking of your hands as mindless hooks, but focus on the pull with your elbows, to feel it in the lats.

Delts

Shrug all lateral movements at the top. This doesn't mean, "throw it" a bit at the top; it means actually feel it in the shrug. (No, this won't just work your traps. Don't worry.)

Also, don't bend your arms on lateral raises and do the funky chicken dance—this is an example of your body trying to make it easier. Avoid it.

Chest

Remember: "above the eyes for presses and flyes."

Now, this is not 100% literal; it's just that most people come up way too low, just over the sternum, instead of doing these movements a bit higher over the actual chest.

Biceps

Flex the weight up, and then "*fight* the flex" on the way down. This doesn't mean "go slow" on the way down, but keep the tension in the muscle you're working.

Similarly, on some bicep movements, you can increase the tension and prevent things like gravity from taking over by using cables or bands.

Triceps

Same rules as for biceps in terms of flexing or “squeezing” the weight up and fighting it on the way down (or vice versa for pressdown movements).

For pressdowns, don’t draw the rope or bar into your body, as if you’re pulling it in. Push it down and away. (Your triceps are for pushing and pressing!) Also, just avoid bent-over triceps kickbacks. They are terrible, for the simple reason that gravity exists. This is another case where the issue is fixed quite nicely with cables

Feedback

More questions?
What do you want to know more about?

Let us know.

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