

Notes on Strength & Hypertrophy

The #1 tool for combating neuromuscular aging is strength training. CAN NOT get that from any other exercise mode.

After age 40, lose:

1% of muscle mass/year.

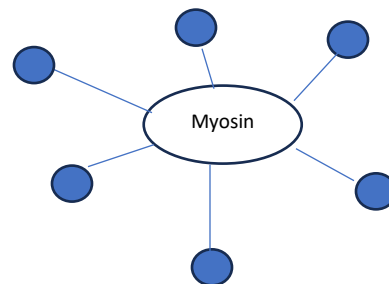
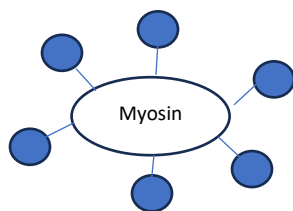
2-4% strength/year.

8-10% power/year.

ST = "Look good, feel good, play good."

ST = Can see faster results compared to fat loss and endurance training.

- ❖ Big overlap between ST & HYP initially, then over time they can become separate from each other.
- ❖ Can increase ST without size.
- ❖ Harder to increase HYP without getting some strength.
- ❖ Muscle should be considered an organ (the largest over the skin) because it regulates the immune system, has RBCs, is a depot for AAs, & blood glucose.
- ❖ For a lifetime of healthy bone marrow density & strength, it is best to have ST starting in teens and early twenties. There is some benefit to starting later in life (i.e., late 40s).
- ❖ Reason why one can increase HYP and decrease strength = lattice spacing in fibers:
 - Six actins surround each myosin.
 - When a contract, sarcomeres stack up.
 - If actin is too close together = stronger.
 - If actin is too far away due to HYP = may get weaker (longer pull and earlier detachment).



- Protein synthesis is not simply growing muscle.
- Can build muscle without ST, but if it occurs, it's usually because one has been deficient in protein intake.

- Protein synthesis simplified:
 - AAs → Combined two AAs → Peptide → Combine multiple AAs = Polypeptide → Combine a lot of polypeptides → protein → to hair follicle, muscle, RBCs, other tissues.
- Why simply eating protein without ST stimulating protein synthesis: the body wants to make them.
- Protein is transient, and the body wants to use it and not store it.

WHAT IS HYPERTROPHY?

- As actin and myosin increase in size, muscle size increases to accommodate.
- Sarcoplasmic hypertrophy does occur, but may not increase the size of other structures that increase strength (A-M), which is another reason HYP may not increase strength.
- Muscle tissue is unique among other cells because it is multinucleated, thus multifunctional.
 - There is a limit to its size because the body wants to preserve that.
 - Then, it was thought that dormant satellite cells determined the size potential.
 - Then detraining came in, and if one quit training, new nuclei “remember” how to access DNA and rebuild muscle, so it occurs faster.
 - BOTTOM LINE: We know “how” to stimulate increases in strength, power, and hypertrophy – and have been doing it for decades, but we are still determining “why” it occurs on the molecular level.

PROTEIN INTAKE AND HYPERTROPHY

1 gram/pound.

If below that, type, quality, and timing factor in.

Timing in general is not a big deal. Get it in somehow.

CHO timing IS big as one needs glucose for HIT.

Post strength-only workout: 1: 1 CHO: protein.

Post conditioning workout: 4:1.

Post combo ST & conditioning workout: 2:1.

Hypertrophy-only workout: no advantage to NOT eating pre- or post-workout.

Supplements: #1 non-macro advice is CREATINE MONOHYDRATE @ 3 – 6 grams/day based on one’s body weight:

- Increases bone marrow density.
- Increases cognitive function.

- The timing of it does not matter.

BASIC TENETS OF ANY TRAINING PROGRAM

1. Adherence/consistency.
2. Progressive overload.
3. Individualization: personal preference + available tools.
4. Specific target/goal: too much variation or too much specificity can be counterproductive.

STRENGTH – POWER – SPEED: 3-5 METHOD

- 3-5 days/week.
- 3-5 exercises.
- 3-5 reps.
- 3-5 sets.
- 3-5 minutes rest between sets.
- Progress @ 3-5%/week.

Prilepin's Chart

Percent of 1RM	Reps per Set	Optimal Total Reps	Range of Reps
55% - 65%	3-6	24	18 - 30
70% - 80%	3-6	18	12 - 24
80% - 90%	2-4	15	10 - 20
90%	1-2	7	4 - 10

1RM = 1 Repetition Maximum

Strength & power training is MUSCLE MOVEMENTS (not response).

Every exercise is done with 100% effort.

Should not create much fatigue.

A hypertrophy workout immediately following a S-P-S workout can interfere with recovery.

Strength loads @ 70%+ 1-RM

Power/speed loads @ 30 – 70% 1-RM

Strength cadence @ C :01 Pause :01 E :03

Hypertrophy cadence @ C :01/:02 Pause :01 E:03

Beginners stay with the same program for at least 6 weeks.

Recovery depends on volume and intensity.

Cluster sets: be fresh on every rep:

3 x 5 = 1 rep → rest :10-:20, repeat.

Rest 5:00 between sets.

Dynamic variable resistance (bands, chains).

THE STIMULUS FOR HYP IS IDIOT-PROOF

1. Must stress muscles – many overload protocols. A cascade of events where overload activates the nucleus → stimulates ribosomes → stimulates protein synthesis.
2. Hypertrophy is training MUSCLE RESPONSE (not movement).
3. Must be strong enough.
4. Must be frequent enough.
5. Combo of 2 & 3.

Both volitional muscle fatigue (VMF) and infrequent (i.e., HIT every 3-4 days), or frequent + 2-3 reps in reserve (RIR) (3 days/week @ just hard), but not if infrequent + not hard enough.

NOTE ON RIR: If you're a rookie and untapped, forget RIR and go for max reps to tap into your genetic potential. Why hold back when you can do more?

To optimally create the environment to grow muscle:

1. ATP energy to contract a muscle.
2. Overload.
3. Protein to rebuild.
4. All other systems must be functioning optimally. If ill, stressed, injured, eating poorly, etc., and the immune system, organs, and other tissues need resources that are not available and thus are compromised, it will diminish one's maximum potential to grow muscle.

HYPERTROPHY SUMMARY

1. Many variations work.
2. 10-15 sets/muscle group/PER WEEK of direct exercises, which includes prime movers and secondary synergists, but not tertiary synergists.
3. Four to 30 reps, but 8 – 15 is optimal.
4. VMF or close to it (2-3 RIR).
5. Rest between sets @ :30 to 3:00 - 4:00.
6. Progression (many options).
7. To maintain hypertrophy, one needs a minimum of 10 sets/muscle group/week (i.e., 2 days/5 sets, 1 day/10 sets, 3 days/3-4 sets).
8. Do not use cold therapy after hypertrophy workouts because it blocks adaptation.