

# IN SEASON TRAINING

## PART I:

### *PERFORMANCE DETERIORATION*

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As the summer season ends and the fall sports season begins, thousands of athletes across the country begin reporting for pre-season conditioning practices and double sessions. Whether Professional, Collegiate, or High School, many of these athletes will report to practice in some of the best shapes of their athletic careers. After a rigorous off season consisting of weights, metabolic conditioning, Plyometrics, yoga, and any other means of performance training, these athletes are physically ready for the rigors of the up coming season. The season they have been working so hard to prepare for is finally upon them. So now that the season is here, the athlete can now lay off the training and rely completely on the conditioning provided at practice to maintain the hard earned results. Right? WRONG!!!! This is the way many athletes, particularly at the high school level, approach their training. They have worked so hard over the off-season months, so now they can kick back and keep those results without doing a thing to maintain them, besides sprints and calisthenics in practice. What good is it to have your highest vertical leap (greatest expression of total body power) in the pre-season if you cannot jump over a candlestick in the post season. Why put such emphasis on being your strongest and most powerful at the end of the summer, when you are going to be at your weakest when it counts late in the fall. If there is no program in place to maintain those hard earned results, an athlete may be heading for disappointment after disappointment 4-6 weeks after cessation of training. These are the potential effects an athlete may face if they do not dedicate themselves to an in season training program focused on maintaining the performance gains they have worked so hard for.

Performance Deterioration, also known as Detraining, Reversibility, De-Adaptation, is the result of an extended cessation in training. If you completely stop training, your hard earned results will slowly deteriorate. It is as simple as that. According to Kramer in his study on Recreationally Strength Trained Men, “Physiological changes corresponding to decreased performance capacity have been reported after periods of significantly reduced training, complete cessation of training, and immobilization. The magnitude may be dependent upon the length of the detraining period and how highly trained the individual is.” Basically, try working out for two months, then lie on a couch for a week and see how you feel come the following Monday morning. That of course would be extremely impractical. Instead, try working out for a 2-3 month period, followed by 1 month of complete cessation of working out. As author of this article this is the approach I took, and below are the findings of my “mini study”.

## **Background Info**

**Age:** 32

**Sex:** Male

**Workout Experience:** 15 years

**Training Frequency:** 4-5 X/ Week

**Focus of Training Prior to Cessation:** Increase Total Body Power/Vertical Leap

**Last Recovery (break) Period:** 3 months prior to complete cessation

**Average Workout Duration:** 60-90 minutes (including warm up and cool down)

**Diet:** Follow Organic Healthy Diet, Do not drink Coffee

No lifting, running, jumping, metabolic conditioning, or stretching. No exercise at all for one month besides regular day to day activities. Below are the baseline results recorded on the eve of the first day of the study.

## **Performance Results as of July 11, 2006**

**Vertical Jump:** 28.5 inches

**Electronic 40:** 5.02s

**Squat:** 345 lbs

**Bench Press:** 230lbs (ugh)

**Metabolic Sprint on Versaclimber:** 305 feet in 1 minute

**Max Pushups:** 62

**Max Pullups:** 18

## **Body Composition Results as of July 11, 2006**

**BodyWeight:** 182lbs

**% Body Fat:** 10.38%

**Waist Measurement:** 32in

### **Results after Week 1**

Vertical Jump actually up ½ inch to 29 inches.

40 is the same.

Did not test squat, bench, versa, pullup or pushups until the study was over.

Bodyweight – 180 (could have been what was eaten or how I slept)

% Body Fat – 10.70%

Notes:

Did not feel too bad.

Bored during the day without workouts scheduled.

Feel like I need some physical activity.

Had Coffee Thurs, Fri and Sat morning because I was tired in morning.

Vertical Jump Felt great!

### **Results after Week 2**

Vertical Jump: 29 inches (no change).

40: 5.1s ( felt slow)

Did not test squat, bench, versa, pullup or pushups until the study was over.

Bodyweight – 179

% Body Fat – Did not test

Notes:

Becoming Sluggish.

Needing coffee every morning to give me an energy boost, sometimes 2 per day.

Muscles beginning to feel loose.

Arms shrinking, especially muscles of the forearms.

Feel very weak.

Eating well.

### **Results after Week 3**

Vertical Jump: Did not test ( wanted complete cessation of any training)

40: Did not test

Did not test squat, bench, versa, pullup or pushups until the study was over.

Bodyweight – 176 (must have been carrying some water weight)

% Body Fat – Did not test

Notes:

Felt very lethargic

Difficult waking in the morning, tired mid afternoon, and wiped out by 8pm.

Need 2 coffee's per day to keep energized (1 in morning, 1 mid afternoon)

Becoming agitated easily

Body feels weak. Shoulder feel like they are rounding forward, upper back muscles becoming loose, and leg strength feels like it is decreasing dramatically.

### **Results after Week 4**

Vertical Jump: Did not test (wanted complete cessation of all training)

40: Did not test

Did not test squat, bench, versa, pullup or pushups until the study was over.

Bodyweight – 176 (must have been carrying some water weight)

% Body Fat – Did not test

Notes:

Need to workout.

Feel like leg strength is completely gone.

I am tripping on things all over the place.

Feel like it takes so much energy to hold myself up and do menial tasks.

Addicted to coffees. Actually had 3 coffees 2 days this week.

Very agitated. Feeling depressed.

Shoulders, neck, and back starting to bother me.

Thought process is slow. No wit. (not that I ever had any in the first place)

Winded walking up and down stairs to do laundry.

In a nutshell, feeling soft, weak, lethargic and depressed.

Cannot fathom jumping, squatting, pushups, versa sprint etc...

## **Final Results as of August 11, 2006**

### **Performance Results:**

**Vertical Jump:** 25 inches

**Electronic 40:** 5.48s

**Squat:** 265 (back and knees began to get sore from the squatting)

**Bench Press:** 200 (felt like I was going to pull a pec muscle)

**Max Pushups:** 37

**Max Pullups:** 12

**Metabolic Sprint on Versaclimber:** 240ft (almost could not finish, took about 10-15 minutes to recover)

### **Body Composition Results:**

**Bodyweight:** 173lbs

**% Body Fat:** 14.2%

**Waist:** 31in

These results speak for themselves. If you stop working out, your hard earned results will slowly disappear. I will discuss these results in In-Season Training Part II. Because I am the author and subject of the study, I understand there may be objectivity issues to these results, so I have included in this article results of many other studies on the subject of performance deterioration.

1. Hortobagyi, T, Houmard, J, Stevenson, J, Fraser,D, Johns, R, Israel, R. **The Effects of Detraining on Power Athletes.** *Med. Sci. Sports Exerc.* 25: 929-935. 1993
  - Reported a significant decrease in fast-twitch muscle fiber size after only 2 weeks of detraining in highly trained power lifter and football players.
2. Fleck, S., Kraemer, W. *Designing Resistance Training Programs.* Champaign Ill. Human Kinetics, 1987
  - No decrease found in 1-RM strength (squat, bench press, leg extension) in college football players who followed a specific in season training program.
3. Nuefer, D, Costill, D, Fielding, R, Glynn, and Kirwan, J. Effect of Reduced Training on Muscular Strength and Endurance in Competitive Swimmers. *Med. Sci. Sports Exerc.* 19:486-490. 1987
  - Swim power, as measured on a biokinetic swim bench system, declined by 13.6% in male college swimmers after only 4 weeks of inactivity.
4. Schnieder, V, Arnold, B, Martin, K, Bell, D, Crocker, P. **Detraining Effects in College Football Players During the Competitive Season.** *Journal of Strength and Conditioning Research.* 1998, 12(1), 42-45
  - Once the competitive season begins, more practice time is usually devoted to skill development and system execution; thus many positive effects of the pre-season training program could be lost relatively quickly.

Test Type	Pre-Season		Post- Season	
	Lineman/ Lineman	Non Lineman	Lineman	Non Lineman
Bench Press (lbs)	313.21	298.29	288.91	279.14
Flexibility (cm)	25.63	32.89	27.31	31.91
Vertical Jump (cm)	55.44	64.97	53.88	62.01
Long Jump (m)	2.39	2.61	2.38	2.58
Agility Run	4.69	4.35	4.64	4.34

**This study was done with 2 days of working out during the season!!!! As this study shows, with 2 days of week of working out during season, an athlete can still have decreases in performance.**

5. Kraemer et al. **Detraining Produces Minimal Changes in Physical Performance and Hormonal Variables in Recreationally Strength Trained Men.** *Journal of Strength and Conditioning Research*, 2002, 16(3), 373-382
  - Significant decreases were observed in the detraining group for both peak power and mean power.
  - Short Term (3 weeks) training cessation appears to significantly reduce the anaerobic power performance as measured by the Wingate Test.
6. Hakkinen, K, Komi, P, and Allen, M. **Effect of Explosive type strength training on isometric force and relaxation time, electromyographic and muscle fibre characteristics of leg extensor muscles.** *Acta Physiol. Scand.* 125:587-600. 1985
  - Decreases in muscle fiber size with concomitant changes in fiber-type composition have been reported after periods of detraining.
7. Hortobagyi, T, Houmard, J, Stevenson, J, Fraser, D, Johns, R, Israel, R. **The Effects of Detraining on Power Athletes.** *Med. Sci. Sports Exerc.* 25: 929-935. 1993
  - Reported a significant decrease in fast-twitch muscle fiber size after only 2 weeks of detraining in highly trained power lifter and football players.
8. Hakkinen, K, Komi, P, and Allen, M. **Changes in Electrical and Mechanical Behavior of Leg Extensor Muscles During Heavy Resistance Strength Training** *Scand Journal of Sport Science* 7:55-65. 1985
  - Reported 10% decrease in 1RM squat in Olympic-style weight lifters after 4 weeks of detraining.
  - Strength athletes decreased maximal force production after 2.5 weeks of training cessation.
9. Houston, M, Bentzen H., Larson H. **Interrelationships Between Skeletal Muscle Adaptations and Performance as Studied by Detraining and Retraining.** *Acta Physiol. Scand.* 105:63-170. 1979
  - Run times at an intensity of 90% maximum oxygen consumption decreased by as much as 25% after only 15 days of inactivity.
10. Fleck, S. **Detraining: Its Effects on Endurance and Strength.** *National Strength and Conditioning Association Journal.* Pp 22-28. Feb 1994
  - Within days or weeks of training cessation, endurance athletes show a loss of submaximal and maximal performance capabilities.

And these are just some of the studies proving the point, that whenever your performance goes up, if you stop training, it must come down. In a nutshell, if you stop working out completely during season you can expect the following:

1. **Up to 10 % Decrease in Maximal Strength within 4 weeks**
2. **Decrease in Maximal Force Production after about 2.5 weeks.**
3. **Decrease in Anaerobic Power after only 3 weeks**
4. **Decrease in VO2Max by 4-14% within 4 weeks of cessation of training.**
5. **Decrease in fast twitch muscle fiber size after 2 weeks**
6. **Reduction in blood volume by 5-12% in a matter of weeks.**
7. **Detraining can decrease the time to exhaustion by up to 24% in 5 weeks.**

The take home message here is clear. A minimum of 2 workouts per week during season are a necessity in order to maintain the your hard earned results. If not, the effects of performance deterioration may creep onto the playing field after you have strapped on your helmets and tied your cleats. In part II, I will present in season program ideas and ways to prevent this detraining effect.

## REFERENCES

1. Hortobagyi, T, Houmard, J, Stevenson, J, Fraser,D, Johns, R, Israel, R. **The Effects of Detraining on Power Athletes.** *Med. Sci. Sports Exerc.* 25: 929-935. 1993
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5. Kraemer et el. Detraining **Produces Minimal Changes in Physical Performance and Hormonal Variables in Recreationally Strength Trained Men.** *Journal of Strength and Conditioning Research,* 2002, 16(3), 373-382
6. Hortobagyi, T, Houmard, J, Stevenson, J, Fraser,D, Johns, R, Israel, R. **The Effects of Detraining on Power Athletes.** *Med. Sci. Sports Exerc.* 25: 929-935. 1993
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8. Hakkinen, K, Komi, P, and Allen, M. **Changes in Electrical and Mechanical Behavior of Leg Extensor Muscles During Heavy Resistance Strength Training** *Scand Journal of Sport Science* 7:55-65. 1985
9. Houston, M, Bentzen H., Larson H. **Interrelationships Between Skeletal Muscle Adaptations and Performance as Studied by Detraining and Retraining.** *Acta Physiol. Scand.* 105:63-170. 1979
10. Fleck, S. **Detraining: Its Effects on Endurance and Strength.** *National Strength and Conditioning Association Journal.* Pp 22-28. Feb 1994
11. Coyle, E., Hemmert, M., Coggan, A. **Effects of Detraining on Cardiovascular Responses to Exercise: Role of Blood Volume.** *Journal of Applied Physiology* 60: 95-98, 1986
12. Zatsiorsky, V., Kreamer, W., **Training Residuals.** *Science and Practice of Strength Training.* Second Edition, Champaign Ill, pp100-106, 2006

