

# Periodization Training Update: New Insights in Ultra Training Design

Len Kravitz, Ph.D.

- I. Periodization: a method of planned progression to maximize performance and minimize overtraining and injury
  - A. Strategic implementation of specific training phases
  - B. Do you want to be successful in training? Then plan for it
  - C. Comparison of designs: Classical designs are strictly linear progressions; Variation designs are based on random manipulation of training variables; Periodization involves systematic phases of increasing and decreasing volume and intensity (with training variable manipulation)
  - D. Volume in periodization is sets x reps; intensity is the %1RM or a Rep zone
  - E. Balancing training variables: choice, order, load, sets, reps, action, tempo, speed, recovery, lifestyle (nutrition and sleep)
- II. Benefits for athlete/client: achievement of goals, motivation to achieve, prevention of overtraining, prevention of boredom in training, goal-directed approach to training, injury prevention, plateau buster, progression built into system
- III. Background and foundation of periodization
  - A. Selye's General Adaptation Syndrome (GAS)
    1. Shock (workout stimulus)
    2. Adaptation (muscular fitness adaptation)
    3. Avoid exhaustion (plateau and overtraining) by CHANGING the workout stimulus regularly; Physiological explanation of GAS
  - B. Overview of how periodization was originally presented
  - C. Inverse association of volume and intensity (technique matches intensity)
  - D. The balance challenge to the fitness professional and personal trainer
    1. Intensity leads to greater motor unit activation & greater force production
    2. Volume leads to greater time under tension and hypertrophy (size and mass)
    3. The key is finding the balance for each individual client
- IV. Where do we start with our periodization planning?
  - A. Basic terms of periodization
    1. Microcycle: number of training sessions that form a recurrent unit (i.e., hard day, easy day, combination day, rest day, repeat); typically 1 week to 10 days
    2. Mesocycle: a block of microcycles that represent the attainment of some goal phase (i.e., strength, power, hypertrophy, etc); typically 4 to 12 weeks

3. Macrocycle: the combined phase of microcycles and mesocycles to accomplish the overall goal (i.e., compete in a marathon or triathlon); ~10 to 12 months

B. Individualizing the training begins with a thorough needs assessment

1. Health/injury concerns, is the individual training for a sport or recreational activity or weight management, time constraints for training, training frequency/week, preferred type of equipment to use, determine muscular strengths/weakness, client's proposed strengths/weakness, how much aerobic training: Goal Setting and Strategy Planning

C. Variable manipulation is key to periodization design (creativity prevails)

Core movements, exercise choice, muscle actions (concentric, eccentric, isometric), volume, rest between sets, fixed vs. free form, intensity, overload progression, recovery between workouts, order and structure of exercises

D. Disclaimer time for your clients: there is no one best periodization plan; the challenge is finding what works best for each client

E. Recovery (for Adaptation) importance: emphasize the importance of recovery to your clients; this is when physiological adaptation occurs

F. Explanation and visual display of 'supercompensation effect' of training; stimulus, fatigue, compensation, supercompensation, involution

IV. Phases of periodization training

A. Preparatory (pre-habilitation) phase: technique, posture, function, stabilization

B. Hypertrophy phase: basic physical training, high volume and low intensity, non-specific to any sport or activity

C. Strength phase: increase in intensity with decrease in volume; overload and begin specificity training

D. Power and peaking phase: near maximum intensity, speed, force and performance technique emphasis

E. Maintenance phase: slightly lower intensity with increase in volume; for long competitive seasons alternate with peaking phase

F. Transition phase: physical and mental recovery cycle, minimize deconditioning, light training, improvement of basic physical training skills and techniques

G. Great programs have variety and creativity: be "consistently inconsistent" in CHANGING the exercise stimulus

H. Example of creativity of exercise stimulus in choice of exercise

Use of free weight/machine/ calisthenics, simple and complex movement variation, specificity of training, balanced and unbalanced movements, compound and single joint exercises, bilateral and unilateral exercises, open and closed chain exercises

- I. Example of creativity in design structure of program
    - Focus on power or strength requirements of client's goals, prioritize workout to goals of client's weaknesses and strengths, large to small design plan of training, agonist/antagonist (flexor/extensor) approach to training, pre-exhaustion combinations, compound sets for progressive overload, Metabolic or energy approach
  - J. Special note; specificity of training for athletes is much more complex (involves cardiorespiratory function, muscle energy production, musculoskeletal integrity, body composition, neuroendocrine responses, muscle hypertrophy, neuromuscular recruitment patterns, and thermoregulation)
  - K. "The most successful resistance training programs are those that are designed towards target-specific training goals."
- V. Special Topic: Should you always train to failure?
- A. Muscular fatigue: point during exercise when the neuromuscular system can no longer produce adequate force to overcome workload
  - B. What is the theoretical basis for training to failure? Activate the greatest # of motor units. Mixed and inconclusive research on this topic
  - C. Precautions to always training to failure: may lead to overtraining and overuse injuries; has been shown to lead to a decrease in IGF-1 (a growth promoting hormone)
  - D. Practical applications: alternate going to failure in sets or workouts; training failure should be varied, as all other acute variables of resistance exercise; stop a set when technique is being compromised; for special populations, function and stabilization may be more important than training to failure
- VI. Periodization planning overview
- Current training status/needs assessment of client; Individualize goals; Accessible resources for training (i.e., equipment); Time and schedule of training; Strategically plan phases  
Ongoing evaluation and assessment; Systematic progression
- VII. Periodization models: linear vs. nonlinear! What can we learn from the research? No difference in endurance; significant difference in strength (daily undulating periodization elicits superior results); linear vs. reverse linear! Linear periodization superior for strength development
- VIII. Repetition zone characteristics
- 1-5 Reps (100-85% 1RM) Strength emphasis
  - 6-8 Reps (84-77% 1RM) Strength and hypertrophy emphasis
  - 9-12 Reps (76-70% 1RM) Hypertrophy emphasis
  - 13-20 Reps (69%-60%) Endurance emphasis (less hypertrophy and less strength)

## IX. Periodization in Practice

### **Periodization: Traditional Linear for Health/Fitness**

**Hypertrophy**, 1-5 Sets, 9-12 Reps, 2-3 Wks, Emphasis Type I, IIa Fibers

**Strength/Hypertrophy**, 1-5 Sets, 6-8 Reps, 2-3 Wks, Emphasis Type IIa Fibers

**Strength**, 1-5 Sets, 1-5 Reps, 2-3 Wks, Emphasis Type IIbx Fibers

**Transition**, 1-2 Sets, 13-20 Reps, 1-2 Wks, Emphasis Type I Fibers

**Periodization: (Daily) Undulating:** day to day variation of intensity/volume program

Rep Zones: 3-5 reps, 8-10 reps, 12-15 reps (ascend or descend during wk)

Total body workout: change exercises daily and rotate ascending and descending

**Periodization: (Daily) Random order Undulating:** day to day variation of

intensity/volume

Rep Zones: 3-5 reps, 8-10 reps, 12-15 reps (randomly ordered)

Options {12-15 RM, 3-5 RM, 8-10 RM}, {8-10 RM, 12-15 RM, 3-5 RM}, {8-10 RM, 3-5 RM, 12-15 RM}

Every 12 weeks plan a transition week (such as circuit training, single set training, calisthenics only, tubing, stability/function)

**Periodization: Linear for Strength (12-week mesocycle)**

Weeks 1-3 Rep zones: 10-12 reps, 8-10 reps, 6-8 reps

Week 4: High Volume Training Week; 12 RM for all exercises

Weeks 5-7 Rep zones: 8-10 reps, 6-8 reps, 4-6 reps

Week 8: High Volume Training Week; 12 RM for all exercises

Weeks 9-11 Rep zones: 6-8 reps, 4-6 reps, 2-4 reps

Week 12: High Volume Training Week; 12 RM for all exercises

Start mesocycle from beginning

**Why does periodization work? Fiber type theory?**

2-day training scheme presenter (keep with daily undulating sequence but just complete 2 workouts per week)

**NOTE: Several Periodization Articles with all references on Dr. Kravitz's WEB Page:**

Prestes et al. (2009). Comparison of linear and reverse linear periodization effects on maximal strength and body composition. *Journal of Strength and Conditioning Research*. 23(1), 266-274.

Rhea, M.R. et al. (2003). A comparison of linear and daily undulating periodized programs with equated volume and intensity for local muscular endurance. *Journal of Strength and Conditioning Research*. Vol. 17(1), 82-87.

Rhea, M.R. et al. (2002). A comparison of linear and daily undulating periodized programs with equated volume and intensity for strength. *Journal of Strength and Conditioning Research*. Vol. 16(2), 250-255.