

## The Science of Body Sculpting

EXERCISE  
ETC. INC.



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- Certified Strength & Conditioning Specialist
- Owner of a private Personal Training Studio in San Diego, CA
- Former All-American in Track & Field, U of Connecticut



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## How to Get Your CE Certificates

- View the *complete* webinar
- Make sure your printer is "on"
- Log on to our website: [www.exerciseetc.com](http://www.exerciseetc.com)
- Click on "Administration"
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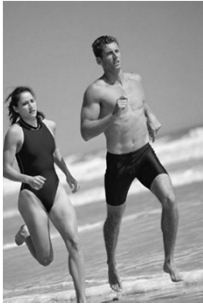
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### Looking Good : Now & Then...



**Now: Malibu, circa 2009**



**Then: San Tropez, Circa 1959**

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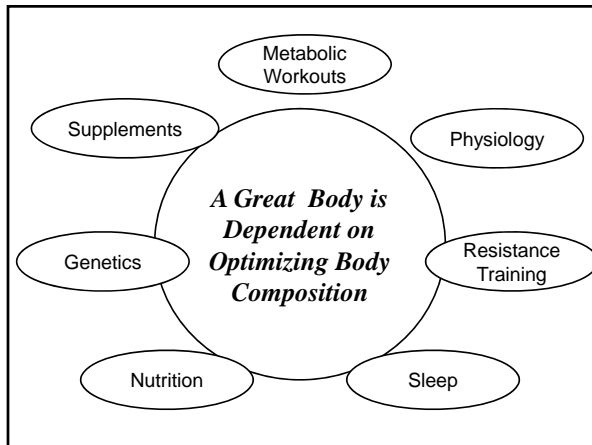
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### The Genetic Link

- Building Muscle
  - Muscle Mechanics
  - Fiber Typing & Distribution
  - Hormones
- Losing Fat
  - Sex & fat storage
  - Hormones



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## We Can Rebuild Him/Her



- Increase Muscle
  - Resistance Exercise
  - Nutrition
- Decrease Fat
  - Metabolic Training
  - Cardio Activities
  - Nutrition

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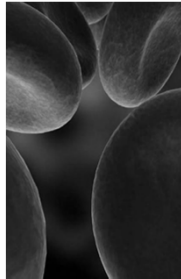
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## Effects of Resistance Exercise

- ↑ muscle cross-sectional area
- ↑ muscle size and number of protein filaments
- ↑ mitochondrial density
- ↑ capillary density
- ↑ glycogen & ATP storage



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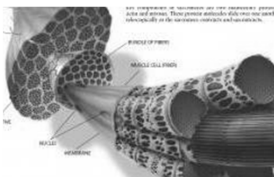
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## Muscle Fiber Types & Training



- TYPE I
  - Slow twitch / Oxidative
  - >15 repetitions
- TYPE IIA
  - Fast twitch
  - Fast, oxidative, glycolytic (FOG)
  - 8 – 15 repetitions
- TYPE IIB/X
  - Fast, glycolytic (FG)
  - < 8 repetitions

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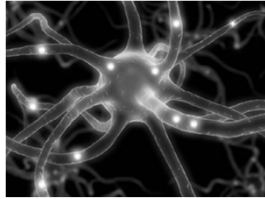
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## The Driving Force for Change

- Hormones
  - Secreted by endocrine glands
  - Alter rates of specific cellular reactions based on presence of specific receptors
  - Facilitate both muscle growth & fat loss



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## Anabolic Hormones



- Increase protein synthesis
  - Growth Hormone
  - Testosterone
  - IGF-1
  - Insulin
  - Estrogen

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## Resistance Training Effects on Anabolic Hormones

- Acute effects
  - $\uparrow$  GH, Testosterone & IGF-1
  - Acute response  $\downarrow$  with long-term training
- Long-term effects
  - Resting levels unchanged with training
  - Differences in baseline levels responsible for  $\uparrow$  or  $\downarrow$  gains with training



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## Fat Loss Hormones



- Epinephrine
  - Activates or inhibits Hormone Sensitive Lipase (HSL), which ↑ Lipolysis
  - Stimulates lipolysis via beta receptors and inhibits lipolysis via alpha receptors
  - Beta receptors in abdominal area
  - Alpha receptors in hips & thighs

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## Hormones & Fat Loss

- Estrogen & Fat Loss
  - ↑ epinephrine production
  - Inhibits Lipoprotein Lipase (LPL), which is the “gatekeeper” for controlling fat storage
  - ↑ GH production



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## Gender & Fat Metabolism



- Women use more fat for energy production at any intensity
  - Most is intramuscular triglyceride, of which women store more than men
  - Some studies have shown greater plasma FFA and glycerol with low intensity exercise in women
- Women have a lower epinephrine concentrations during sub-maximal exercise
  - May be more sensitive to epinephrine

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## Cardio Intensity & Fat Loss

- Use a higher percentage of fat during low intensity exercise, which may preserve muscle
  - Based on research low intensity exercise may benefit women more than men
- Use more energy (i.e. Calories) during high intensity exercise, but may sacrifice muscle
  - Keep sessions to 30 minutes



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## Confused About Training?

Can I build muscle & lose fat simultaneously?

How many reps & sets?

Should I use Intervals?

How often should I train?

How much rest between sets?

Should I do weights or cardio 1<sup>st</sup>?



What's the BEST plan?

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## Traditional Resistance Training Strategies for Definition



- Repetitions
  - 8 to 15 / set (concentric failure)
- Sets
  - 3 to 5 (4 to 8) / body part
  - 15 to 25 total sets / workout
- Rest Interval
  - 30 to 90 sec between sets

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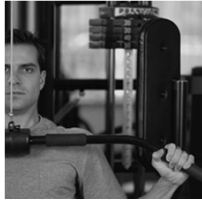
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## The Great Training Debate: *Volume vs. Intensity*

- Volume
  - Results dependent on total work performed over time
  - Volume = Reps x Sets X Load x Number of Exercises
- Intensity
  - Results dependent on amount of muscle and/or neural fatigue induced by training using sufficient resistance (i.e. >80% 1RM)



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## Understanding Training Intensity

- Based on % of 1 RM
  - > 60-70% 1RM necessary for muscle hypertrophy
  - Permit b/w 6 and 15 reps
- Influenced by:
  - Rest intervals
  - Repetition tempo
  - Extent of muscle failure



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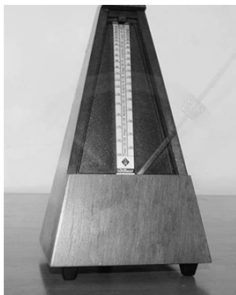
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## Controlling Repetition Tempo



- Time Under Tension
  - 40 – 70 sec per set
- Tempo per repetition
  - Slow controlled
    - 3:1:3 or 3:2:1
  - Fast controlled
    - 2:1:0 or 1:1:0

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## Achieving “True” Failure

- Muscle failure occurs when the muscles can “no longer produce sufficient force to control a given load”.  
– Willardson (2007)
- Activates more higher threshold fast-twitch motor units (Type IIB/X)
- Increases anabolic hormone production



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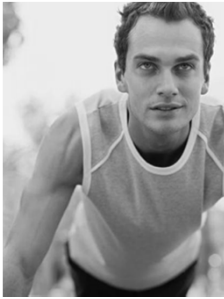
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## What’s Best...Volume or Intensity?



- Depends on a variety of factors
  - Level of training
  - Chronological age
  - How you’ve been training, and
  - How long you’ve been training that way

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## Programming New Recruits

- Build a foundation in movement & retrain efficient motor patterns
- Mostly compound movements
- Begin with 1-3 sets of 12-15 reps to concentric failure
- Progress to 2-4 sets of 8-12 reps to concentric failure over 3 to 6 months



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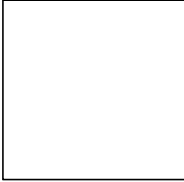
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## Intermediate to Advanced



- Choose the path least taken
- Favor intensity over volume
- Vary stress weekly/monthly to avoid adaptation and prevent overtraining
- Progress up to 6 sets of 6-8 reps to concentric failure
- Integrate "advanced" techniques to optimize muscle recruitment and fatigue

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## Compound Sets for Hypertrophy

- Pre-fatigue
  - DB Flys before Bench
- Post-fatigue
  - Bench before DB Flys
- Pre- & Post-fatigue
  - DB Flys – Bench – DB Flys
  - DB Flys – Bench – Triceps



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## Post-Fatigue / Drop Sets



- Perform 1 set of 8 to 12 reps
- Immediately lower the weight by 5-10% and complete another 6 – 12 reps
- Repeat up to 6 times
- Use for no more than 2-3 weeks consecutively

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## Rest-Pause Training

- Traditional
  - Do 1RM, take 10-15 seconds rest
  - Repeat 6 times
- Alternative
  - Do 10RM, take 10 sec rest, Repeat to max
  - Repeat no more than 3 times or for 25 reps



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## Eccentric Overload



- Negatives
  - Slow controlled eccentric with partner-assisted concentric
- Forced Reps
  - Client completes 1 set to muscle failure followed by 1 or 2 repetitions with spotter assistance

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## Balancing Your Efforts

- Program must result in symmetrical development
  - Train compound/multi-joint movements in balance
  - Build the weak links via prioritization
- Smaller muscles adapt faster and thus require greater training stimulus



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## Rest & Recovery



- Traditionally 30 – 90 seconds between sets
- 2-3 days between workouts for a body part or movement
- Type IIB/X fibers respond optimally to greater training intensities and greater rest between sessions

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## Metabolic Workouts



- High intensity anaerobic intervals on non-strength training days for 20-30 minutes
- Goal is to increase 24-hour energy expenditure to increase fat loss

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## Low Intensity Cardio Workouts

- Low intensity cardio after weight training
- Goal is additional fat calorie expenditure
- 15 minutes at 40-60% HRR or  $VO_2$ max
- Keep total workout time < 60-75 minutes



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## Post-Training Recovery:

*Where the Real Growth Occurs*

Factors contributing to recovery:

- Genetics
- Age
- Maturation
- Gender
- Training condition
- Occupation
- Lifestyle
- **Nutrition**
- **Supplementation**
- **Sleep**

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## Physique Athlete Nutrition

- Total Calories
- Macronutrient Breakdown
- Training Demands
- Supplements



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## Nutrition Essentials



- 4 to 6 feedings daily
  - Each 15-20% of total intake
- 64 ounces of water/day
  - 75% of muscle mass is water weight!
- Eat vegetables & protein at every meal

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## Before and/or During Training

- ~1-2 hours pre-workout or during training
- 30 to 60 grams of **Carbs**
- 7-10 grams of **Protein**
- Low in fat and fiber
- Adequate fluids



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## Post-Workout Nutrition

- Three Objectives
  - Stop Protein Breakdown
  - Increase Protein Synthesis
  - Replenish Glycogen Stores
- Within 2 Hours Post-Workout
  - .8 g CHO/kg Body Wt
  - .4 g PRO/kg Body Wt



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## The Window of Opportunity



- 15-30 Minutes Post-Workout
  - Carbohydrate/Protein Beverage
  - 2:1 or 3:1 Ratio of C:P
- 1-2 Hours Post-Workout
  - Mixed Meal

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## Protein Intake to Build Muscle

- 1.4 - 2.0 grams/kilogram of protein on training days
- Lean meats, fish, poultry, dairy, eggs, vegetable proteins
- Consume 20-30 grams at each of 4-6 meals



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## Fats & Carbohydrates



- 20-35% Fat
- 7-10 grams per kg Carbohydrate per day
- Best time to eat carbohydrates is
  - immediately prior to training, and
  - within 1-2 hours after training

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## Macronutrient Cycling

- Alter composition of daily intake to manipulate both total calories and insulin to enhance fat loss
- Moderate carb + lower fat on training days
- Lower carb (mostly vegetables) + higher fat on non-training days
- Protein is constant at 30%



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## Example: 140 lb (64kg) Client

	%	Training Day	%	Non-Training Day
Total Kcal	100%	1600	100%	1400
Pro	30%	120g	30%	100g
Carb	40%	160g	30%	105g*
Fat	30%	53g**	40%	62g**

\*All Carbohydrates as Vegetables (minus potatoes, corn, etc)

\*\*Majority of fats from mono- and poly-unsaturated form

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## Supplemental Nutrition

- Creatine Monohydrate
- BCAA
- Beta Alanine
- Caffeine
- Fish Oils




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## Creatine Monohydrate



- Doubles  $\uparrow$  LBM vs. placebo
- $\uparrow$  Strength & Performance by 5 to 15%
- Proper Supplement Usage
  - ~5g four times/day for 2 to 7 days
  - 3 to 5g/day for maintenance
- 10 to 40%  $\uparrow$  muscle creatine & PCr stores

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## B.C.A.A.'s

- Leucine, Isoleucine, and Valine
- When taken during endurance exercise
  - ↓ protein degradation
  - ↓ muscle glycogen depletion,
  - may delay fatigue
- 4 to 6 g may produce same benefit as 20 to 30 g of whole protein sources



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## Beta-Alanine



- Precursor to carnosine, which helps buffer H<sup>+</sup> in the blood and neutralize lactic acid, and ↑ ATP stores
- May improve both anaerobic and aerobic performance
- Levels ↑ over 4 weeks when taking 4 to 6 g/day

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## Caffeine

- ↑ catecholamine production
- ↑ release of free fatty acids for energy, which may lead to increased fat utilization during long-duration exercise
- ↑ endurance
- May enhance fat loss
- May reduce post-exercise soreness

I've gotta cut back on the caffeine



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## Fish Oils



- Reduce inflammation
- May enhance fat loss when combined with exercise
- May improve insulin sensitivity
- Recommended 1 to 4 grams of EPA + DHA daily for benefit

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## Catch Some ZZZZZ's

- Sleep needs vary from 6.5 to 9 hours daily
  - GH Release Optimized
- *Levine et al (1987)* found that interrupted sleep results in
  - Suboptimal recuperation
  - Daytime sleepiness
  - Reduced performance



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## What Can You Expect?



- Results optimal in 8-12 weeks
- Realistic expectations
  - Add 4 to 6 lbs of muscle
  - Lose 15-20 lbs of fat

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