High Intensity Training: When Less is More

Why High Intensity Training?
- Build & retain lean muscle & bone
- Increase strength & endurance
- Optimize function and performance
- Enhance growth hormone production

High Intensity Strength Improves Bone Health
- High intensity loading exercises helps the adaptability of bone structure during aging.
- Study found that in middle and older age master athletes (40-85) the combination of high intensity, heavy and explosive strength exercise paired with sprinting was more effective for improving bone strength and structure.
- *Osteoporosis International 2017*

Greater Neural Adaptations Following High Intensity Strength Training
- Found that 6 weeks of HIT (80%) vs. LIT (30%) had greater neural muscular gains.
- Each showed similar hypertrophy gains when trained to failure.
- HIT group had greater strength gains, better voluntary contraction, & higher maximal voluntary isometric contractions.
- *Frontiers In Physiology 2017*

High Intensity Exercise Improves Motor Memory
- High intensity exercise was found to improve motor memory retrieval skills after exercise.
- Pairing exercise with motor practice may assist learning of movement sequences or memory of tasks in sports or rehab.
- *Medicine & Science in Sport & Exercise 2016*

Functional HIT Improves Body Composition & Quality of Life
- Compared HIT Circuit style training with Circuit Training combined with high volume low intensity exercise in overweight women.
- Both methods improved body composition, functional strength, and quality of life.
- Combined group reported less perception of pain and more perception of overall health.
- *Frontiers In Physiology 2017*
The Psychology of HIT

- Engaging in long-term HIT is not for everyone
- It is fatiguing, uncomfortable
- Requires attention to rest, hydration, nutrition
- May increase potential for injury, repetitive stress disorders, overtraining

Is Your Client Ready?

Easing Your Client into HIT

- Start slow: A little goes a long way
- Start by “sneaking” HIT intervals into your client’s regular routine
- Allow plenty of rest
- Consider cutting the duration of the workout as intensity increases
- Try a microburst or periodized plan.

The Physiology of HIT

Defining “High Intensity”

- Two elements must exist for an activity to be called “high-intensity:”
  - VO2 must be at or above 75% VO2 (breathless)
  - This intensity must be sustained for ≥30 minutes
  - If your client can talk on their cell phone during these activities they are NOT high-intensity.

Is Your Client’s Heart Healthy Enough for HIT?

- Some Definitions:
  - “Regular Exercises:” exercises 3 times per week for 20 minutes per session.
  - “Vigorous Exercise:” Activity that produces fatigue in 20 minutes or less.
  - “GXT:” Graded Exercise Test
  - “S/S:” Signs or symptoms
Breaking News:
*New ACSM Guidelines for Risk Stratification*
May, 2017

- Signs & symptoms (S/S) are the major factors that determine need for medical clearance.
- Risk factors no longer used to determine need for medical clearance.
- Need for GXT or EKG is determined by the physician.
- Guidelines not age-based.
- Clearance no longer needed for strength training.
- Hypertension is no longer considered as CAD.
- Anyone with BMI ≥ 30 is now considered “pre-diabetic”

Determining Need for Medical Clearance

- Are there signs and symptoms of CAD?
  - Chest pain
  - Palpitations
  - Shortness of breath with mild (or no exertion)
  - Nocturnal dyspnea
  - Ankle edema
  - Intermittent claudication
- Goals of Health Screening:
  - Identify participants at risk for CV complications during or immediately after aerobic exercise
  - Determine the need for medical clearance before initiating or progressing exercise programming

Six Risk Categories (ACSM, 2017)
The New Focus on Signs/Symptoms

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NON-EXERCISER</td>
<td>No disease, no S/S, no clearance needed</td>
</tr>
<tr>
<td>REGULAR EXERCISER</td>
<td>No disease, no S/S, clearance recommended</td>
</tr>
<tr>
<td></td>
<td>Known disease, no S/S, clearance needed for moderate</td>
</tr>
<tr>
<td></td>
<td>Any S/S, clearance needed</td>
</tr>
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</table>

Medical Clearance vs. Medical Exam

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Clearance</td>
<td>Form sent to the appropriate health care provider for verification that client can exercise.</td>
</tr>
<tr>
<td>Medical Exam</td>
<td>Need determined by physician</td>
</tr>
<tr>
<td></td>
<td>May or may not include a GXT and/or EKG</td>
</tr>
</tbody>
</table>

Determining HIT Intensity:
*Is Age Predicted Heart Rate Effective?*

- Published in 1970, it was a *suggested formula* based on a very small, non-random sample of people with CAD.
- It routinely over/underestimates HR by ± 20 bpm in either direction.
- It was never meant for universal usage:
  - “I’ve laughed about it over the years; it’s typical of Americans to take an idea and extend it way beyond what it was intended for.” William Haskill, study author

The Oakland University Formula:
*(HRM = 207 – 0.7 x age)*

<table>
<thead>
<tr>
<th>Age</th>
<th>Old formula</th>
<th>New formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>200</td>
<td>194</td>
</tr>
<tr>
<td>30</td>
<td>190</td>
<td>187</td>
</tr>
<tr>
<td>40</td>
<td>180</td>
<td>180</td>
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<td>50</td>
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<td>60</td>
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<tr>
<td>70</td>
<td>150</td>
<td>159</td>
</tr>
</tbody>
</table>
Keeping it Real:
Talk Test vs. RPE

<table>
<thead>
<tr>
<th>RPE</th>
<th>% VO2</th>
<th>Exertion</th>
<th>Talk Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>50%</td>
<td>Very light</td>
<td>Speaks normally</td>
</tr>
<tr>
<td>11</td>
<td>60%</td>
<td>Fairly light</td>
<td>Speaks normally</td>
</tr>
<tr>
<td>13</td>
<td>70%</td>
<td>Somewhat hard</td>
<td>Slightly short of breath</td>
</tr>
<tr>
<td>15</td>
<td>75%</td>
<td>Hard</td>
<td>Speaks haltingly</td>
</tr>
<tr>
<td>17</td>
<td>85%</td>
<td>Hard to very hard</td>
<td>Can gasp out 1 or 2 words</td>
</tr>
<tr>
<td>19</td>
<td>95%</td>
<td>Very, very hard</td>
<td>Cannot speak</td>
</tr>
</tbody>
</table>

According to the Old Wife’s Club…

- One of the most common old-wife’s tales in fitness:
- “You burn more fat at lower levels of exertion”

Understanding Fuel Sources

<table>
<thead>
<tr>
<th>Intensity (% of VO2)</th>
<th>Total cals burned</th>
<th>Fat cals burned &amp; % fat cals</th>
<th>Main substrate</th>
<th>EPOC 24 hrs.</th>
<th>Fat cals &amp; Tot cals</th>
</tr>
</thead>
<tbody>
<tr>
<td>50% Walk, 3.5mph</td>
<td>126</td>
<td>–106 (84%)</td>
<td>Fat</td>
<td>0</td>
<td>106 / 126</td>
</tr>
<tr>
<td>70% Jog, 5 mph</td>
<td>228</td>
<td>–152 (66%)</td>
<td>Fat</td>
<td>0</td>
<td>152 / 228</td>
</tr>
<tr>
<td>80% Run, 6 mph</td>
<td>273</td>
<td>–89 (32%)</td>
<td>Glycogen</td>
<td>160</td>
<td>249 / 443</td>
</tr>
<tr>
<td>90% (20 sec) / 70% (40 sec) 9 mph / 5mph</td>
<td>298</td>
<td>105</td>
<td>ATP / Glycogen &amp; fat</td>
<td>200 + 305 / 498</td>
<td></td>
</tr>
</tbody>
</table>

Intensity & Lactate Threshold:
The Great Lactate Debate

- What we used to think:
  - Lactic acid is a waste byproduct of anaerobic metabolism, responsible for muscle fatigue & exhaustion.
- What we know now:
  - Lactic acid is a form of fuel that is a direct precursor to several performance enhancing hormones.

The Work/Rest Cycle

- **HIGH INTENSITY WORK**
  - Utilizes ATP / CP in muscles
  - Then uses glycogen in muscles
  - Next uses glucose in bloodstream
  - Lactic acid levels increase
- **REST**
  - Lactic acid returns to liver & converts back to glycogen
  - ATP /CP replenishes
  - Hormonal boost

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Program Considerations

- With increased intensity comes increased risk of injury; proper screening and assessment is vital
- Client must have a baseline of fitness PLUS high level of motivation
- Proper progression is vital; progression is not always a linear ascent
- If outdoors, factor in environmental factors

Three Vital Program Design Tips

- Allow for an appropriate warm up; insufficient warm-ups limit intensity
- Allow for sufficient rest between work intervals; incomplete or inadequate rest limits the peak intensity of the subsequent intervals
- Encourage proper nutrition & hydration before, during and after the workout.

Breathing & HIT

- “Inspiratory Muscle Training”
- A means to increase strength of respiratory muscles to enhance power & performance
- Accomplished by providing muscles with overload

The Core Revolution: “Breathe Freely”

- Breathing recommendations that emphasize exhalation with exertion may cause spinal destabilization when the spine is loaded, especially under near-maximal loads
- Pressurizing the abdominal cavity is essential to maximize spinal stabilization
- When you inhale to prepare, and exhale to exert it causes an abrupt decrease in intra-abdominal pressure leaving the spine vulnerable to injury

Restoring Posture & Breathing

- Ask client to take a deep breath in and out to determine any breathing dysfunctions.
- Many have a hard time getting complete exhalation.
- Proceed with postural correction, diaphragmatic breathing drills and resisted exhalation.

Resisted IMT Training

- Train twice a day.
- Breathe in & out as far as possible using the diaphragm.
- Start with no resistance & gradually add resistance (straw).
- Perform 25 – 35 breaths per session or until you reach respiratory fatigue = “failure to achieve a satisfying breath”.
- Eventually, use the straw while training.

Low Back Disorders, 2nd ed, Stuart McGill, pp 219-220.
Implementing HIT Programs

Body Weight Exercises for HIT

- Push-ups
- Squat thrusts
- Burpees
- Plank Jacks
  - Plank jacks with gliders
- Mountain climbers
  - Gliding mountain climbers
- Tubing speed squats
- Squat jumps
- Medicine Ball Series:
  - Front slams
  - Side Slams
  - Squat & toss
  - Med ball push-ups
  - Toe taps
  - 1-leg “around the world.”

“Microburst Workouts”
High intensity, short duration & very effective

- More effective time management
  - For busy executives
  - While traveling
  - Any time when time is limited
- Burn fat more effectively
- Increase muscle development & bone health
- Improve athletic performance
- To situationally add intensity

“No Time” to Work Out?

- One of the biggest barriers to participate in exercise is no time.
- Many assume that if you can’t exercise for 60 minutes it’s not worth it
- But – Something is better than nothing & less may well be more!

Why Use Shorter Workouts?

- Improve mobility and range of motion
- Increasing frequency
- Travel workouts
- Perfecting movements
- Add intensity

Minimum Effective Dosage

- If “exercise is medicine” is it possible to over- or under-dose?
- What is the least amount of effort that will yield results?
**Microburst Workout #1:**  
*The 4-minute (Tabata) Workout*

- Choose 1 exercise  
  - May utilize body weight  
  - May utilize light weight: 25 – 40% 1 RM  
- Technique  
  - Perform as many perfect, full ROM reps as possible in 20 secs  
  - Rest for 10 secs  
  - Perform 8 sets, for a total of 4 minutes per drill

**Suggested 4-minute Drill:**  
*Push-ups*

- Do either straight leg or bent knee, but keep form consistent during drill  
- Localized triceps fatigue is the limiting factor  
- Watch form; client may rest in the “up” position

**Microburst Workout #2:**  
*Scientific 7-Minute Workout*  
*ACSM Health & Fitness Journal, May/June, 2013*

**Do each exercise for 30 seconds; rest for 10 seconds between each.**

1. Jumping jacks  
2. Wall sit  
3. Push-ups  
4. Crunches  
5. Step-ups on chair  
6. Squats  
7. Triceps dip on chair  
8. Plank  
9. High Knee run in place  
10. Alternating lunges  
11. Push-up with rotation  
12. Side Plank

**Microburst Workout #3**  
*The 9-minute Workout*

- One Minute Each:  
  - Total Body Extensions  
  - Push Ups  
  - Prisoner Walking Lunges  
  - Burpees  
  - Rest and repeat

**Microburst Workout #3**  
*The 10-minute Challenge*

- Perform a different exercise each minute for 10 minutes.  
- Try Walking lunges, Squats, Deadlifts, Mountain climbers, Push Ups, KB Swings, Burpees, Turkish get-ups, squat jumps & “mannakers.”*

*A “mannaker” is a burpee with a weighted renegade row in the middle and a weighted overhead press at the end. Yes, we know the term is politically incorrect and sexist; we did not make it up -- that is what it is called. We prefer the gender-neutral, non-patriarchal term “Person Maker.”*  

**Appendix:**  
*Suggested HIT Strength Programs*
Cardio Core Complex
No rest between sets, 30 seconds rest between rounds.
Complete 4 - 6 rounds

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Sets</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mountain Climbers</td>
<td>1</td>
<td>30 sec</td>
</tr>
<tr>
<td>Double leg lifts</td>
<td>1</td>
<td>30 sec</td>
</tr>
<tr>
<td>Oblique crunch</td>
<td>1</td>
<td>30 sec</td>
</tr>
<tr>
<td>Side plank (each side)</td>
<td>1</td>
<td>30 sec</td>
</tr>
<tr>
<td>Abdominal crunch</td>
<td>1</td>
<td>30 sec</td>
</tr>
<tr>
<td>Plank</td>
<td>1</td>
<td>30 sec</td>
</tr>
</tbody>
</table>

Dynamic Core Complex
No rest between sets, 30 sec rest between rounds.
Complete 4 - 6 rounds

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Sets</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Squat jumps</td>
<td>1</td>
<td>30 sec</td>
</tr>
<tr>
<td>Med ball bridge</td>
<td>1</td>
<td>30 sec</td>
</tr>
<tr>
<td>Push ups</td>
<td>1</td>
<td>30 sec</td>
</tr>
<tr>
<td>Plank</td>
<td>1</td>
<td>30 sec</td>
</tr>
<tr>
<td>Rotation Push-ups</td>
<td>1</td>
<td>30 sec</td>
</tr>
<tr>
<td>Side plank (each side)</td>
<td>1</td>
<td>30 sec</td>
</tr>
</tbody>
</table>

Amazing Arms & Shoulders Complex
No rest between sets, 30 seconds rest between rounds.
Complete 4 - 6 rounds

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Sets</th>
<th>Reps</th>
</tr>
</thead>
<tbody>
<tr>
<td>KB Front raise</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>KB Overhead press</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>KB Bent over row</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Bicep curl</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Triceps extension</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Carrying angle curl</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Close grip push-ups</td>
<td>1</td>
<td>8</td>
</tr>
</tbody>
</table>

Epic Glutes Complex
No rest between sets, 30 sec rest between rounds.
Complete 4 - 6 rounds

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Sets</th>
<th>Reps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hip Extensions</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Med ball bridge</td>
<td>1</td>
<td>30 sec</td>
</tr>
<tr>
<td>Single leg deadlift</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Lateral monster walks</td>
<td>1</td>
<td>8</td>
</tr>
</tbody>
</table>

Countdown Complex
6 rounds as quickly as possible.
No rest between sets, 30 seconds rest between rounds.
Each round, do 1 less rep.

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Sets</th>
<th>Reps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulgarian squats</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Horizontal row</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Feet-up push-ups</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Box dips</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

Crazy 8’s Complex
No rest between sets, 30 secs rest between rounds.
Complete 4 - 6 rounds

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Sets</th>
<th>Reps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deadlift</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Romanian deadlift</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Bent over row</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Power clean</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Front squat</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Push press</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Back squat</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Good morning</td>
<td>1</td>
<td>8</td>
</tr>
</tbody>
</table>