

HIIT-Circuits: The BEST of Both Worlds!  
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**Learning objectives:** Following this lecture, attendees will:

- understand how to select specific work-to-rest ratios for high-intensity interval training (HIIT) workouts
- be able to identify the physiological benefits of using many different pieces of cardio equipment
- refine skills in exercise selection for circuit-based resistance training programs
- have the results from the latest research in the area of HIIT-circuits

**Four (4) Major ‘Takeaways’:** Trainers should 1) meet the client where they’re at with their aerobic and muscular fitness, 2) select the piece of cardio equipment that best suits the client, 3) adapt the HIIT work-to-rest ratios to the client’s experience and training goal, 4) determine what exercises will be effective for a well-rounded circuit routine, and 5) adapt the circuits number of sets, repetitions, rest and intensity to meet the client’s experience and training goal.

## The Background

- I. Recommendations for aerobic and muscular fitness
  - a. Basic formatting
    - i. 3-5 days per week of aerobic exercise at a moderate- to vigorous-intensity; total of at least 150 minutes per week
    - ii.  $\geq 2$  days of resistance exercise for all major muscle groups at an intensity that is considered challenging for at least 8-12 repetitions
  - b. Goal of the guidelines
    - i. Aerobic exercise should increase caloric expenditure throughout the week; promote active lifestyles (avoid sedentarism); reduce cardiovascular disease risk
    - ii. Resistance exercise should strengthen primary muscle groups surrounding major joints; improve or maintain muscle quality over time; improve or maintain bone mineral density
  - c. Addressing the ‘time’ concern
    - i. Most cited concern with starting a training program is lack of time—training programs should be time-efficient, but still promote the physiological adaptations surrounding aerobic and resistance exercise
- II. High-intensity interval training research
  - a. Physiological benefits of HIIT
    - i. High-intensity interval training promotes many of the same benefits as moderate-intensity continuous aerobic training
    - ii. Individuals performing HIIT typically see improvements in aerobic capacity, glucose tolerance, insulin sensitivity and blood pressure after only 4 weeks

- iii. Type of cardio equipment may play a role in benefits to muscle quality and bone density—higher impact aerobic exercise will promote bone remodeling, while resistance-based devices may improve muscle quality
- b. Time efficiency of HIIT compared to continuous training
  - i. HIIT protocols with multiple high-intensity bouts with a duration as short as 10-seconds can promote aerobic benefits—total exercise time for these protocols are typically only 10-20 minutes
  - ii. Moderate-intensity continuous training requires longer durations (multiple sessions of  $\geq 10$  minutes) to elicit a sufficient physiologic response to promote improvements in cardiorespiratory and metabolic factors
- c. Formatting of HIIT through the years
  - i. Fartlek training for running performance—periods of high, moderate, and slower speeds mixed into a single workout
  - ii. Tabata training for muscle quality—performing different calisthenic exercises for 20 seconds at a high-intensity with 10 seconds of rest between movements/sets
  - iii. HIIT for optimal aerobic performance—using ratios of longer work intervals and sufficient rest intervals (work:rest = 1:1, 2:1, 3:1)
  - iv. HIIT for optimal anaerobic performance—using ratios of shorter work intervals and longer rest intervals (work:rest = 1:2, 1:3, 1:4)
  - v. Sprint-interval training (SIT) for optimal power—using very short all-out effort intervals with sufficient rest intervals (work:rest = 1:5 – 1:10)

### III. Circuit training research

- a. Physiological benefits of circuit weight training (CWT)
  - i. Circuit weight training promotes benefits to both aerobic and muscular fitness by programming resistance exercises for a sustained effort during a workout
  - ii. Improvements are similar to aerobic exercise—promotes improvements in aerobic capacity, insulin sensitivity, glucose tolerance, blood pressure (in individuals with hypertension), and blood lipids
  - iii. Depending on the protocol, CWT can lead to similar improvements as traditional resistance training—improved muscular strength, muscular endurance, muscular hypertrophy, body composition, muscle quality and bone density
- b. Time efficiency of CWT compared to traditional resistance training
  - i. CWT protocols are typically more time efficient since they utilize shorter rest intervals between exercises and sets (or rounds)
  - ii. Six to 10 exercises performed at a sufficient training volume and intensity can be completed in under 30 minutes, while traditional resistance training may last as long as 60 minutes
- c. Formatting of CWT through the years
  - i. Original CWT protocol was performed with university physical education students using calisthenic exercises in a gymnasium
  - ii. First research article published on CWT used machine-based exercise equipment for 3 rounds of 10 repetitions and 30 seconds between exercises (Wilmore et al. 1982); attempted to promote muscular and aerobic fitness
  - iii. More recent research is now using free weights and resistance exercise intensities that promote muscular hypertrophy and strength

- iv. Combination of CWT and HIIT has grown in popularity in an attempt to make programs more time efficient while receiving optimal results from both types of exercise

## Resistance Training Tools & Programs

### Basic RT Toolkit

Area of focus	Hip dominant	Knee dominant	Horizontal Push	Horizontal Pull	Vertical Push	Vertical Pull
<b>Movement</b>	Dead lift	Squat	Bench Press	Bent-over Row	Shoulder Press	Lat Pull-down
<b>Modification</b>	Hip bridge	Leg Press	Chest Press	Seated row	Wall slides	Modified cobra
<b>Primary muscle group(s)</b>	Gluteals / hamstrings	Gluteals / Quadriceps	Pectoralis major / anterior deltoid / triceps	Trapezius / posterior deltoid / biceps	Deltoids / Upper trapezius / triceps	Latissimus dorsi / lower trapezius / biceps

Enjoy these seven (7) exercise programs detailed below:

#### Dissertation Protocol: HIIT-Circuit

30-sec ON @105% Vmax; 90-sec OFF @ 3mph walk; 3% incline for both ON and OFF

<b>6 HIIT</b>	1. BB Squat	4. DB Shoulder Press	7. KB Sumo Squat
	2. BB Bent Over Row	5. BB Deadlift	8. Lat Pulldown
	3. SB Sit-up	6. SB Plank	9. Low Back Extension

#### Dissertation Protocol: Cluster-HIIT

30-sec ON @105% Vmax; 90-sec OFF @ 3mph walk; 3% incline for both ON and OFF

<b>Cluster 1</b>	<b>3 HIIT</b>	<b>Cluster 2</b>	<b>3 HIIT</b>	<b>Cluster 3</b>
1. BB Squat		1. DB Shoulder Press		1. KB Sumo Squat
2. BB Bent Over Row		2. BB Deadlift		2. Lat Pulldown
3. SB Sit-up		3. SB Plank		3. Low Back Extension

#### NEW HIIT-Circuit (PHA)

30-sec ON @100% Vmax; 90-sec OFF @ 3mph walk; 3% incline for both ON and OFF

<b>8 HIIT</b>	1. KB Swing	3. KB Goblet Squat	5. KB Deadlift
	2. KB Bent Over Row	4. KB Shoulder Press (stacked)	6. KB Floor Press (stacked)

#### NEW Cluster-HIIT (Super Set)

30-sec ON @105% Vmax; 90-sec OFF @ 3mph walk; 3% incline for both ON and OFF

<b>Super Set 1</b>	<b>3 HIIT</b>	<b>Super Set 2</b>	<b>3 HIIT</b>	<b>Super Set 3</b>
TRX Chest Press		RB Upright Row		SB Half Pike
TRX Body Row		RB Kneeling Pulldown		SB Hamstring Curl

#### NEW HIIT-Circuit-HIIT (Neuro/Coordination)

HIIT Row Erg: ON 20-sec, damper@10, S/min=25-30, max pull effort; OFF 60-sec, S/min=25-30, light pull

<b>3 HIIT</b>	<b>Nine-exercise Circuit</b>			<b>3 HIIT</b>
	1. Walking Lunges	4. Crab Walk	7. Monster Walks	

	2. QP Lift	5. Bear Crawl	8. Lat. Bear Crawl	
	3. Super Pushup	6. Swimmers	9. B.O. Ts/Is	

**NEW Cluster-HIIT-Cluster (Strength)**

HIIT Cycle Erg (find moderate climb resistance): ON 10-15-sec sprint; OFF 60-sec light pedaling

Cluster		Cluster
Front-loaded Lunge (alt)	<b>6 HIIT</b>	Glute Buster (alt)
Isolateral Chest Press (alt)		Bent Over Isolateral Row (alt)
Isolateral Pulldown (alt)		SB Seated Isolateral Press (alt)
Cable-cross Punch (alt)		TRX Torso Rotation (alt)