Heart Rate Weight Training

Warning and Cautionary

HRWT is extremely demanding on the body's resources and should only be attempted after a complete physical examination and medical approval from your doctor. Please consult your physician and get his or her approval before attempting any of the weight training methods described in this article. The author assumes no responsibility or liability for any medical condition or injury one may incur attempting any of the techniques described herein.

HRWT

Heart Rate Weight Training, HRWT, is the term I use to describe this form of slow-speed resistance weight training in which the primary feedback indicating the quality of a weightlifting set is based on monitoring the increasing heart rate during the execution of that weight lifting set. There are many formulas for slow-repetition resistance training and I have used them successfully for what is decades now. In fact, I would like to thank all the authors who have covered these methods over the years for their books and articles that outline procedures for slow-motion workouts. Those workouts are extremely efficient, effective and reduce the risk of injury. The major difference (or one could say, addition) in this workout is an even slower cadence whereby heart rate is the metric defining the quality of the set.

The general idea would go like this: a pre-repetition heart rate is noted and the increasing heart rate from that baseline would then represent the muscle fiber recruitment metric – the higher the heart rate from baseline, the more muscle fiber recruitment and therefore the better the exercise quality. This set must be performed from a controlled and stationary position, VERY SLOWLY and under constant load allowing little to no muscle fiber recovery. When performed under these parameters, motor neurons are recruited according to size. Smaller to larger muscle motor units are recruited and exhausted continuously and in succession according to the Henneman size principle. Because of the well-controlled parameters (there are no other motions or muscle groups contributing to this work except for the designed movement), any heart rate increase represents the extent of muscle fiber recruitment and therefore the quality of the exercise. No other metric is needed as a basis for exercise quality: not repetition duration, repetition count, weight or any other typical weight lifting metric – just heart rate.

Background

OK, so what is this all about? I wear a heart monitor strapped to my chest at all times in the gym. After intervals on the step mill, sometimes referred to as HIIT (High-intensity Interval training), I then do what is sometimes called high-intensity weight training. I have done this for what is decades now. A description of high-intensity weight training might go something like this: "6 very slow repetitions to the point of total muscle failure" – six repetition max (6RM). I did this over about 90 second total and do appreciate it as more

efficient and effective over the more typical and familiar "3 sets of 10" workout. Simply put, it is more intense and makes better inroads into muscle fiber motor units therefore better results.

During the negative portion or eccentric motion of the first couple repetitions (reps) I noticed, even with a very slow tempo, my heart rate decrease. To me this can only be indicative of slow twitch Type I muscle fiber recovery, something I did not want – total muscle failure, maximum muscle fiber recruitment being my goal. So, I slowed this negative motion down while constantly monitoring my heart rate until I observed little to no heart rate decrease. This took approximately 60 seconds for the first rep (I use a weight of about an 8-repetition max or 8RM for these sets.) and left only enough strength for one more rep. This second and last rep executed significantly increased my heart rate 20+ more beats per minute (BPM) than already observed and totally exhausted my muscle group more than any previous workouts. This indicated to me the recruitment of the larger and stronger muscle fiber units in the second rep.

As already stated, many hi-intensity formulas can produce great results: 20 seconds up, 20 down, measuring time under load (TUL) …., but how do you really know how effective your set has been or how do you measure quality? What I am suggesting is the quality of any other metric under a very slow cadence is much improved when heart rate is taken into consideration: heart rate being the common denominator.

I have used 2 repetition weight sets with heart rate monitoring successfully, so that is what is presented here.

A Simple Formula: 2 Reps, 1 Week (2R1W)

The simplest form describing this workout can be done in 2 repetitions with very few constraints, from an eccentric position, performed VERY SLOWLY with no movement except for your designed set. One week represents muscle recovery time if total muscle failure has been achieved. Muscle fiber recruitment is indicated by increased heart rate over baseline heart rate:

1. Use a weight you might usually get 8 reps max (8RM).
2. Obtain a baseline heart rate.
3. Perform 2 reps:
    a. 30 sec. concentric motion.
    b. 30 sec. eccentric motion.
4. Heart rate, HR, above baseline indicates muscle fiber recruitment level.

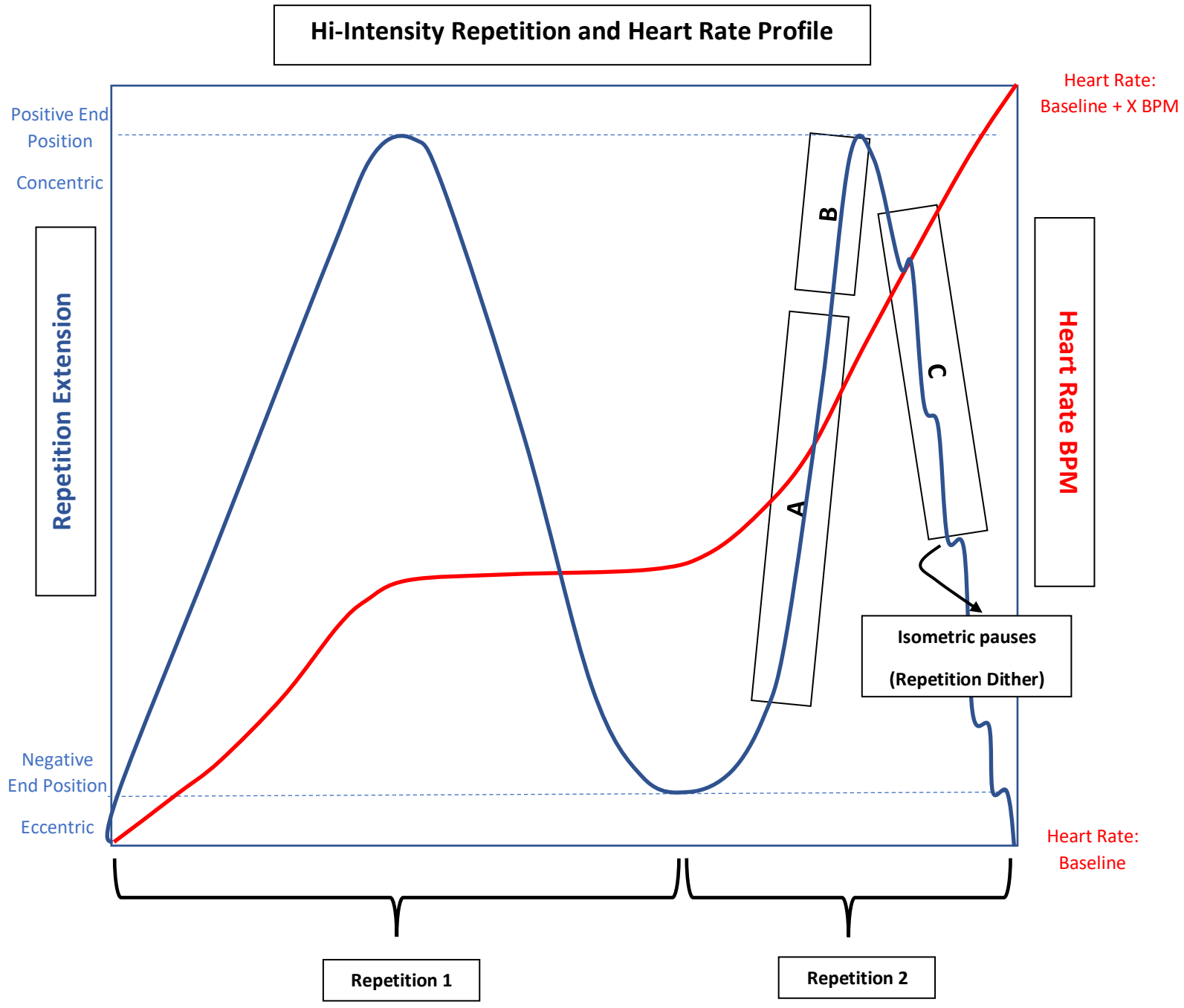
Durations are not fixed, but represent a starting point. The higher your heart rate, the more muscle fiber recruitment one can assume. As you get more experience with this technique: tempo, duration, weight selection…, you will find your heart rate also increase – more recruitment, which also means you will need more recovery time. To make more gains, refine your set in such a way that you witness a higher maximum heart rate. This should happen naturally if your intention is to gain muscle mass and you are monitoring your heart rate throughout the exercise. This is a general formula and can be adjusted for maximum fiber recruitment as you see fit – HR is your guide. For a hi-intensity formula, see HIHRWT, below.

Note: Any sets should be performed with exercise equipment or weights whose starting position is eccentric. For instance, a bench press starting position is concentric and should not be used.

Hi-Intensity Heart Rate Weight Training

High-intensity Heart Rate Weight Training, HIHRWT, is the extension of HRWT to the point of total muscle failure. What is presented below is a recipe for that. All muscle fiber types are recruited and exhausted in succession: first the smaller, fatigue resistant Type I Motor Units, then the larger more rapidly fatigued, Type IIa and Type IIb motor units. The number of muscle fibers increases exponentially with increasing recruitment order. It is essential to push rep 2 to the limits described below to accomplish total failure.

The following graph should help explain this workout and outlines a very detailed map to get to complete muscle failure in 2 reps. Heart rate and relative times are used only as an example, but do reflect a real-life one. Repetition times are less important than intermediate goals explained in the below segments. Because the smaller type I motor units are so fatigue resistant, it is suggested the first rep be performed VERY SLOWLY, to the point the eccentric motion allows little to no heart rate decrease. 2 reps make it easy to keep track of heart rate while still allowing enough set time to accomplish maximum muscle fiber recruitment. All references to a complete or end position, positive or negative, mean 90%. A 100% position with skeletal bones locked or at rest would promote muscle recovery prematurely. Weight selection and cadence will more than likely require adjustment for optimal results.


Hi-Intensity Repetition and Heart Rate Profile
Heart Rate: Baseline + X BPM
Positive End Position
Concentric
Repetition Extension
B
C
A
Heart Rate BPM
Isometric pauses
(Repetition Dither)
Negative End Position
Eccentric
Heart Rate: Baseline
Repetition 1
Repetition 2

1. The total time for reps 1 and 2 can be 2 minutes or more, depending on how long it takes you to totally fatigue. This may be 90 to 120 seconds to start. Your heart rate will indicate the quality of the set. As you perfect your technique, it will show as an increased max heart rate over previous sets for the same exercise and more than likely a longer set time.
2. **Repetition 1** Exhaust type 1 muscle fibers – perform this very slowly. At the completion of repetition 1, there should only be enough strength left to complete one more rep.
3. **Segment A** – This is where you will really start to recruit large diameter motor neurons and muscle fibers. The rate of the extension in Segment A of rep 2 should be adjusted so to leave only enough strength to complete the repetition, Segment B. For instance, if one has more strength than necessary to complete the positive up portion of rep 2, the rate can be slowed down to fatigue more so that Segment B should require everything you have to complete. Conversely, if you cannot complete a "full" contraction, speed up Segment A so you can complete the rep.
4. **Segment B** – This should require 100% effort to the extent this contracted position cannot be held for any length of time and the weight begins to drop into Segment C.
5. **Segment C** – Try to maintain a full positive end position throughout the negative motion down to rest. This should be controlled and require everything you have for as long as you can. I have found the longer you can push Segment C, the better the recruitment and the higher the heart rate. In other words, heavier weights are not necessarily better.
    - If you cannot resist the falling weight and it falls to the start position quickly (faster than 10 seconds or so), then the selected weight is too heavy and or you have exhausted too much muscle fiber with a too slow a cadence previously in the exercise. Consider using a lighter weight.

Repetition Dither – It is sometimes hard to assure you are actually giving 100% effort trying to maintain that concentric position. Repetition Dither, RD, is the term I use to characterize reattempts at full contractions during the eccentric motion. It is a technique that can be used to help accomplished total muscle failure. During the negative portion of the repetition, attempts are made to complete another rep which inherently fail due to the exhausting muscle group. This produces a type of dithering motion or isometric pauses throughout the complete muscle fiber length. If one could guarantee you were fully attempting to hold the second rep at full extension with maximum effort throughout the complete negative motion, you would not need to do this. RD can help you stay honest.

General Notes

- Concentrate on you muscle group.
- If you are not experienced in concentrating on the muscle group being worked, it may be helpful to use a very small weight, maybe 25% - 50% of what you typically might use. Perform these very slowly and concentrate on the exercised muscle group.
- Heart rate increases from rest to 40 to 60 BPM can be expected as you get proficient in this technique, depending on the muscle group and quality of your set.
- BREATHE! Your muscles are demanding oxygen, so give it to them.
- REST! If you have achieved total muscle failure (or as close as one can get to it), you will need at least 5 and more likely 7 days to allow your muscles to repair and grow.

What I have tried to express has been adjusted over years of working at this. There a lot of ways to work out and many great techniques. So, who would benefit from this workout? If you are an athlete perfecting your sport, I would think you should continue to do so and this workout is probably not for you. If you love your present training methods and they are providing you the results you want, then by all means, enjoy. But if you need to switch things up, are an athlete in the off-season, or are like the majority of us that want to make the most efficient use of their gym time while pushing the limits of your muscle capacity, you might want to give this workout a try. Make an attempt at total muscle failure in 2 “simple” reps. If you do succeed in pushing those limits, you might be surprised how much adequate rest you will need for full muscle recovery and therefore growth.

If I could only find some weight lifting machines that display heart rate. Now, that would be sweet.