



Whole Body Vibration Training, Part 2

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In the first article we learned two concepts related to how Whole Body Vibration (WBV) produces many of its physiological benefits: Tonic Vibration Reflex (TVR) and G Forces. The third concept relates to how WBV can be used to increase range of motion through stimulation of the Golgi Tendon Organ (GTO).

The GTO monitors tension in the muscular system. Trainers manipulate the GTO during static stretching by creating increased tension that the GTO picks up then signals the muscle to relax. The GTO also creates relaxation in opposing antagonistic muscles when the agonist contracts strongly—for example contracting the quadriceps during a hamstring stretch creates greater relaxation in hamstring.

Trainers can control the effect of vibratory stimulus by controlling levels of pretension and posture. For example in a static squat on a WBV unit there is pretension in the lower body causing a dominance of spindle activation resulting in stronger and more frequent contractions of the involved muscles. At the same time if we apply vibration to a relaxed muscle (during a stretching exercise) there is a dominance of GTO activity with increased relaxation of involved muscles. So WBV is effective for increasing the effectiveness of stability, strength, and power exercises; and is also a great tool for increasing the effectiveness of all stretching. (Virtually every stretch can be done on a WBV unit with enhanced results.)

WBV Acute Variables and Progression

There are eight key acute variables trainers can use to progress clients using WBV. These variables are:

- Time per set/work interval/number or repetitions

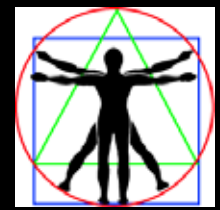
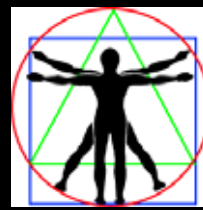
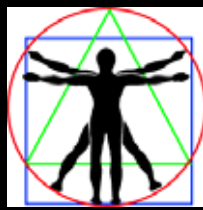
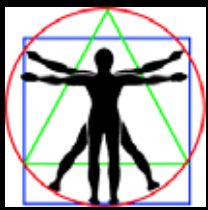
- Number of sets
- Number of exercises
- Work/Rest Ratio
- Skill/Movement Progression
- Frequency
- Amplitude
- External Load

Notice that the first five variables are not unique to WBV. The only new variables are frequency (how many times per second the platform vibrates) and amplitude (how far the platform moves with each vibration). As per part one the interaction of these two variables determines G Forces. One way to quantify the effects of specific changes in frequency and amplitude if you do not have a g force chart for a WBV unit is to take the frequency and multiply it by the amplitude to determine total distance of displacement per second.

For example a WBV unit set to a frequency of 30 hertz with amplitude of 2 millimeters provides a total displacement of 60 millimeters/second. If you change the frequency from 30 - 40 but keep the amplitude the same, displacement is 80 millimeters/second. However, if you increase amplitude from 2 to 4 millimeters the displacement is 120 millimeters. (For many WBV units, there are only two possible amplitude settings: low which is 2mm and high which is 4 mm.)

As a general rule, progression should proceed from the first variables related to volume of work first, then skill/movement progression, then frequency, then amplitude. The LAST variable you alter within a person's program should be the addition of external load. As per Paul Chek "learn the move then load the move" and realize that G Forces **ARE** load. **Also remember that any additional**

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ACROSS THE GAMUT

external load is way more significant when using WBV because the additional load is amplified by the increased G Forces. As a rule of thumb you should use 50% of usual load for any exercise on a WBV unit versus the same exercise on the floor, and there is no need to provide any additional load until you have progressed the person through the first 7 acute variables to the point where the only way to provide more progression is the addition of external load.

Now let's consider an example of how these variables should be applied relative to the goal of increasing client strength and power.

The first progressions would involve volume changes through increased interval work time, number of repetitions, number of sets or more exercises. The next progressions can occur via a manipulation of work/rest ratio followed by increasing movement skill requirements. After these progressions are complete additional progression can be achieved via increases in frequency or amplitude followed by the addition of external resistance.

Different Types of WBV Machines

There are two primary types of WBV machines: vertical vibration and oscillating teeter totter. The entire platform on vertical WBV machines moves primarily or entirely up and down. Popular commercial quality vertical WBV units include Power Plate and Wave.

Oscillating machines work like a see saw in that the platform sits on a fulcrum and the two ends move up and down rapidly. A popular commercial quality oscillating machine is Maxuvibe.

The primary advantage of vertical vibration is that a wide variety of exercises can be safely done on these platforms including squats, lunges, push-ups, planks, single leg balance drills, etc. This is because of the larger standing area and the fact that the entire platform moves up and down rather than just the two ends.

The advantage of the oscillatory systems is that they can produce very high G Forces at a lower frequency. Because of the see saw movement, the ends of the platform on these units have a MUCH greater amplitude so small changes in foot position mean BIG changes in amplitude and G Forces. The closer the feet are placed to the center of the platform the less movement/amplitude the user experiences, and the farther apart the feet are placed the higher the G Forces. The other advantage is that these units do NOT produce uncomfortable head and neck movement when the knees are not bent which can occur with pure vertical vibration units (this is easily prevented by keeping slightly soft knees at all times when using vertical WBV units).

Join us in the third and final article in this series on WBV where we will review the contraindications for WBV. We will also review the physiological benefits of WBV and the role of WBV in athletic conditioning, fall prevention and bone health, along with its proven effects on visceral fat.

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