

# Guidelines for Using the AlterG

## Patients with Orthopedic Problems

by Jacon Chun, MPT, SCS, ATC, CSCS, and Dev Mishra, MD

In physical rehabilitation, the focus is to restore function, enhance movement, and assess, treat, and prevent dysfunction. There are numerous potential causes for movement dysfunction in patients, among them are: pain, edema, and weakness. The AlterG can play a vital role in each phase of rehabilitation for patients, helping to improve recovery time and optimize their outcomes. From addressing pain and inflammation in the early stages, to assisting with endurance and speed training in the latter phases, the AlterG provides a complete rehab tool that will help clinicians and patients throughout the recovery process.

### PURPOSE

The goals for the AlterG in assisting with the rehabilitation of patients with orthopedic issues are to 1) Support the healing tissue and 2) Restore normal walking and running mechanics.

Inflammation is a normal biological response to injury or surgery. While it is important in increasing circulation, preventing infection, and assisting with tissue repair, chronic inflammation can have deleterious effects on the healing process. Prolonged inflammation and pain can increase joint stiffness, potentially leading to arthrofibrosis (scar tissue formation). The resultant range of motion limitations and muscular weakness can cause gait and functional anomalies to persist long beyond the normal healing time. By unweighting an individual to the appropriate loads to modify pain while protecting healing tissue, early AROM and can be encouraged to avoid the consequences of extended immobility and guarding.

More specifically, the lower body positive pressure (LBPP) unweighting can be used to enable patients to:

1. Decrease pain and minimize swelling during early stages of recovery
2. Increase hip, knee, and ankle mobility by encouraging AROM
3. Initiate weightbearing activities earlier to help begin proprioceptive training
4. Progressively load the lower extremities to assist with strength, endurance, and neuromuscular re-education
5. Work on normalizing gait mechanics and decrease the need for assistive devices
6. Increase cardiovascular and muscular endurance in the later recovery stages

### SETTINGS

Since patients can be weight bearing as tolerated (WBAT) or partial weight bearing (PWB), most physical therapists using the AlterG determine parameters for unweighting, treadmill speed,

treadmill incline, and duration/frequency of treatment, based on subjective reports of the patient and/or physician instructions.

Parameters are adjusted to allow for optimal gait mechanics with maximum comfortable loading. The following are some suggested guidelines for incorporating the AlterG into a post-injury/ post-operative protocol.

### UNWEIGHTING

By definition, WBAT usually spans from 50-100% of the patient's body weight. These patients may increase their weight bearing capacity as tolerated. Adjust unloading as necessary to achieve pain free weightbearing on the treadmill. Recommendation is to use the minimal amount of unloading necessary, to allow for some of the benefits that come with load bearing on the lower extremity (improved proprioception, improved strength, maintenance of bone mineralization).

For PWB patients, calibration can still be achieved even without equal weight bearing in both lower extremities. Patients can also use the treadmill rails to assist with support and decreased loading while entering the AlterG. The precise unweighting measurements allowed by the AlterG provide for strict adherence to physician protocols and the ability to protecting healing tissue during the rehabilitation process.

### SPEED

Once proper unweighting parameters have been determined, treadmill speed can be adjusted to provide for a comfortable walking pace. Average walking speed is approximately 3 mph, so any range between 2.0-4.0 mph should be an appropriate goal based on patient's height and step/stride length. In the initial stages of rehabilitation, we can start at approximately 50% (1.0-2.0mph), with the focus on preventing any compensatory gait abnormalities from developing. The goal is to select the speed that allows for optimal gait patterns and minimal symptoms. Once again, adjust as appropriate to take into account patient's morphology.

### DURATION

Typical parameters for time on a bicycle ergometer, to assist with improving ROM and decreasing swelling, usually start at 5 minutes. Based on the above, it would be appropriate to begin use of the AlterG for 5-10 minutes in the early stages of recovery, as long as symptoms do not increase during or after the treatment session. Try to decrease loading or walking speed to eliminate symptoms, if they are present. Discontinue use of the AlterG immediately if symptoms cannot be reduced or if they continue to

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### **DURATION** *(cont.)*

increase. You may resume AlterG use at a later date once patient is able to achieve a pain free weight bearing status on the AlterG Anti-Gravity treadmill.

### **FREQUENCY**

Physical therapy session frequency as recommended by physicians for post-operative or post-injury conditions, usually start at two (BIW) or three times per week (TIW). Due to the gentle nature of exercise in the AlterG, frequency can be increased initially when symptom control and ROM gains are of utmost importance in the beginning stages of healing. Visits are usually placed at intervals, with appropriate time for rest and recovery between sessions. AlterG use can be adjusted appropriately based on physician or physical therapist recommendation.

### **ASSISTANCE INTO THE ALTERG**

Patients who have difficulty standing long periods, or are PWB, may benefit from putting on the AlterG shorts in a seated position. Once standing, the shorts can be adjusted with assistance to ensure proper fit.

If knee flexion or hip flexion range of motion is limited, a small step may be necessary to help the patient step up onto the AlterG Anti-Gravity Treadmill. Patients can step directly onto the bag, but may need reminders to avoid the edge of the treadmill, which may be hidden beneath the bag.

Once inside the cockpit, raise the frame to approximately the level of the greater trochanter. This will allow for maximum upper extremity mobility, especially for those patients wanting to practice running in the AlterG. For patients that are PWB or need more support, the frame height can be elevated to the level of the iliac crests.

During calibration, patients are encouraged to stand still and cross their arms. For those that are PWB or have difficulty balancing, they can use the treadmill rails for light support. Encourage these patients not to push to avoid error readings by the load sensors.

### **WARM UP PHASE**

Warm up for the AlterG can be done over ground or while the treadmill is in the stop position. For those who have pain with weight bearing, they may benefit from performing the warm up in the AlterG after being partially unweighted.

Typical warm up activities in the AlterG can include: stretches to heel cords, squats or lunges to ensure proper seating in the shorts, and marches or hip movements to confirm proper shorts fit.

During the warm-up phase, it may be important to provide the patient with verbal cues regarding foot placement and heel strike, especially if this is their first experience with the AlterG. Focus should be on encouraging normal gait mechanics while accommodating to the feel of the lower body positive pressure of the AlterG.

### **COOL DOWN PHASE**

At the completion of the AlterG training/rehab session, return body weight to lower extremities gradually. This should occur while reducing speed, to allow patient to adjust to being loaded again with full body weight. Hit the stop button on the AlterG only after the patient has been returned to 100% BW and the treadmill has been stopped.

For patients who are required to remain PWB, they should hold the AlterG handrails for support or get assistance from the physical therapist as their prescribed body weight is approached, then maintain support on the uninvolved leg as they are returned to 100% BW.

Cool down can continue outside of the AlterG with further walking, stretching, therapeutic exercise, and hydration. Heart rate and respiratory rate can be measured if necessary. Patients should be discouraged from sitting or lying down immediately to allow the heart to gradually transition back to a resting state.

### **EXITING THE ALTERG**

Patients may be fatigued when completing their training/rehab session in the AlterG. Support on the siderails may be necessary when exiting the AlterG.

Once the training session has been completed, the shorts may be unzipped from the bag and the patient may carefully exit the cockpit forward or backward. The patient may need to be reminded again where the end of treadmill is, as it may be hidden underneath the deflated bag.



*Unweighting technology for the orthopedic rehab patient.*

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## BALANCE TRAINING

In addition to treadmill training, the AlterG Anti-Gravity Treadmill can be used for balance or proprioceptive training in the stop position. Balance pads or discs can be placed inside the AlterG before calibrating, allowing patients to begin working on balance in an unweighted state.

By encouraging stimulation of proprioceptors and incorporating these types of closed-kinetic chain activities early on in the rehabilitation process, we can:

1. Encourage co-contraction of lower extremity muscles in rehab
2. Improve joint stability by stimulating proprioceptors
3. Prevent shearing forces in the tibiofemoral joint that usually accompanies open-kinetic chain activities
4. Encourage functional activities for greater specificity of training and increased neuromuscular control during rehabilitation

The table on the right is a sample timeline that can be modified to track and monitor the patient's progress in physical therapy.

Actual protocols must be individualized per each patient based upon the prescription of the treating physician and the clinical judgment of the physical therapist.

Weeks (Post-op)	Unweighting (Progressed as Tolerated)	Speed (mph)	Time (min)	Frequency
Week 2 - 3	50% of BW	1.0	5 min	3x / wk
Week 4 - 5	50 - 60% of BW	1.5	5 min	3x / wk
Week 6 - 8	60 - 75% of BW	2.0	10 min	2x / wk
Week 9 - 10	60 - 75% of BW	2.5	10 min	2x / wk
Week 11 - 12	75 - 85% of BW	2.5	15 min	2x / wk
Week 13 - 14	85 - 90% of BW	2.5	15 min	2x / wk
Week 15 - 16	90 - 95% of BW	3.0	20 min	2x / wk

For more information feel free to contact our Clinical Specialist, Jacon C. Chun, MPT, SCS, ATC, CSCS at 510.270.5381 or [jacon@alter-g.com](mailto:jacon@alter-g.com).

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