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**Who:** 25-year-old female referred for cardiac rehabilitation s/p acute myocardial infarction.

**What:** Significantly deconditioned female s/p acute MI discharged from hospital with medical recommendation to limit physical and functional capacities. Mother requested cardiac rehab and patient could participate in 5K walk and return to local gym activities after cardiac rehab program including the AlterG Anti-Gravity Treadmill™.

**Why:** The AlterG Anti-Gravity Treadmill allowed for decreased physiologic demand on a compromised cardiovascular system and the ability to train at a higher intensity than possible with a regular treadmill because of the ability to adjust intensity with body weight support.

## Introduction

A 25 year old female was referred for cardiac rehabilitation (CR) following an acute myocardial infarction. Her ejection fraction (LVEF) was at 20% on 2D echocardiography. She had a history of Type 1 diabetes. 3 weeks prior to the referral she had experienced severe chest pain intermittently for a week. She finally visited her doctor and was admitted to the ICU. An emergent cardiac catheterization was performed and she was put on an Impella device to enhance her cardiac function. Upon discharge from the hospital, she was placed on a Life Vest and told that her physical and functional capacities would need to be very limited. It was suggested that she may have to live her life in a wheelchair. Her mother investigated and then requested that she be referred to cardiac rehab.

Prior to the event she was very active with biking and running. She was enrolled in a college program and was working part time at a day care. She could not continue with these due to the event. She had been very active socially. During the initial sessions she appeared withdrawn and the Health Related QOL outcome measure scores were poor. She began to report feeling depressed and isolated and being ready to “give up”. She was not allowed to drive. She fatigued very easily after minimal exertion and was walking half to one mile at a pace that to her was “very slow”. Her parents were extremely supportive and encouraging. At the time of evaluation her medical prognosis and expectations of recovery were poor. She was considered for but was not approved for cardiac transplantation. She expected that she would receive an automated internal cardiac de brillator (AICD) after a couple of months on the Life Vest.

This case study illustrates how the use of the AlterG allowed the patient to achieve her goal of jogging earlier than it would have been possible with the conventional methods of rehabilitation.

Reducing the body weight during rehabilitation allowed for early progression to higher intensities while maintaining the parameters required for her hemodynamic stability and safety. Status post surgical diagnosis included: medial meniscus tear, cyst, grade 3 chondromalacia patella, grade 1 chondromalacia trochlea, grade 3 chondromalacia lateral tibial plateau, grade 1 chondromalacia lateral femoral condyle. The patient is active, exercises regularly, and works full time as an Acute Care Physical Therapy Assistant in a hospital.

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## Goals

- Improved 6 minute walk distance
- Decreased submaximal HR and BP responses
- Increased maximum WL on aerobic and resistive equipment
- Improved score on Duke Activity index
- Improved score on the Dartmouth QOL survey
- Independent with Home Exercise Program
- Return to school, driving and part time work
- Jogging/Running
- Regular Gym workout for > one hour
- Live life without “fear”

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## History

The patient was evaluated for the CR program on 10/1/14. 6 minute walk test was 1040 feet with a peak HR of 98 and a MET level approximated at 2.5. However, her exercise sessions began on 10/23/14 as she was unwell with fatigue and fever for 2 weeks. She reported being “scared”. She wore a Life Vest during her exercise routine. Frequent rest periods were required. She was monitored continuously on telemetry. Her HR, BP, SpO2% were monitored pre exercise, after each exercise and after recovery. She tolerated a total of 18 minutes of exercise with multiple rest periods. Her blood sugars were monitored pre and post exercise. Although her progression was limited by episodes of hypoglycemia and fatigue, by 12/1/14 she was tolerating exercise for 45 minutes with 2 brief rests with minimal complaints of fatigue. Resistive exercises were added to the routine on her 6th session.

On 12/1/14 a repeat echocardiogram showed an EF of 25 to 29% with a recommendation to

remain on the Life Vest till she had an automated internal cardiac de brillator (AICD) inserted. She continued with rehab and on 12/30/14 she was instructed to remove her Life Vest as her EF was 40-45%. Her 6 minute walk was 1170 feet with a peak HR of 93 and an approximated MET level of 2.7 METS. She had completed 26 sessions out of the 36 prescribed sessions in Phase II cardiac rehabilitation. Due to insurance changes she could not continue in this phase and was transitioned to Phase III. This phase of CR included close monitoring of vitals, supervised exercise progression and education, but did not use telemetry. Although she had made gains in functional activities, exercise endurance and quality of life outcomes, these were still at a low level for her personal goals. She wished to begin training toward jogging and a gym workout.

Given the moderate increase in her EF and her determination but at the same time keeping her cardiac history and diabetic status in mind,

the AlterG treadmill was added to her training routine. The reduction in body weight with the use of the AlterG, it was thought, would decrease the physiologic demand on the cardiovascular system allowing a safe progression toward her goals.

Her workload on the AlterG was decided after a walk/jog test on the regular treadmill while she was on telemetry. Her peak HR was 134 with complaint of dyspnea. The same test was repeated on the AlterG with the body weight (BW) decreased to 50% and her peak HR was 120 bpm. This was about 30 beats greater than her resting heart rate and was chosen as the optimal target rate for training. She did not complain of dyspnea but did complain of soreness in the quadriceps muscle in both legs. She received 26 sessions of training on the AlterG in conjunction with an exercise routine on the upper body ergometer (UBE) and resistive equipment.

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## Results

Her initial training was a walk/jog routine at 50% of body weight (BW) with longer periods of walking than jogging for a total of 12 minutes. Toward the end of the training period BW was progressively increased to 90% for 18 to 20 minutes. At this time she was jogging more than walking. Within 3 weeks of including and initiating AlterG training she reported resuming her part time job. She reported more confidence, appeared up beat and also began to willingly offer support for other patients in the cardiac rehab program. She began to talk about re enrolling for college courses.

Her EF from a Transthoracic echocardiogram 4 months post training on the AlterG was estimated at 50-59%. She did not need an AICD insertion. In November of 2015 (14 months after the event) she participated in the local 5K heart walk and completed it in 48 minutes without needing a rest. Now she is 9 months post training on the AlterG and works out regularly at a local gym 3 to 4 days a week, attends college and works part time at a day care facility.

## Rational

The AlterG has mainly been used to rehabilitate orthopedic injuries. The idea of including high intensity interval training in patients with systolic dysfunction has been documented but the calculation of “high intensity” varies depending on the patient and diagnosis. The reduction in body weight with the use of the AlterG, it was thought, would decrease the physiologic demand on a compromised cardiovascular system. It would help in achieving the safe parameters to prevent cardiac compromise and yet be able to train at a higher training intensity than what would have been possible with regular treadmill training. Compared to other training systems which allow for reduction of body weight, the AlterG is the one that most closely mimics exercising on a regular treadmill. Using the AlterG to rehabilitate a patient with significantly reduced cardiac function and co morbidity of Type 1 diabetes could provide useful information re: benefits of this alternate method of training. Based on verbal reports from this patient and her family, using the AlterG training regimen allowed her to jog earlier than expected. It significantly increased her motivation and confidence which translated into an improved quality of life.

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## Medical Episodes During Training

On the first training session she forgot her medications. However, she maintained established parameters for training. She missed 3 weeks of treatment (week 15 to week 18) due to a kidney infection and had a PICC line in her R brachial artery when she resumed. However, she was able to resume pre hospitalization levels of exercise. On week 29 she slipped and hurt her knee while walking with high heels. She did not resume training after this episode but continued with a home exercise routine when her knee injury resolved.

# AlterG Case Study

Days	Program Walking/Running % Body Weight	Speed (mph)	Time	Peak Heart Rate BPM	Frequency
<b>Week 10</b>	50% Bw Walk 3 Min Jog 1 Minute Repeat X 3	walk 3mph jog 3.8mph	12min	124	2-3 x week
<b>Week 14</b>	50% and 60% walk/jog 6 min x 2 @50% walk/jog 3 min x 1 @60%	walk 3mph jog 3.8mph	18min	126	2-3 x week
<b>Week 18</b>	50% and 60% walk/jog 3 min x 2 @50% walk/jog 6 min x 1 @60%	walk 3mph jog 3.8mph	18min	107	2-3 x week
<b>Week 23</b>	70% and 80% walk/jog 6 min x 2 @50% walk/jog 6 min x 1 @60%	walk 3mph jog 3.8mph	18min	134	2-3 x week
<b>Week 27</b>	80% And 90% Walk/Jog 6 Min X 2 @80% Walk/Jog 6 Min X 1 @90%	walk 3mph jog 3.8mph	18min	139	2-3 x week
<b>Week 28</b>	80% Walk/Jog 18 Min @80%	walk 3mph jog 3.8mph	18min	119	2-3 x week