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**Who:** 52 year old Physical Medicine and Rehabilitation physician and ultra-marathon runner, suffered L4-5 disc extrusion after an acute lifting injury.

**What:** Body weight support was incorporated into the rehabilitation program to allow athlete to maintain cardiovascular fitness and capacity to allow him to compete in ultra-marathon planned for 3-5 months after the injury. Athlete was able to set age group course record at the race.

**Why:** The AlterG Anti-Gravity Treadmill™ allowed for decreased Ground Reaction Forces (GRF's) during walking and running, which helped reduce Joint Compression Force (JCF) on the injured intervertebral disc. Less impact load allowed for proper healing of the lumbar disc injury.

## Introduction

The patient is a 52 year-old physical medicine and rehabilitation physician and ultra-marathon runner. He had been in good health without previous back problems prior to an acute lifting injury resulting in an MRI confirmed L4-5 disc extrusion that completely effaced the right neural foramen. At the time of the injury, he was running 70-80 miles per week and cycling 25-50 miles per week in preparation for 50 km and 100 mile ultra-marathon races 3-5 months later.

## Introduction

- Maintain cardiovascular fitness and capacity to be competitive in ultra-marathon races planned for 3-5 months after the injury.
- Allow for healing of the disc injury.

## History

### Plan

- Six days after the injury, while the runner was still having significant difficulty walking due to pain in the right low back and hip, he walked for 30 minutes at 50% body-weight support. He felt considerably better afterwards and had no increase in symptoms the following day.
- He initiated regular (almost daily) training on the AlterG the following day with workouts ranging from 1-3 hours. Workouts were initially performed at 50% body-weight, and addition of a 5% grade was used to further reduce impact forces. He progressed to 70-80% body-weight by day 12 post-injury. Each workout began with a 10-15 minute warm-up at walking speeds before progressing to running speeds. Running at 100% body-weight was difficult due to weakness of the right leg, but at 70-80% body-weight, he was able to increase the speed to levels allowing him to train at heart rates of over 150 beats per minute. Following each workout, his gait normalised and his pain and mood improved for hours.
- By day 15 post-injury, his back and hip pain had resolved completely. He ran 4 miles very slowly on the roads, experiencing no symptoms other than considerable weakness of the right leg.
- During the third week post- injury, the runner ran 27 miles on the AlterG in the first half of the week, and then progressed to a similar amount on trails and roads during the later part of the week. Most of the running on the AlterG was at 90% body-weight and no grade, and included some interval work with heart rates above 160 beats per minute. Unsupported running remained difficult due to continued, but improving, right leg weakness.
- During the fourth and fifth weeks post- injury, the runner ran 95 and 70 miles, respectively with about 24 miles each week on the AlterG at 85-90% body-weight and 3 trail runs of 20-28 miles. His right leg weakness continued to improve and the sensory loss resolved by the end of the fifth week.
- Six weeks after the injury, he underwent isokinetic strength testing of the knee extensors and flexors which showed a strength and power deficit of approximately 30% on the involved side. Despite the objective strength deficit, he was running comfortably on mountain trails and was back to his regular training schedule of at least 80 miles per week.



## Results

The runner improved upon his previous time and set a new age group course record in a 50-km trail run in 3.5 months after the injury, and completed a 161-km trail run 5 months after the injury without symptoms.

| Weeks/Days             | Program                                                                                       | Speed (mph)             | Incline | Time (mins.) | Frequency |
|------------------------|-----------------------------------------------------------------------------------------------|-------------------------|---------|--------------|-----------|
| Day 6 post-injury      | Walking at 50% BW                                                                             | 2.0-3.5                 | 0%      | 30           | N/A       |
| Day 7 post-injury      | Running at 50% BW                                                                             | Progressing up to 10    | 0%      | 60           | N/A       |
| Days 9-14 post-injury  | Running at 50% and progressing to 80% BW                                                      | Ranging from 7.0-11.4   | 0%      | 60-180       | Daily     |
| Day 15 post-injury     | Outdoor running                                                                               | N/A                     | 0-5%    | 40           | N/A       |
| Days 17-19 post-injury | Running at 90% BW                                                                             | Ranging from 6.0-9.2    | 0-5%    | 20-120       | Daily     |
| Days 20-22 post-injury | Outdoor running                                                                               | N/A                     | 0%      | 60-120       | Daily     |
| Day 23 post-injury     | Running at 87-90% BW                                                                          | 1 mile intervals to 9.6 | 0%      | 70           | N/A       |
| Day 24 post-injury     | Outdoor running                                                                               | N/A                     | 0%      | 405          | N/A       |
| > Day 24 post-injury   | Resumed normal outdoor running training supplemented with AlterG workouts 1- 2 times per week | N/A                     | N/A     | N/A          | N/A       |