

The PeopleProp brace project spun out as a company, AbiliLife, which further developed the prototype and manufactured the brace for commercial use. Additional information about purchasing the brace can be found by visiting <http://www.abililife.com>.

# people prop

## a back brace for camptocormia

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**Carnegie Mellon**

**introduction** People Prop is a custom-designed back brace that addresses the symptom of postural instability in Parkinsonian patients known as camptocormia.

Data was gathered from local support units such as the Parkinson's Support Group in order to inform the design.

### background

#### General

More than 1.5 million Americans live with Parkinson's; 7-10 million worldwide  
No current cure for Parkinson's itself  
Main courses of action - alleviate negative symptoms

#### Camptocormia

Postural instability characterized by forward and/or lateral flexion depending on the individual person  
Found in patients with Parkinson's and similar neuromuscular diseases  
Akinetic: patients lack physical ability to self-correct posture  
Leads to other symptoms such as difficulty in breathing and fatigue

#### Neuromuscular Disease

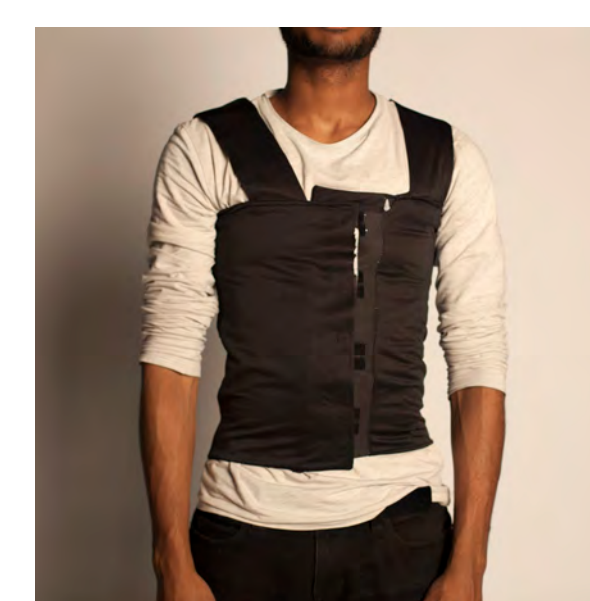
Any disease/ailment which impairs motor function  
Symptoms include "decrease in spontaneous movements, gait difficulty, postural instability"

#### Proposed solution

Back brace  
Maintains proper posture  
Can be worn in public  
Compatible with daily activities  
Provides a level of comfort which alleviates related symptoms of Parkinson's

**market** Sources of inspiration come from braces on the market including the Thoraco Lumbar Sacral Orthosis for post-spinal-injury, sports braces such as the Mueller Adjustable Lumbar Brace, and the Activaidded Orthotics brace. None of these, however, are designed specifically with the Parkinson's community in mind.

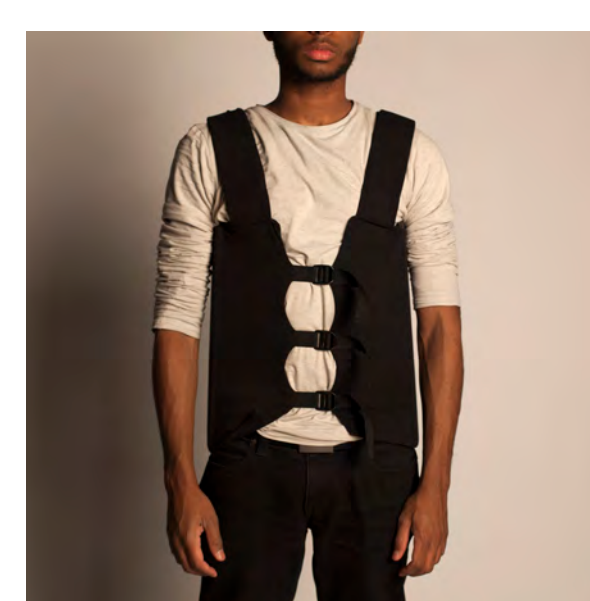
### prototype 1



**ABOVE**  
Full velcro closure with non-stretch fabric offered substantial support of the torso. Styrene side panels also gave nice support, but was too flexible. Elastic flanked the side panels to accommodate different body sizes.

**BELOW**  
Straps converge to y-like shape for upper support. Styrene panel against spine for alignment.

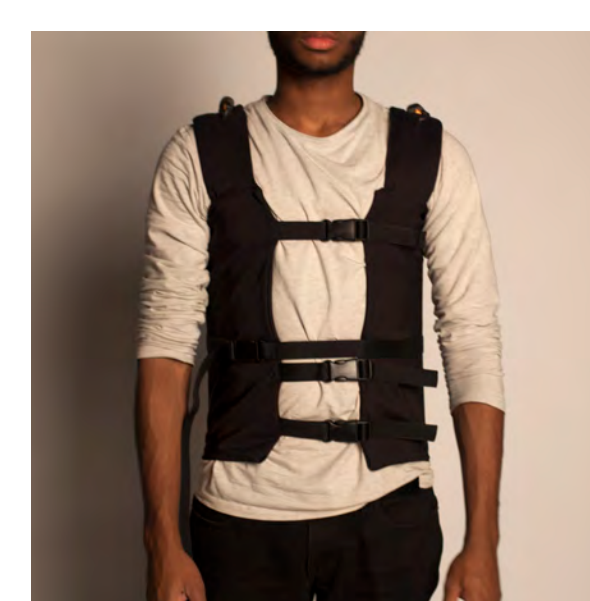
### prototype 2



**ABOVE**  
Front closure made of nylon webbing did not offer the same amount of support as the velcro. Substituted styrene panels with 1/8" thick copper plates. These were too rigid for the contours of the human body and too heavy for the wearer.

**BELOW**  
Four-directional spandex was too stretchy for the weight of the copper.

### prototype 3



**ABOVE**  
Tested a thicker nylon webbing for better support in the front, but it was too thick to smoothly tighten the brace.

**BELOW**  
Incorporated a tensioning system to the straps to keep the shoulders pulled back. The bungee cables hook from the front of the shoulder to the back. A series of holes were cut into the aluminum to allow varying levels of tension. Bungee cable hooks were not the right size to easily slide into the holes of the aluminum in the back.

### prototype 4

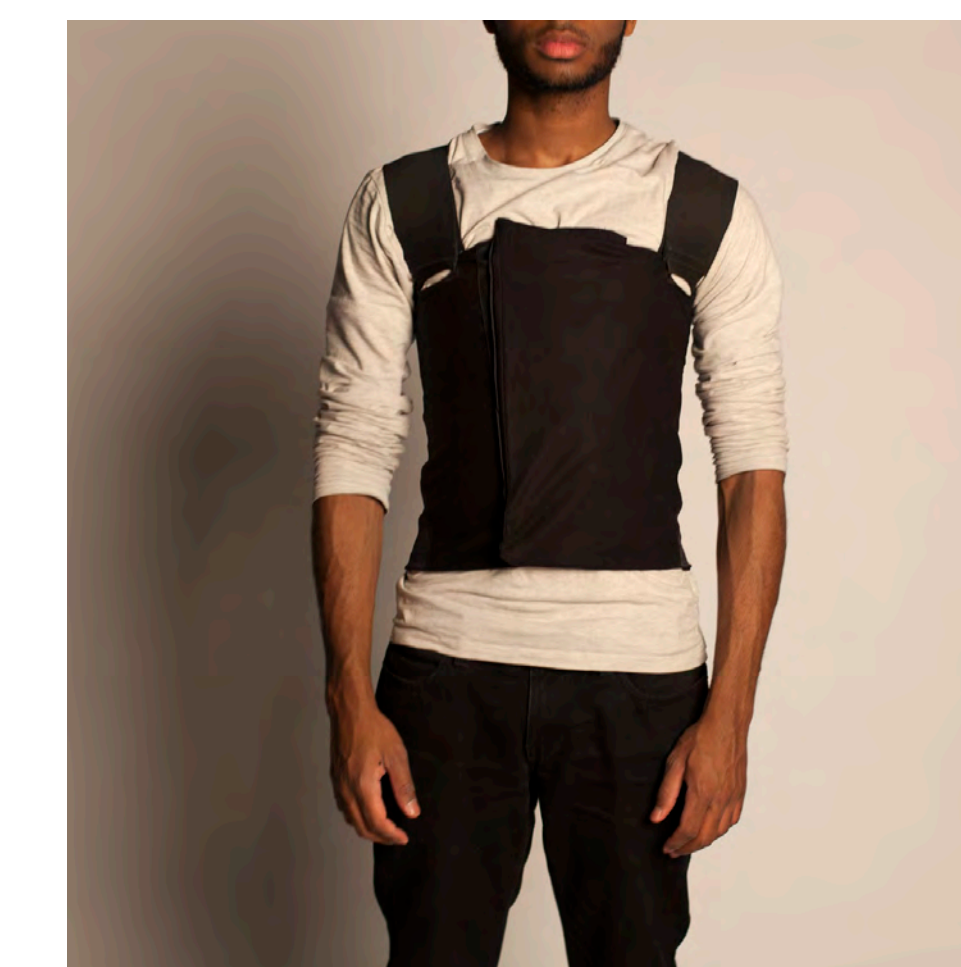


**ABOVE**  
Two inch velcro straps for adjustable sizes in the front. Two-directional spandex was too stretchy for the straps to loop through. After talking to a Parkinson's focus group, we decided to get rid of the side support panels because the patients we observed were displaying forward flexion, but not lateral flexion.

**BELOW**  
Tensioned straps evolved into an integrated y-shaped elastic-velcro system that combined elements that worked best from prototypes one and three. Spandex was too stretchy for the tensioning in the back. Aluminum pocket needed to be fastened shut to prevent the metal from popping out when the tension is applied.

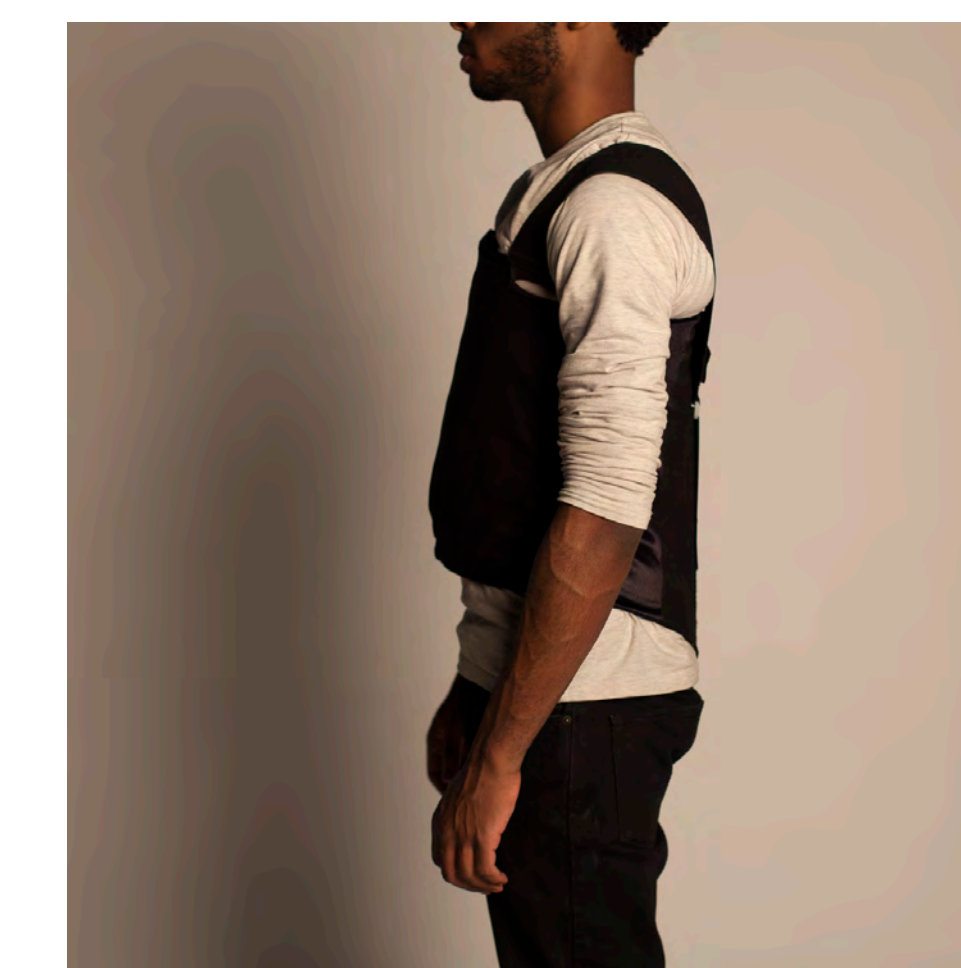
### novel design

No other supportive device on the market addresses the symptoms of camptocormia or other similar neuromuscular diseases in the same way. Special attention was paid to correcting the involuntary forward flexion of the torso. Applying tension to the pectoral girdle via elastic straps keeps the shoulders pulled back to maintain an upright posture. A panel of corrosion-resistant formable 3003 aluminum is used to stabilize the spine and reduce slumping. And this is all achieved with a design tailored to fit unobtrusively under clothing to reduce the stigma of using a corrective wearable in public.



Went back to full velcro closure in the front because it provided the most support to the torso

Front is made of a non-stretch cotton to reduce the stretching that occurs at the opening for the straps to loop through



Tensioned straps keep shoulder pulled back, while the aluminum panel props the spine upward to achieve and maintain a straight and healthy posture.

Sides are made of the two-directional spandex so the brace stretches only where it needs to in order to accommodate a range of sizes. The spandex was also selected for its breathable properties.



The elastic straps were shortened to increase the amount of tension that could be displaced upon the pectoral girdle.

The y-shaped configuration evenly distributes the force across both shoulders and the upper back for a safe adjustment.

The central aluminum panel now has a dual function: (1) it keeps the spine propped upright and (2) it keeps the brace from riding up when the bottom of the 'y' is pulled taught.

A metal closure was added to the top to keep the aluminum from popping out as a safety precaution.

### future intent

Propose integration of brace with a harness that fits over the back of a chair to provide better stability to patients when sitting  
Add component to the brace to improve pelvic alignment/stability  
Modify design to fit different body shapes/sizes  
Address anatomical differences between male and female body types  
Perform controlled, IRB-approved user-testing  
Seek funding from technological incubators such as AlphaLab Gear

### production costs

aluminum	\$1.69
cotton	\$9.45
elastic	\$4.60
spandex	\$5.19
velcro	\$8.38
<b>total</b>	<b>\$29.31</b>
<b>w/ 20% mark up</b>	<b>\$36.00</b>

### special thanks

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