Respiratory insufficiency is a limiting factor for patients with chronic lung disease when performing activities of daily living (ADL). Contributing factors to respiratory insufficiency include hypoventilation, perfusion and poor conditioning, thus preventing patients from exercising or performing ADLs. It has been shown that supplying non-invasive ventilation and oxygen during walking could offset some of the functional impairment associated with advanced COPD. A new non-invasive open ventilation system (NIOV™, Breathe Technologies, Irvine, CA) has been developed that provides both oxygen therapy and ventilation. The system is 1lb, easily carried around the waist and has a unique nasal pillow interface that can be worn comfortably and is aesthetically acceptable.

As part of a pilot study, we evaluated a 79 year old male with Stage IV COPD, based on GOLD guidelines, using the open ventilation system (NIOV™) while performing ADL activities using his oxygen system followed by the same activities while using the NIOV™ system. The severity of his disease has limited the patient’s ability to go outside of his home without severe dyspnea, fatigue and fear.

### Background

The patient was evaluated at home and was asked to establish a 30-day motivational goal. Baseline information was collected on the patient’s status using his current oxygen as well as the NIOV™ system. SpO2, HR, and RR were collected along with Borg, Comfort rating system (CRS) and Fatigue rating systems (FRS) were at the beginning, middle and end of the ADL exercise. The same information and activities were recorded after using the device for 46 days.

### Method

The patient was limited by his current oxygen system and was able to double his treadmill activity while using the NIOV™ system. After 46 days of use, the intensity of the activity increased while wearing the NIOV™ device. Additionally, the patient’s daily exercise routine now includes a minimum of 15 minutes of exercise with either a stationary bicycle or treadmill. Prior to using the NIOV system, he was unable to exercise and never left his home. Since using the NIOV™ system, he has been able to resume an active lifestyle and was able to achieve his goal of driving a car again and taking walks.

### Results

<table>
<thead>
<tr>
<th>Baseline Data</th>
<th>ADL 1 unloading groceries</th>
<th>ADL 2 4 points of home</th>
<th>Treadmill</th>
<th>SPO2</th>
<th>RR</th>
<th>Borg</th>
<th>CRS</th>
<th>FRS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy Pulse™ @ 2 5 minutes</td>
<td>5 minutes</td>
<td>none</td>
<td>93-94</td>
<td>25-26</td>
<td>4</td>
<td>9</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>NIOV™ 4 minutes</td>
<td>13 minutes</td>
<td>8 minutes</td>
<td>94-97</td>
<td>26-32</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>After 46 Days of NIOV™ Use</th>
<th>ADL 1 unloading groceries</th>
<th>ADL 2 4 points of home</th>
<th>Treadmill</th>
<th>SPO2</th>
<th>RR</th>
<th>Borg</th>
<th>CRS</th>
<th>FRS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy Pulse™ @ 2 3 minutes</td>
<td>7 minutes</td>
<td>none</td>
<td>94-95</td>
<td>28-32</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>NIOV™ 4 minutes</td>
<td>6 minutes</td>
<td>16 minutes</td>
<td>95-98</td>
<td>24-30</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

With the overall improvement in conditioning, SpO2/RR and dyspnea the patient’s risk of complications should be diminished.

### Conclusions

This individual went from a sedentary lifestyle to an active lifestyle while using the NIOV™ with improvement in:
- SpO2 levels
- Respiratory rates
- BORG scores
- Daily exercise
- Quality of life

### Disclosures

Kim Wiles is an employee of Klingensmith HealthCare

### Acknowledgments

The authors would like to thank the patient for participating as well as Breathe Technologies for funding the study.