

It is possible that your breathing may be affected following your spinal cord injury. This fact sheet aims to provide you with information on how we breathe, what is considered “normal” breathing and how this may change after a spinal cord injury.

## How do I breathe?

The respiratory system is your system for breathing, and the windpipe and lungs are the major parts of your respiratory system. When you breathe in, either through your mouth or nose, air travels down your windpipe and into your lungs. Your lungs then extract oxygen from the air and pass it through your blood stream to the rest of your body.

The body uses oxygen and produces carbon dioxide as a waste product. When you breathe out, carbon dioxide leaves your body back through your windpipe and out of your nose or mouth.

Most of the work to get air into your lungs is done by the diaphragm, which is a dome shaped muscle that separates your chest from your abdomen. The intercostal muscles between your ribs help the ribs expand as you take a deep breath in. When you breathe out, your breathing muscles relax and let the air out of your lungs. When you are sneezing, coughing or breathing hard during exercise, your abdominal muscles help to push the air out of your lungs forcefully.

## How does having a spinal cord injury affect your breathing?

Your brain sends messages through your nerves to control your breathing muscles. When your autonomic nervous system and respiratory system is not damaged, breathing in and out is an effortless task usually done without much thought.

After a spinal cord injury, there is the possibility that the nerve supply to your respiratory muscles may be

damaged. The amount of muscle control lost after a spinal cord injury will depend on the level and the degree of your injury. Other factors such as your age, general health and history of smoking will also have an impact on your breathing.

The damage that occurs to the autonomic nervous system as a result of a spinal cord injury can result in increased irritability of your breathing system. People can experience symptoms similar to that of asthma.

It is not unusual to feel panicky or anxious after experiencing changes in your breathing as a result of a medical condition. If this applies to you, talk to one of your health professionals who will be able to refer you to the best person to help.

## Tetraplegia

- Generally, if you have a high injury in your neck (C1 – C3), which is “complete”, all of the muscles that you use to breathe can be paralysed. This means that you will most likely need a ventilator (machine) to breathe.
- A “complete” injury in your cervical spine usually results in total loss of intercostals and abdominal muscle control for breathing. An injury from C4 – C7 usually means you will be able to breathe on your own but the work will usually be done solely by the diaphragm. You will likely need help to cough through an “assisted cough”.

## Paraplegia

- Generally, if your injury is between T1 and T6 some of your intercostals and all of your abdominal muscles may be paralysed and so your breathing may not be as good as before. You may also need assistance to cough.
- An injury at T6 – T12 means you will have more of your respiratory muscles working and so your breathing will be better.

- If your injury is below T12 all of your breathing muscles will be working and your breathing should be close to as good as it was before your injury.

### What is an assisted cough?

An assisted cough is a specialised procedure which is used when your cough is weak and help is required to remove phlegm or mucus from your lungs. This will be taught in your spinal unit. This procedure is important, as the inability to remove mucus, dust or saliva from your lungs can lead to infection. An assisted cough is indicated when you have a weak or ineffective cough, and/or excessive secretions.

An assisted cough is completed by a trained attendant applying firm, even pressure over the rib cage or abdomen. This is done while you are sitting or lying in bed, as you breathe out or attempt to cough.

There are reasons why you would not want an assisted cough completed, such as in the event of pain, pregnancy or internal injury. Therefore it is essential you talk with your spinal rehabilitation consultant or physiotherapist before undertaking this procedure. Specific training can be given to you, your family and caregivers.

### Respiratory complications

People with a spinal cord injury are at increased risk of developing respiratory complications because of a weakened respiratory system. The development of pneumonia is one of the greatest risks to your body. This is the same for any level of injury or “completeness” of injury. Be aware of the symptoms of pneumonia and seek medical advice if you have any symptoms such as:

- Shortness of breath
- Pale skin
- Fever
- Heavy chest
- Congestion
- Chills
- Increased breathing rate
- Increased heart rate
- Increased phlegm
- Change in colour and/or consistency of phlegm



### Mechanical ventilation

If you do not have the control of your breathing muscles (usually a complete level from C1 to C3), a ventilator will be required to do the work of the paralysed muscles by pushing air into and out of the lungs.

It may be possible to wean off a ventilator completely, or use it for part of the day. This may be more likely if your level of lesion is C3 to C4, and your blood oxygen levels have been normal.

If you require mechanical ventilation, special training on how to care for your ventilator at home and in the community will be provided in your spinal unit.

It is not unusual for people to have concerns about being ventilated or being weaned from using a ventilator. If you have any concerns, raise them with your health professionals who can discuss your concerns and/or refer you to someone who is able to help.

### Other Breathing Support Devices

While you may not require breathing support from a ventilator, you may benefit from using bi-level positive airway pressure (BiPAP) or continuous positive airway pressure (CPAP) to assist your breathing. This consists of a pump that blows air through a mask worn over the nose, mouth or face. These therapies are used mainly

at night, however, can also be used during the day when required. There are many new masks that are available to improve comfort when using CPAP.

### Sleep apnoea

Sleep apnoea is a breathing problem that usually presents as an interruption to your breathing overnight. Research suggests that people with a weakened respiratory system may be at high risk of developing sleep apnoea. Symptoms can include:

- Irregular breathing or snoring
- Increase in sleepiness during the day
- Waking up often during the night
- Waking up tired or with a headache
- Problems with memory or concentration

Sleep apnoea can lead to health complications in the long term if symptoms are not managed. Such complications include heart attacks, strokes, diabetes and sudden death. It is important you talk with your spinal consultant or GP if you have any of these symptoms. You may be referred for a sleep study and to a respiratory or sleep physician to determine treatment options. Common treatments for controlling symptoms and long-term consequences of sleep apnoea include the use of CPAP or BiPAP.

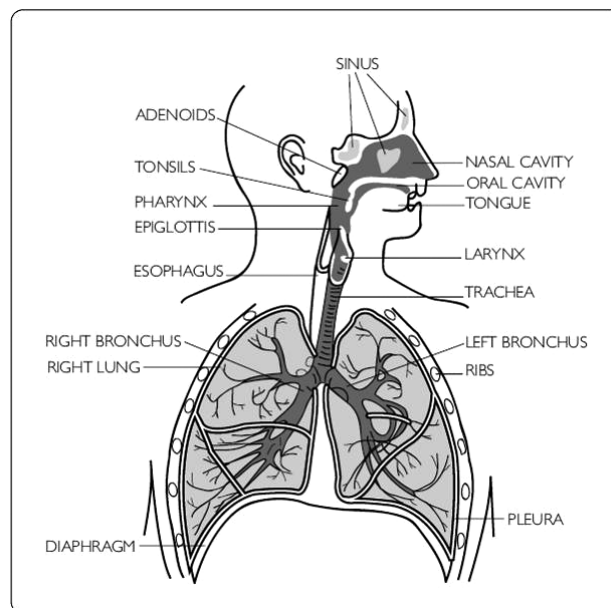
### How do I keep my lungs healthy?

These are general suggestions that, if carried out, will help you keep your lungs and breathing as healthy as possible:

- Don't smoke
- Do regular breathing exercises
- Have someone help you cough regularly
- Live sensibly by trying to stay away from known pollutants (e.g. smoke, dust, chemicals, cold and flu germs)
- Maintain good posture
- Maintain a healthy diet and manage your weight
- Drink plenty of water
- Exercise

There are several breathing exercises you may be able to do, at least twice a day, to help your respiratory system:

- Take a deep breath and hold it for a few seconds before slowly breathing out



- Take a deep breath, bringing in as much air as you can and as fast as you can before pushing the air out as fast as you can
- Take a deep breath and hold it, take another breath and hold it, and take one more before slowly breathing out
- Take a deep breath in then breathe out counting for as long and as fast as you can

### References and Further Resources

BrightSky Australia for product and clinical services  
[www.brightsky.com.au](http://www.brightsky.com.au) Tel: 1300 886 601

ParaQuad NSW: [www.paraquad.org.au](http://www.paraquad.org.au)  
 (02) 8741 5600

ParaQuad's Community Support and Wellbeing Service  
 (02) 8741 5674

Ventilator supplier [www.ventworld.com](http://www.ventworld.com)

Sleep Apnoea Brochure: Sleep Disorders Australia  
[www.sleepoz.org.au](http://www.sleepoz.org.au) (02) 9990 3514

Rancho Los Amigos National Rehabilitation Centre  
 Patient Information: How to Do an Assisted Cough  
[www.rancho.org](http://www.rancho.org)

Assisted Coughing Clinical Guidelines [www.spinalinjurycentre.org.uk/information/pdfs/019.pdf](http://www.spinalinjurycentre.org.uk/information/pdfs/019.pdf)

Apparelyzed: Spinal Cord Injury Peer Support  
[www.apparelyzed.com/respiratory.html](http://www.apparelyzed.com/respiratory.html)

Paralyzed Veterans of America, Respiratory Management Following Spinal Cord Injury: What You Should Know. [www.pva.org](http://www.pva.org)