

Breathing and motor neurone disease: an introduction

What you should know

- Motor neurone disease causes the muscles you have control over to weaken. This can include the muscles involved in breathing – the respiratory muscles.
- A baseline measurement of your breathing function soon after diagnosis can be helpful for future treatment.
- Respiratory muscle weakness usually develops gradually, but can occur suddenly.
- Let your doctor or clinic know if you think you have respiratory muscle weakness.

About breathing

When you breathe in, your chest expands and air is pulled into your lungs. This air includes oxygen that your body needs for survival.

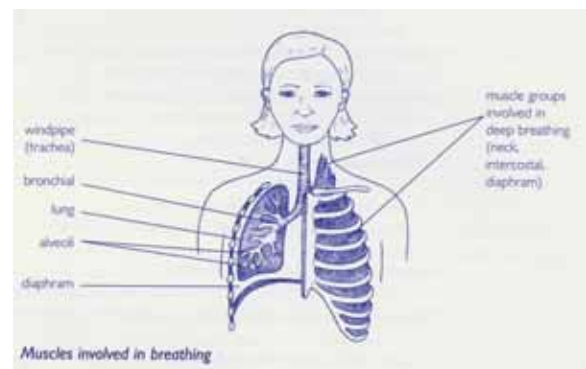
When you breathe out your chest contracts and air is pushed out of your lungs. This air includes carbon dioxide that your body no longer needs.

There are two main types of respiratory muscles involved in expanding and contracting your chest for breathing. These are the intercostals, which run between and over the ribs, and the diaphragm, which separates the rib cage from the abdomen.

A cough is a very forceful breath out. When you cough your abdominal muscles contract and push stomach contents up against your diaphragm. This causes your diaphragm to move up and force air out of your lungs.

People generally find it easier to breathe when they are sitting or standing than when they are lying flat. This is because gravity helps the downwards movement of the diaphragm necessary for a full breath.

The diaphragm is also affected by a full stomach. A full stomach pushes the diaphragm up, and the diaphragm needs to work harder to contract downwards to provide you with maximum lung capacity.



To force your chest to expand, the diaphragm contracts downwards. When you relax, the diaphragm relaxes upwards and air is pushed out of your lungs.

Breathing with MND

Motor neurone disease causes the muscles you have control over to weaken. This can include the muscles involved in breathing – the respiratory muscles. Respiratory muscle weakness usually develops gradually, but can occur suddenly. Sometimes, respiratory muscle weakness may even be the first sign of motor neurone disease.

Respiratory muscle weakness causes breathing to become shallower than usual. Less air is drawn into the lungs so less oxygen is absorbed into the blood. It is also more difficult to breathe out the carbon dioxide that is produced by the body. When this happens people often use their neck and shoulder muscles (accessory muscles) to help with moving air in and out of their lungs.

When a person is sleeping the diaphragm works alone and the accessory muscles are not used. If your diaphragm is weak, it may not be able to help you breathe effectively when you are asleep. This creates a change in your breathing and causes you to wake up. This can happen frequently during the night.

Changes that may result from respiratory muscle weakness

- disturbed night sleep or loss of sleep
- daytime sleepiness
- morning headaches
- increased fatigue
- decreased appetite
- impaired concentration or confusion
- irritability and anxiety
- quiet voice and fewer words per breath
- shallow, faster breathing
- reduced movement of the rib cage or abdominal muscles
- excessive use of the muscles in the upper chest and neck
- breathlessness (dyspnoea) even when at rest
- breathlessness lying flat (orthopnoea)
- weakened cough and sneeze

Finding out more about respiratory management

Talk to your doctor early about respiratory management. A baseline measurement of your breathing function, soon after diagnosis, provides details about your 'usual' breathing and can be helpful for future treatment.

If you think your respiratory muscles are becoming weaker, let your doctor or clinic know. There are effective ways to reduce discomfort caused by respiratory muscle weakness. The best strategies for you can only be determined after careful consideration of your individual situation. This may involve discussion with your neurologist, an assessment of your respiratory muscle function by a respiratory physician, regular ongoing respiratory function testing and referral to other health professionals (Andersen et al 2007).

The respiratory muscle function examination

A respiratory muscle function examination usually includes assessment of vital capacity, sniff nasal pressure, arterial blood gas measurement and several other tests. A baseline measurement of your respiratory function is recorded at your first visit. Follow-up examinations will show trends in your respiratory muscle function.

Vital capacity

You blow into a spirometer, which measures the strength of your breath when you breathe out. To do this, your lips need to make a seal around the spirometer mouthpiece. If you have weakness in the muscles controlling speech and swallowing, and cannot make a seal around the mouthpiece, you may be asked to wear a facemask for the test.

Arterial blood gases

Blood samples are taken from an artery, usually in the wrist. The levels of oxygen and carbon dioxide in your blood are measured.

Sniff nasal inspiratory pressure

A small tube is placed to seal the opening of one or both of your nostrils and you are asked to breathe air into your nose through the sealed tube. This measures the strength of your breath when you breathe in.

Other tests of respiratory muscle function

You may be asked to undergo other tests, such as overnight monitoring of breathing. Some monitoring of breathing can take place at home using a machine called an oximeter. However, sometimes you may need to stay overnight in hospital for this to take place.

Referral to other health professionals

Other health professionals such as the specialist respiratory nurse, physiotherapist, palliative care team, speech pathologist, occupational therapist, dietitian and general practitioner may also provide you with specific advice about particular strategies for respiratory management.

More information

For more information about respiratory management contact your general practitioner, neurologist, respiratory physician, palliative care team, MND clinic or service or your MND Association.

References

Andersen et al, 2007, 'Good practice in the management of amyotrophic lateral sclerosis: clinical guidelines: an evidence-based review with good practice points. EALSC Working Group.', *Amyotroph Lateral Scler* 8(4).

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