

An introduction to

# NVM5<sup>®</sup>

## Nerve monitoring system

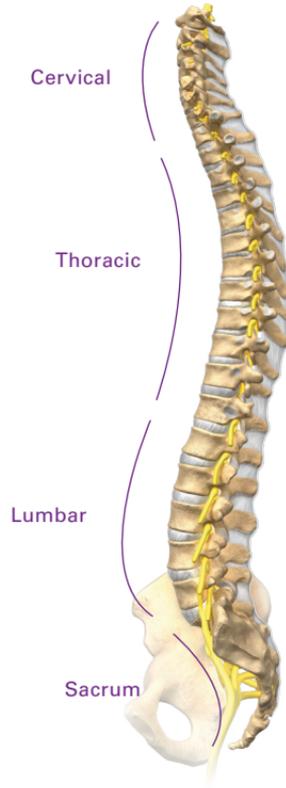
This booklet provides general information on NVM5 nerve monitoring. It is not meant to replace any personal conversations that you might wish to have with your physician or other member of your healthcare team. Not all the information here will apply to your individual treatment or its outcome.



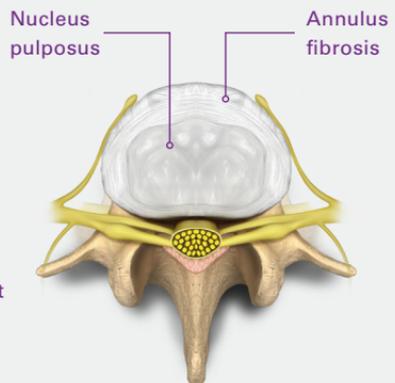
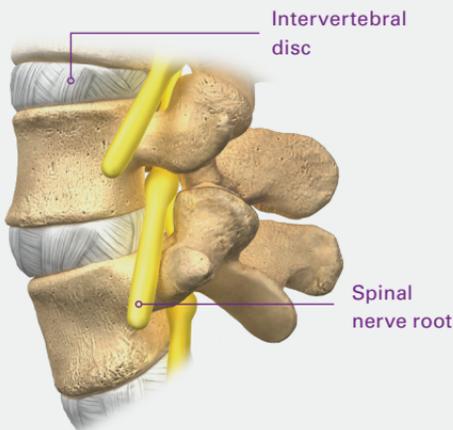
# About the spine

The human spine is made up of 24 bones or vertebrae in the cervical (neck) spine, the thoracic (chest) spine, and the lumbar (lower back) spine, plus the sacral bones.

Vertebrae are connected by several joints, which allow you to bend, twist and carry loads. The main joint between two vertebrae is called an intervertebral disc. The disc is made of two parts, a tough and fibrous outer layer (annulus fibrosis) and a soft, gelatinous center (nucleus pulposus). These two parts work in conjunction to allow the spine to move, and also provide shock absorption.



*Side view of spine*



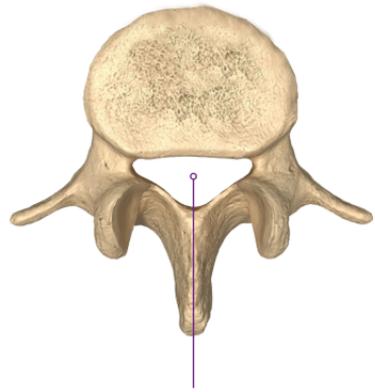
# Neural anatomy

## Spinal cord, cauda equina and spinal nerves

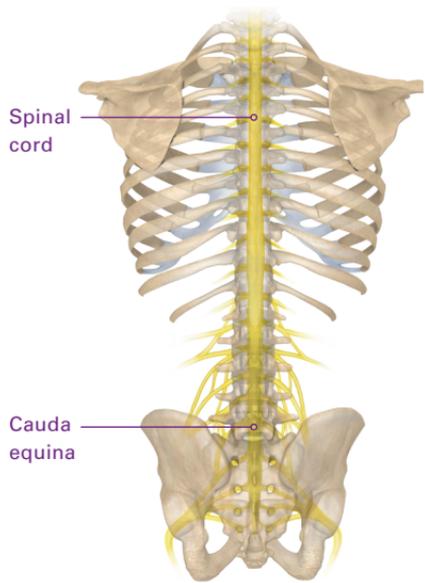
Each vertebra has an opening (vertebral foramen) through which a tubular nervous structure travels. Beginning at the base of the brain to the upper lumbar spine, this structure is called the spinal cord. It acts as a conduit for sensory and motor information to travel to and from the brain.

Below the spinal cord, in the lumbar spine, the nerves that exit the spinal cord continue to travel through the vertebral foramen as a bundle of individual nerves known as the cauda equina.

At each level of the spine, spinal nerves exit the bony spine then extend throughout the body, further intertwining to send signals between the brain and organs, muscles and other tissues. Cervical spinal nerves innervate (provide muscle activity and sensation functions to) the upper back, arms and hands. Lumbar spinal nerves innervate the lower back, abdomen and legs.



Vertebral foramen



Spinal cord

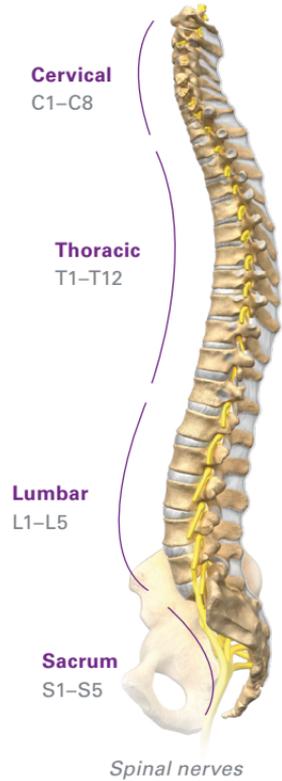
Cauda equina

Back view of spine

# Myotomes

Myotomes are muscle groups whose motor innervation can be attributed to specific spinal nerve levels. By knowing which spinal nerves innervate specific muscles, we can monitor those muscles for changes in the health of the nerve during spine surgery. For example, we can monitor the muscle groups listed below for information about the corresponding spinal nerves.

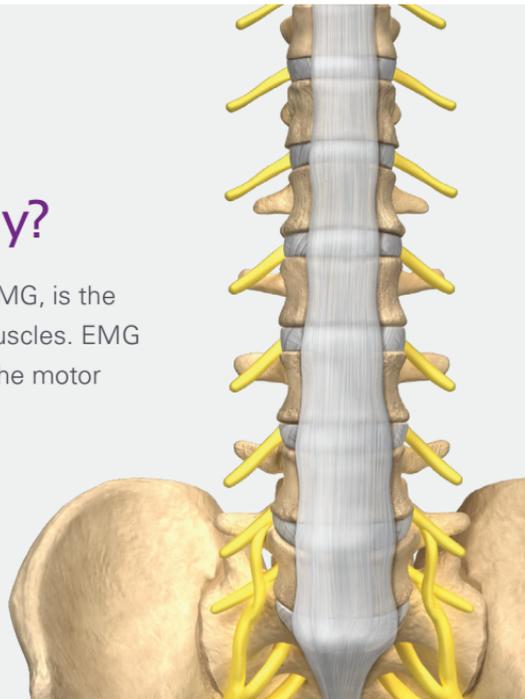
- Quadriceps (front thigh muscles) L2, L3, L4
- Anterior tibialis (shin muscle) L4, L5
- Hamstrings (back thigh muscles) L5, S1
- Gastrocnemius (calf muscle) S1, S2



# What is electromyography?

Electromyography, also known as EMG, is the study of the electrical activity of muscles. EMG monitoring is used to help assess the motor function of nerve roots.

*Front view of spine*

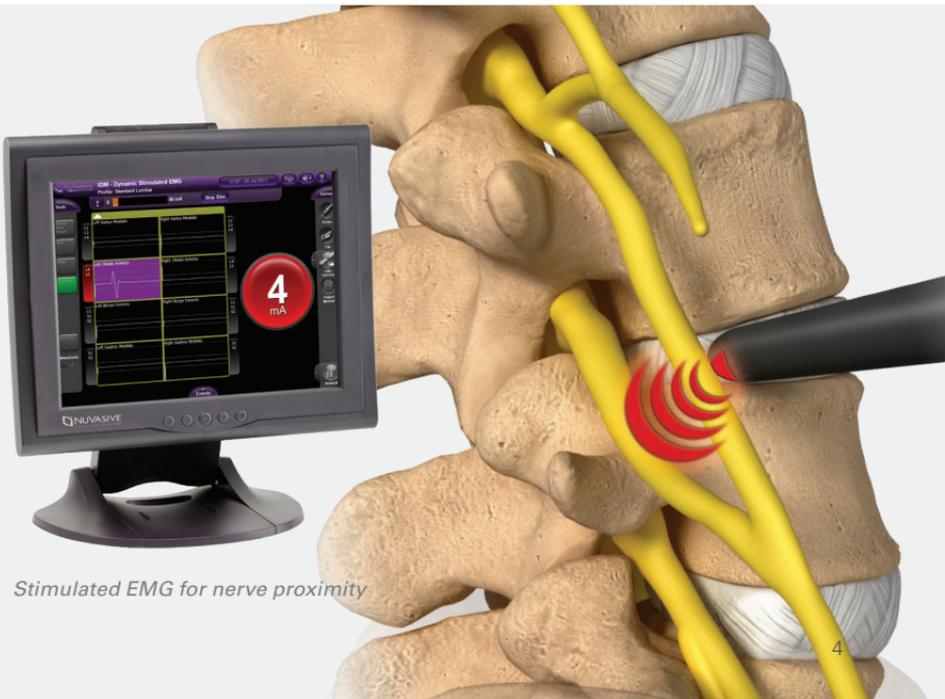


# Why is EMG used in surgery?

During surgery the brain is unconscious and unable to tell the muscles via nerves to contract. In its place, we use EMG to evaluate nerve health. To do so, electrodes are placed over muscles and responses to nerve stimulation are evaluated. Muscle twitches produce a signal on a recording machine, which indicates the health of the nerves that innervate it.

EMG can be used to inform the physician of nerve proximity and location to assist him/her in determining proper hardware and screw placement in fusion surgeries. This helps reduce the chance of nerve impingement.

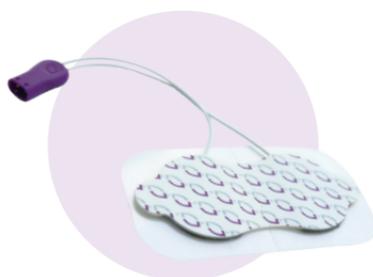
While EMG monitoring is the standard of care for nerve root monitoring, other monitoring techniques may be used if other neural anatomy is at risk.



*Stimulated EMG for nerve proximity*

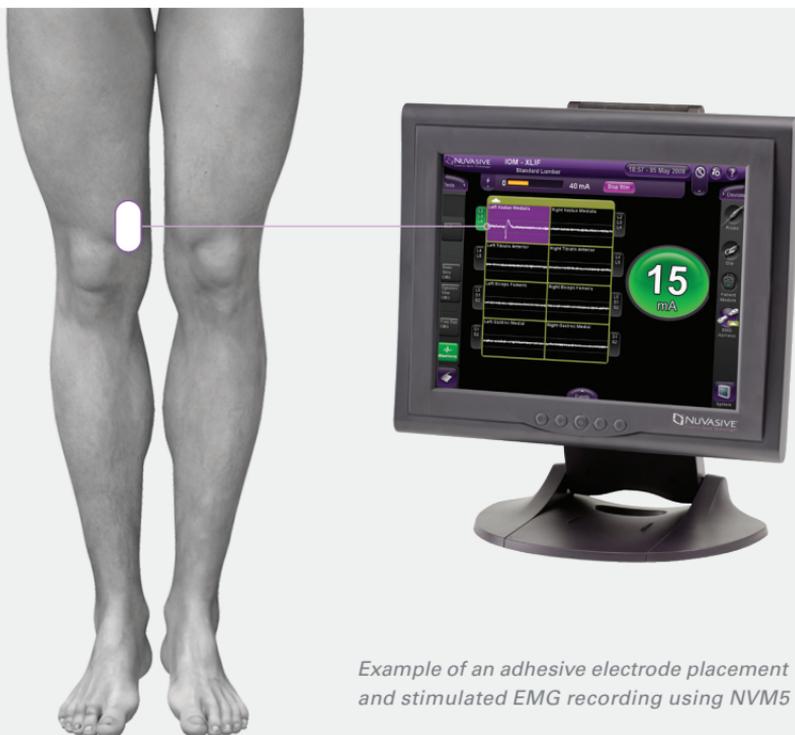
## What to expect before and during surgery

Inform your physician if you have an allergy or sensitivity to adhesives as adhesive surface electrodes may be used with NVM5 monitoring. Needle electrodes may also be used. Should you have any questions regarding EMG, do not hesitate to ask your surgeon. Your physician should provide thorough preoperative instructions.



*Adhesive electrode*

Your surgeon should review the information displayed on the NVM5 monitor from your muscle twitches to evaluate the health of your nerves and should provide guidance on where to place spinal instrumentation during the procedure.



*Example of an adhesive electrode placement and stimulated EMG recording using NVM5*

# Can EMG monitoring be right for me?

Your physician might determine that intraoperative NVM5 EMG monitoring is a good option for you if you require spine surgery where your cervical or lumbar nerve roots are affected. Example surgeries may include:

- lumbar decompression,
- lumbar interbody fusion from any approach: front (ALIF), back (PLIF, TLIF) and side (XLIF®),
- lumbar pedicle screw instrumentation,
- lumbar total disc replacement,
- cauda equina surgery,
- anterior cervical decompression and fusion (ACDF), and
- cervical total disc replacement.

This is not intended to be a complete list of all possible surgeries where EMG may be beneficial. Please contact your physician to discuss additional spine surgeries.

Conversely, your surgeon may determine that EMG is not a good option for you. For example, if your surgeon determines that muscle relaxants are necessary throughout your procedure, monitoring cannot effectively be performed.

It is important to discuss this as well as the potential risks, complications and benefits of spine surgery with your physician prior to surgery in order to determine the best course of treatment for you.

Refer to the NVM5 system instructions for use for additional information on indications, contraindications, warnings and precautions at [nvasive.com/eifu](https://www.nvasive.com/eifu).





## Notes

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## Resources

For more information about NVM5, please visit:

**[nuvasive.com](https://www.nuvasive.com)**

If you would like to learn more about patient support and education for chronic back, leg and neck pain sufferers and their loved ones, please visit:

**[thebetterwayback.org](https://www.thebetterwayback.org)**

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*If you have any questions about NVM5 or spine surgery, please call or visit your physician, who is the only one qualified to diagnose and treat your spinal condition. This patient information brochure is not a replacement for professional medical advice.*

## About **The Better Way Back**<sup>®</sup>

The Better Way Back is a nationwide patient support program created by NuVasive<sup>®</sup>, a leader in developing minimally invasive, procedurally-integrated spine solutions. The Better Way Back is a free community built on the power of empathy, and is dedicated to providing hope, support and information to individuals suffering from chronic back, leg or neck pain.

Through its Patient Ambassador Program, The Better Way Back pairs patients considering spine surgery with patients who have previously undergone a spine procedure. Ambassadors volunteer their time to discuss their experiences in order to provide additional, first-hand perspectives.

To learn more about The Better Way Back, please



call **1.800.745.7099**



visit **thebetterwayback.org**



text "TBWB" to **858.360.8292**

# NVM5

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