



Designed: NVM5



XLIF is the only lateral procedure with an integrated neuromonitoring solution that provides surgeon-driven, directional, real-time EMG information throughout the procedure. This allows surgeons to reproducibly access, locate, and avoid the nerves of the lumbar plexus to address pathologies at L4-L5 and above from the lateral approach.



Designed: NVM5

Leadership in Neuromonitoring

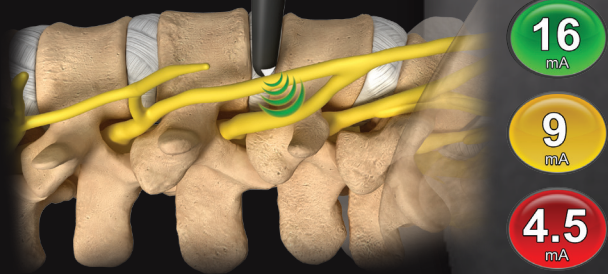
NVM5 is the only system that provides surgeon-controlled, automated nerve detection during lateral lumbar procedures to predictably avoid the nerves of the lumbar plexus.

- **NVM5 Patented Real-time EMG Hunting Algorithm:** Objective measure on nerve proximity
- **XLIF Directional Dilators:** Precise localization of nerves
- Stimulation control from sterile field
- Clinically validated, automated thresholds
- Immediate audible and visual feedback direct to the surgeon



Discrete Thresholds

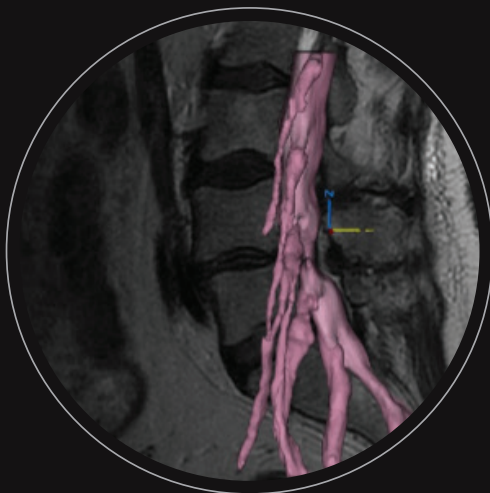
Surgeon-driven



Real-time

Directionality

Relative Proximity

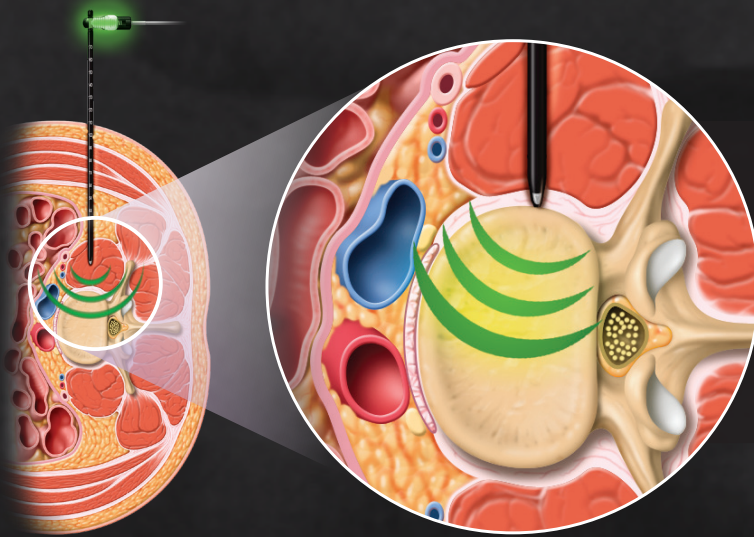
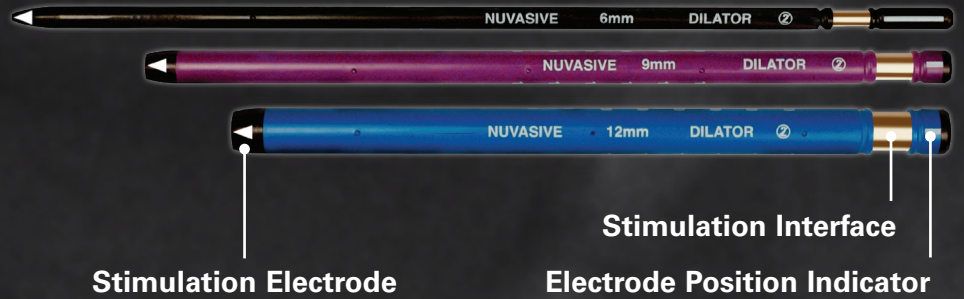


Nerve Proximity and Location: Patient-specific Information

- Anatomic variability of the lumbar plexus can pose a challenge for lateral procedures, especially at L4-L5.
- NVM5 enables surgeons to map the neural structures, gain an understanding of the anatomical landscape of the lumbar plexus, and reproducibly establish a lateral working zone.
- No other lateral procedure provides this integrated solution to reproducibly access L4-L5 and above.

Real-time, Objective Nerve Avoidance with the XLIF Directional Dilators

When used with the NVM5 system, XLIF dilators offer the potential for an ideal approach to the disc space, minimizing soft tissue disruption while communicating a real-time, objective measure on nerve proximity and directionality.



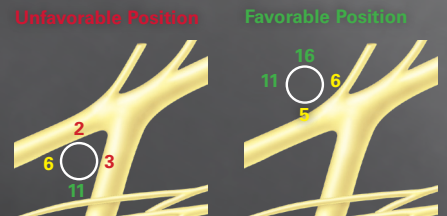
The stimulus is applied via the clip at the interface of the XLIF dilators. The electrode at the distal tip continuously emits the stimulus while the EMG electrodes on the innervated muscle groups monitor for a response.

Key Benefits

- Using the electrode position indicator at the top of the dilator, the surgeon can track the dilator direction throughout the transpoas approach and re-direct accordingly at any time.
- As the dilator rotates, the EMG values change in accordance with the proximity to the nerve, enabling 360°, real-time feedback.

NVM5 Nerve Identification

Combined discrete thresholds and directional dilators identify both nerve proximity and specific location.



Traditional Nerve Identification

Without real-time directionality, stimulated EMG may not identify nerve location, which may lead to possible over-retraction and postoperative complications.



Proven: NVM5

“Dynamically Evoked, Discrete-threshold Electromyography in the Extreme Lateral Interbody Fusion Approach”

Variability of Nerve Location

Location, navigation, and avoidance enabled by NVM5

“Nerves were identified within proximity of the dilators in 55.7% of all cases during the XLIF approach. Although nerves were more commonly identified in the posterior margin (63%), there was significant variability in the location of nerves identified.”

Tohmeh AG, Rodgers WB, Peterson MD. Dynamically evoked, discrete-threshold electromyography in the extreme lateral interbody fusion approach. *J Neurosurg Spine* 2011;14(1):31-7.

“NVM5 Detection Thresholds in >900 XLIF Surgeries”

Confidence in Nerve Detection

only enabled by NVM5 proximity and directionality information

“Why is neuromonitoring necessary during an XLIF?... Even while targeting the anterior half of the disc space, nerves are detected 84% of the time, and the dilators need to be redirected 50% of the time...NVM5 is the only system that can provide real-time neural proximity and directionality information.”

Smith W, Rodgers WB. NVM5 detection thresholds in >900 XLIF surgeries. NuVasive White Paper 9500205. May 2005.

“Defining the Safe Working Zones Using the Minimally Disruptive Lateral Retroperitoneal Transpsoas Approach: An Anatomical Study”

Definition of Safe Working Zone

utilizing the XLIF technique with NVM5

“Study defines safe working zones for the XLIF approach... The safe access zone for L1-L4 is at the middle posterior quarter of the vertebral body while the safe access zone for L4-L5 is at the midpoint of the vertebral body...The genitofemoral nerve is at risk in Zone II at L2-L3 and in Zone I at L3-L5.”

Uribe JS, Arredondo N, Dakwar E, et al. Defining the safe working zones using the minimally invasive lateral retroperitoneal transpsoas approach: an anatomical study. *J Neurosurg Spine* 2010;13(2):260-6.

“Electromyographic Monitoring and Its Anatomical Implications in Minimally Disruptive Spine Surgery”

3x

Reduction in neural complications

“Electrophysiological monitoring is a necessary tool to avoid nerve injury while traversing the psoas muscle...The addition of EMG to lateral approach surgery has contributed to a complication rate drop from 30% to less than 1%.”

Uribe JS, Vale FL, Dakwar E. Electromyographic monitoring and its anatomical implications in minimally invasive spine surgery. *Spine* 2010;35(26 Suppl):S368-74.



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