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Rivanna Medical
press release
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Stanford University Trial Demonstrates Accuracy of Accuro Automated Ultrasound

***Anesthesia & Analgesia* Publishes Results of RIVANNA's Image-Guided Technology's Epidural Success**

CHARLOTTESVILLE, Va., September 25, 2017—A clinical trial conducted at Stanford University Medical Center published this week in *Anesthesia & Analgesia** proved the accuracy of the Accuro® image-guided spinal navigation system in calculating the optimal site and needle depth for epidural anesthesia administration. The research is the latest in a series of studies supporting the efficacy of RIVANNA's handheld ultrasound system with proprietary pattern recognition software, which identifies spinal landmarks and provides automated epidural placement guidance. The innovative Accuro platform also has application in a range of additional medical procedures that benefit from visualization of targeted anatomical areas.

In the trial, RIVANNA® Accuro identified the appropriate epidural injection sites along the lower spine and calculated the depth to the epidural space, a narrow hollow area in the spine. Actual epidural depth was confirmed by measuring needle penetration during successful epidural delivery by anesthesia providers. Accuro predicted this depth within an average of .61 cm.

In addition, Accuro identified the appropriate spinal interspace for needle insertion in 94% of patients and enabled 87% success in first-attempt epidural administration. The research was conducted under the direction of Brendan Carvalho, MD, at Stanford Medical Center and led by Katherine Seligman, MD, currently faculty at the University of New Mexico.

"The ability to visualize spinal anatomy in detail during epidural needle placement has a strong impact on the procedure's success," says Will Mauldin, Chairman and CEO of Rivanna Medical. "Today, anesthesiologists rely on spinal palpation and their knowledge of spinal anatomy to determine the appropriate injection site and depth. Depending on the patient condition and physician skill, up to 80% of first attempt epidural needle placements fail. Obesity and atypical spinal characteristics such as scoliosis place patients significantly at failure risk."

Repeated epidural needle insertions can negatively impact the patient with ongoing headaches, bleeding, back pain and possibly paralysis. Failed epidurals cost the medical system more than \$1.5 billion annually.

Mauldin notes that ultrasound is the imaging modality of choice for epidurals because most are administered to expectant mothers who must avoid the radiation involved in other imaging procedures.



Significant research shows that ultrasound guidance of epidural and other neuraxial anesthesia significantly improves efficacy and patient safety. However, performing and interpreting ultrasound requires specialized training not typically in the anesthesia provider's skillset.

Accuro's SpineNav3D™ computerized ultrasound image guidance eliminates the steep ultrasound learning curve, making it simple and practical for anesthesiologists and other medical professionals not trained in the modality.

"This study published in a respected anesthesiology publication underscores the device's precision in providing physician guidance," says Mauldin.

In addition to innovative image guidance, RIVANNA Accuro also incorporates BoneEnhance® technology, which optimizes the device for visualization of bony spinal anatomy. Accuro delivers a five- to 10-fold increase in bone-to-tissue contrast compared to traditional ultrasound, which is generally preferred for soft tissue imaging. The pocket-sized, wireless device is simple and practical to use in a wide range of settings where traditional large, unwieldy systems can be a problem.

"Accuro is designed to eliminate the risks of multiple needle placement attempts, increasing patient satisfaction while supporting anesthesiology workflow," notes Mauldin. "A growing number of studies underscore the device's success in meeting these goals."

A recent randomized trial at University of Virginia Medical Center found that for residents with prior spinal anesthesia experience, Accuro improved first-attempt needle placement by more than 100% in patients with a high body mass index. Appropriate needle placement in these patients is particularly difficult. The average number of needle redirections to achieve placement using Accuro was almost half that of the same sub-group using conventional placement methods.

* ANESTHESIA & ANALGESIA is the official journal of the [International Anesthesia Research Society](https://www.internationalanesthesiasociety.org/).

About Accuro® and Rivanna Medical, LLC

RIVANNA® Accuro is the world's first ultrasound-guidance system designed to effortlessly enhance spinal and epidural anesthesia placement accuracy. The revolutionary platform features BoneEnhance®, which optimizes ultrasound for the visualization of bony vs. soft tissue anatomy, and SpineNav3D™, which automates measurements of the spinal midline, epidural depth and trajectory. Accuro was engineered and commercialized by RIVANNA, an innovative medical device company headquartered in Charlottesville, VA. The proprietary device is FDA 510(k)-cleared for a variety of imaging applications. For anesthesia providers, certainty can be effortless with Accuro. For more information, visit rivannamedical.com.

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