

# B-Smart™ Injection Pressure Monitor

Objective Monitoring and Documentation for Peripheral Nerve Blocks



Take Away the Guesswork.

# Be Decisive with the B-Smart™ Injection Pressure Monitor.



The B-Smart pressure monitor is the first disposable manometer for objective monitoring of injection pressure during administration of peripheral nerve blocks (PNB). Monitoring opening injection pressure with the B-Smart monitor can help identify potentially unsafe injections before they start. When the B-Smart monitor indicates high (> 15 psi) opening injection pressure, the needle can be repositioned and the injection resumed.

## Significance of Objective Pressure Measurements

*Intrafascicular injections at high pressures > 15 psi:* "High injection pressures at the onset of injection may indicate an intraneural needle placement and lead to severe fascicular injury and persistent neurologic deficits."<sup>1</sup>

*Needle-nerve contact and high pressures:* One study cites 97% detection of needle-nerve contact at  $\geq 15$  psi<sup>2</sup>. Forceful needle-nerve contact and injection may result in intraneural inflammatory changes.<sup>3</sup>

*Perineural injections:* Typically result in pressures  $\leq 4$  psi<sup>1</sup>

Resistance to injection is part of the standard documentation procedure during nerve blocks. Before the B-Smart monitor, documentation of resistance was merely subjective and relied on the "learned feel" and experience of the provider.

The results of one study show that, "providers vary widely in their perception of appropriate force and rate of injection during PNB. The syringe-feel method of assessing injection force is inconsistent."<sup>4</sup> Of the 30 providers, "21 (70%) initiated injection using a force that resulted in pressures greater than 20 psi; 15 (50%) used a force greater than 25 psi, and 3 (10%) exerted pressures greater than 30 psi."<sup>4</sup>

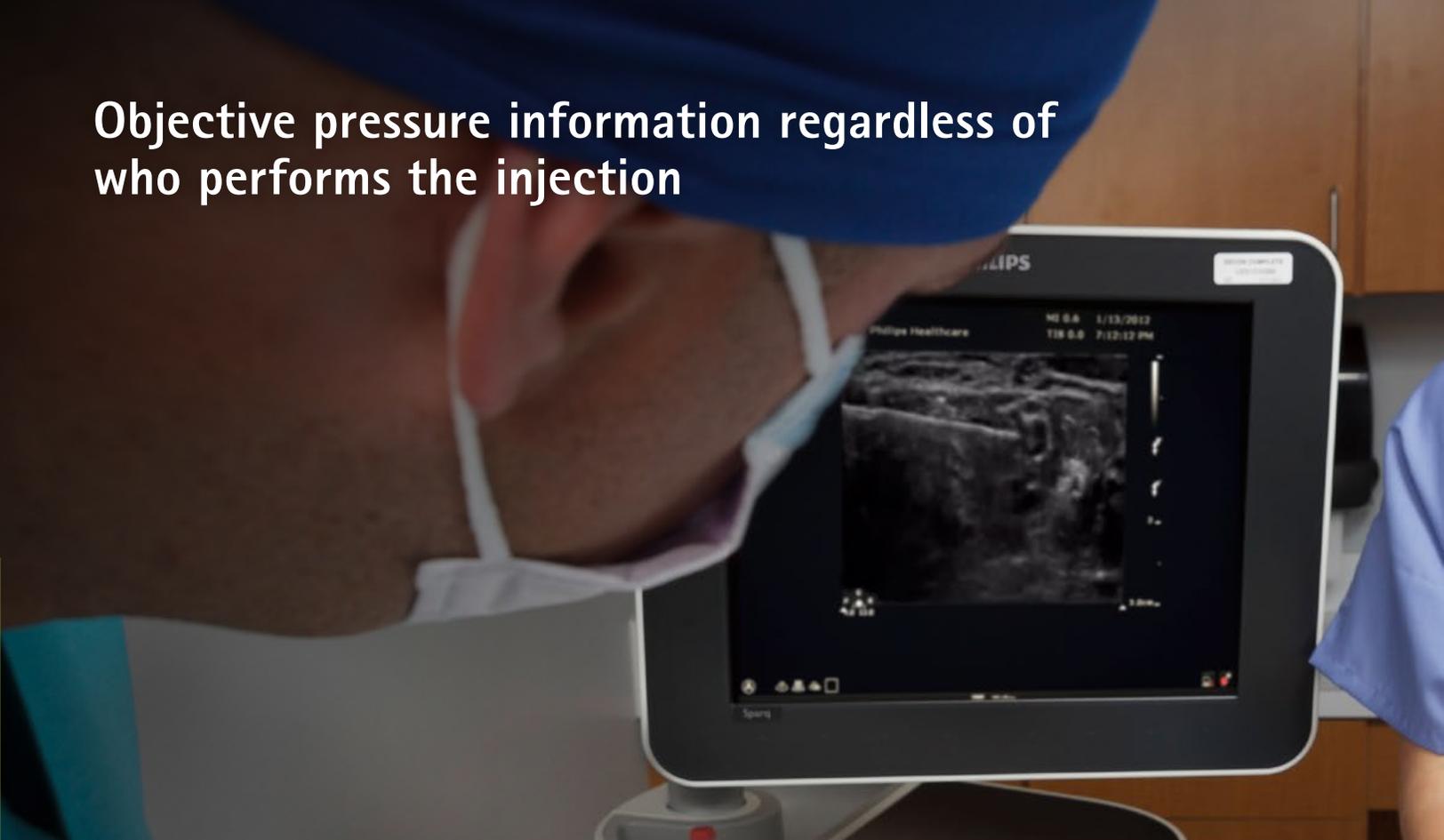
## Priming the B-Smart Pressure Monitor



1. Attach the B-Smart monitor to filled syringe
2. Attach needle tubing to the B-Smart monitor
3. Flush system, ensuring the B-Smart monitor's piston rises so "> 20 psi" (orange) is visible.

The B-Smart monitor's piston must move upward during priming in order for the device to be ready to use. It may be helpful to obstruct the injection tubing to accomplish this. Refer to product labeling for complete instructions for use.

# Objective pressure information regardless of who performs the injection



< 15 psi



15 - 20 psi



> 20 psi





## Advantages of Monitoring Opening Injection Pressure with the B-Smart™ Injection Pressure Monitor.

### Take away the guess work:

Provides a visual indication of injection pressure

### Last line of defense:

Monitoring pressure in real-time provides objective information to make more informed decisions on how to proceed with an injection.

### Objective documentation:

An objective and quantifiable method of monitoring and documenting injection pressure regardless of who performs the injection

## What is Opening Injection Pressure?

Before an injection of local anesthetic can occur, a certain pressure is required to overcome the resistance of the tissue at the tip of the needle. The pressure in the syringe/B-Smart/tubing/needle-system at which the resistance of the tissue is overcome and the flow of the local anesthetic begins is called the opening injection pressure.

Pressure is equal throughout the syringe/ B-Smart/tubing/needle system and independent of the size of the system or speed of injection until flow begins (Pascal's law).

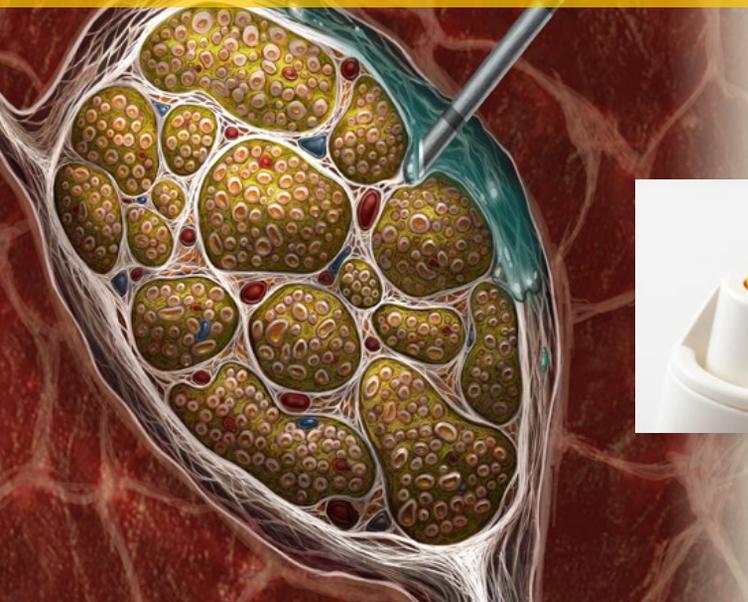
## Intrafascicular injection. High pressure >15 psi



"High injection pressures at the onset of injection may indicate an intraneural needle placement and lead to severe fascicular injury and persistent neurologic deficits."<sup>1</sup>

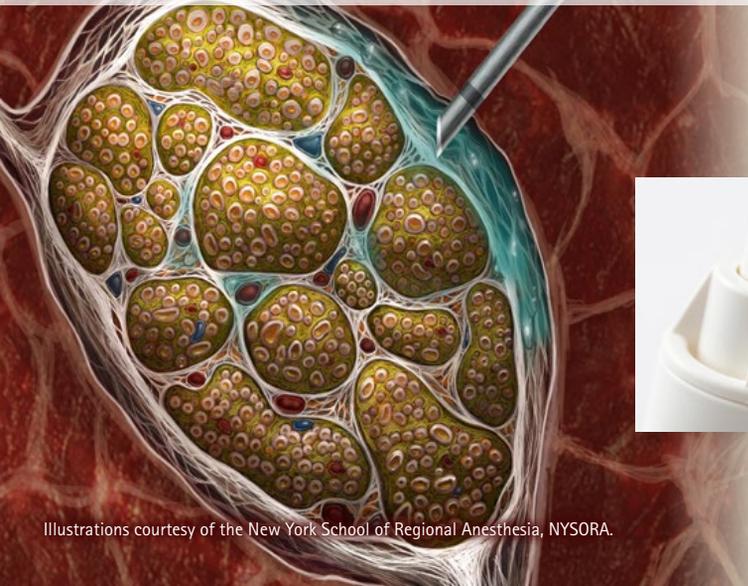
"The majority of intraneural injections were associated with high pressures (25-45 psi) at the beginning of the injection. Persistent motor deficits were observed in all 4 animals having high injection pressures ( $\geq 25$  psi)."<sup>1</sup>

## Needle-nerve contact. 97% detection at 15 psi<sup>2</sup>



Forceful needle-nerve contact and injection may result in intraneural inflammatory changes.<sup>3</sup>

## Perineural injection. Low pressure $\leq 15$ psi



"Extraneural (1-mm distant) needle placements were associated with low opening injection pressure ( $< 15$  PSI)."<sup>2</sup>

"All perineural injections resulted in pressures  $\leq 4$  psi. Normal motor function returned 3 hours after all injections associated with low injection pressures ( $\leq 11$  psi)."<sup>1</sup>



Order code: BS015-30  
Case quantity: 25

To learn more, contact your local B. Braun representative  
and visit [www.BBraunUSA.com/BSmart](http://www.BBraunUSA.com/BSmart)

1-800-227-2862



Learn how the B-Smart™ injection pressure monitor fits  
into the Injection Safety Monitoring (ISM) concept at:  
[www.PNBmonitoring.com](http://www.PNBmonitoring.com)

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2. Gadsden JC, Choi JJ, Lin E, Robinson A: Opening Injection Pressure Consistently Detects Needle-Nerve Contact during Ultrasound-guided Interscalene Brachial Plexus Block: *Anesthesiology* 2014; 120:1246-53
3. Steinfeldt T, Poeschl S, Nimphius W, Graf J, Zoremba M, Mueller H-H, Wulf H, Dette F: Forced needle advancement during needle-nerve contact in a porcine model: histological outcome. *Anesth. Analg.* 2011; 113:417-20
4. Claudio R, Hadzic A, Shih H, Vloka JD, Castro J, Koscielniak-Nielsen Z, Thys DM, Santos AC: Injection pressures by anesthesiologists during simulated peripheral nerve block. *Reg Anesth Pain Med* 2004; 29:201-5

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