

# BSmart™ Injection Pressure Monitor

Objective Injection Pressure Monitoring for Peripheral Nerve Blocks



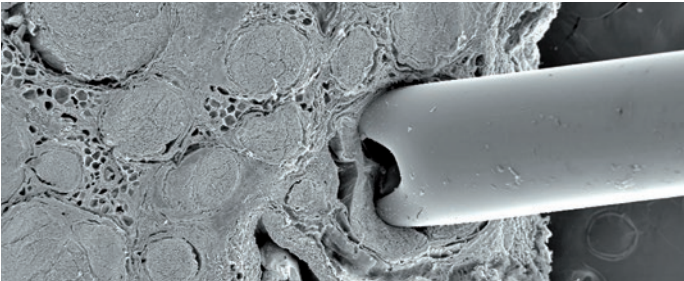
Regional Anesthesia

# Monitoring Opening Injection Pressure ... ... with BSmart™

Objective pressure information regardless of who performs the injection

## Injection Pressure Monitoring

Accidental injection of local anesthetic into fascicles of peripheral nerves can result in permanent nerve injury.<sup>7</sup> Research has shown that high opening injection pressure (> 15psi) consistently detects needle-nerve-contact<sup>1</sup> or indicates intrafascicular injection.<sup>1,2,4,5</sup> Therefore, avoiding injection with high opening injection pressure (> 15psi) can prevent injection into poorly compliant tissue (e. g. nerve fascicles).<sup>1</sup>



Intrafascicular needle placement<sup>6</sup>

## BSmart™ Injection Pressure Monitor

The BSmart™ Injection Pressure Monitor is an easy-to-use inline injection pressure monitoring device providing clinicians with objective pressure information regardless of who performs the actual block. BSmart™ Injection Pressure Monitor does not interfere the tactile feedback of the syringe which has been traditionally used to assess the resistance of injection during nerve block procedures.

Monitoring the opening injection pressure with BSmart™ may prevent injections into poorly compliant tissue by aborting an injection and repositioning the needle when the monitor indicates that opening injection pressure is abnormally high (> 15psi).

By avoiding high injection pressure throughout the nerve block procedure, BSmart™ can also help to prevent too forceful, rapid injections.

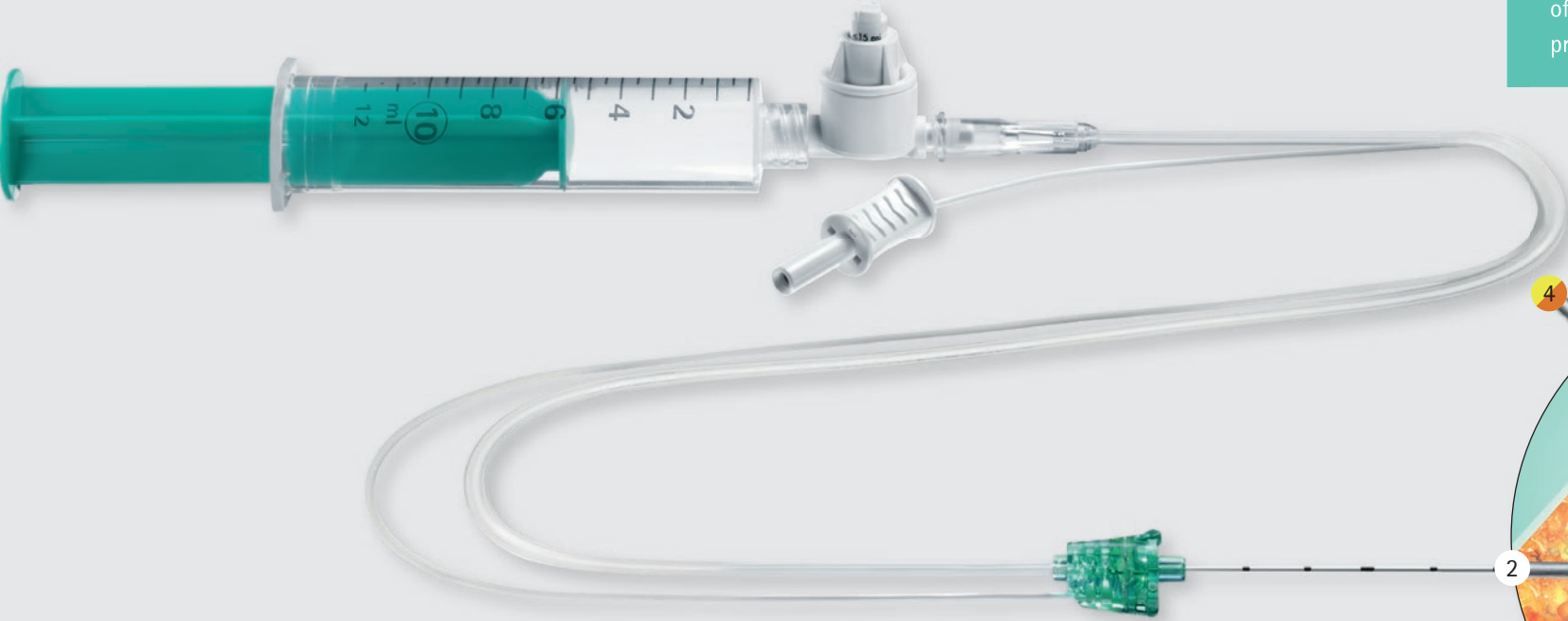
## Opening Injection Pressure

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-BSmart™-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.

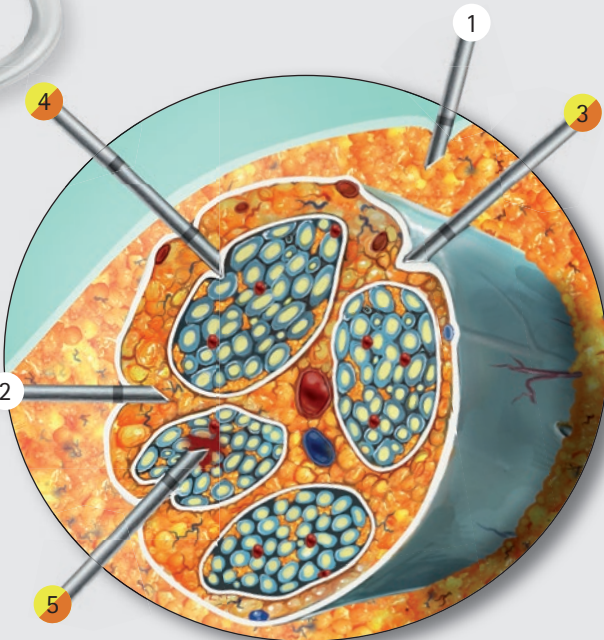
BSmart™ objectively indicates the opening injection pressure. While perineural injections are typically associated with low opening injection pressure (< 15psi)<sup>1</sup>, high opening pressure can indicate needle-nerve-contact<sup>1</sup> or intrafascicular needle placement.<sup>4</sup>



The pressure information is conveniently displayed by the colour-coded pressure ranges on the BSmart™ piston.



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



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- ### User Benefits
- Monitors injection pressure objectively
  - Alerts the physician of high opening injection pressure
  - Prevents too forceful, rapid injections
  - Allows consistent monitoring of resistance to injection regardless of who performs the actual injection
  - Allows for standardized and objective documentation of injection pressure information during nerve block procedures

## Examples of low opening injection pressure (< 15psi):

- 1 Needle tip placed perineurally<sup>1,2</sup>
- 2 Needle tip placed sub-epineurally in adipose tissue between fascicles<sup>2,3</sup>

## Examples of high opening injection pressure (> 15psi):

- 3 Needle-epineurium contact (needle-nerve-contact)<sup>1</sup>
- 4 Needle-perineurium contact (needle-nerve-contact)<sup>1,2,4</sup>
- 5 Needle tip placed intrafascicularly<sup>1,2,4</sup>

# Preparing BSmart™ for Clinical Use



1. Attach female end of BSmart™ to syringe.



2. Connect the injection tube of PNB needle to BSmart™.




3. Prime the syringe-BSmart™-tubing-needle-system.

The piston of BSmart™ must move upwards to indicate yellow-red range during priming in order for the device to be ready to use. To ensure that the piston moves upwards until the red colour on the piston is visible, it may be helpful to obstruct the injection tubing while priming the system.

When BSmart™ indicates a high opening injection pressure (> 15psi, yellow or red), the needle may be inserted into poorly compliant tissue (e. g. nerve fascicle, fasciae, tendons) or obstructed. In this case, a slight withdrawal of the needle and re-confirmation of the needle tip position is suggested before reattempting to inject.<sup>1</sup> Typical perineural injection can be accomplished with opening pressure < 15psi.<sup>1</sup>

## Product Characteristics

BSmart™ Injection Pressure Monitor	Sales unit	Code No. (REF)	Features
	25 pcs.	4894000-01	<ul style="list-style-type: none"> <li>Objectively measures and displays injection pressure</li> <li>Simple, unobtrusive and easy-to-use</li> <li>Colour coding for easy visualization of pressure information</li> <li>Monitoring independent of who is performing the actual injection<sup>8</sup></li> <li>Allows for objective and standardized documentation of injection pressure information</li> <li>Can be used for single shot as well as continuous peripheral nerve block techniques</li> </ul>

## References

<sup>1</sup> Gadsden et al. Anesthesiology, Jan 2014 [Epub]

<sup>2</sup> Kapur et al. Acta Anaesthesiol Scand, 2007; 51:101-7

<sup>3</sup> Lupu et al. Reg Anesth Pain Med, 2010; 35:132-9

<sup>4</sup> Orebaugh et al. Reg Anesth Pain Med, 2012; 37:525-9

<sup>5</sup> Bigeleisen et al. Anesthesiology, 2009; 110:1235-43

<sup>6</sup> Human tibial nerve. Scanning electron microscopy. Magnification x30. With permission, Miguel A. Reina.

Atlas of Functional Anatomy. New York: Springer, 2015; p.1-850

<sup>7</sup> Farber et al. Anesth Analg, 2013 Sep; 117(3):731-9

<sup>8</sup> Theron et al. Reg Anesth Pain Med, 2009; 34:330-332

For further information visit:  
[www.bsmart-bbraun.com](http://www.bsmart-bbraun.com)