PAJUNK®

REGIONAL ANAESTHESIA & PAIN MANAGEMENT

NerveGuard

Automatic Injection Pressure Limiter

CLINICAL BROCHURE

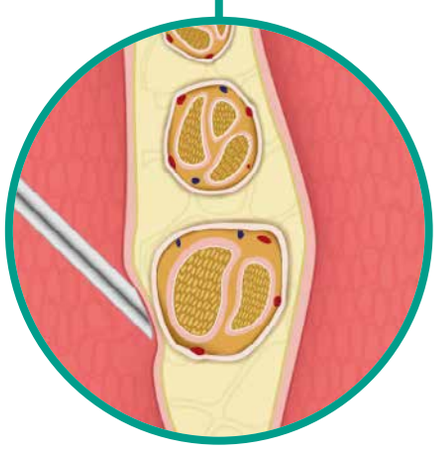
MADE IN GERMANY

Causes and Approaches

Avoiding Nerve Damage During Peripheral Nerve Blocks

Ultrasound-guided localisation of peripheral nerves and the associated real-time visualisation provide crucial benefits in Regional Anaesthesia.[1] However, it is clear that this does not reduce the incidence of permanent nerve damage.[2] Even in combination with nerve stimulation, intrafascicular injections cannot be ruled out.[1,3,4] The causes include incorrect needle position along with exceeding critical injection pressures.

Neurological complications during peripheral nerve blocks



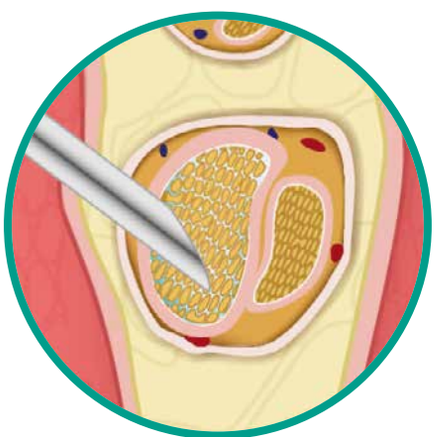
Needle-Fascia Contact

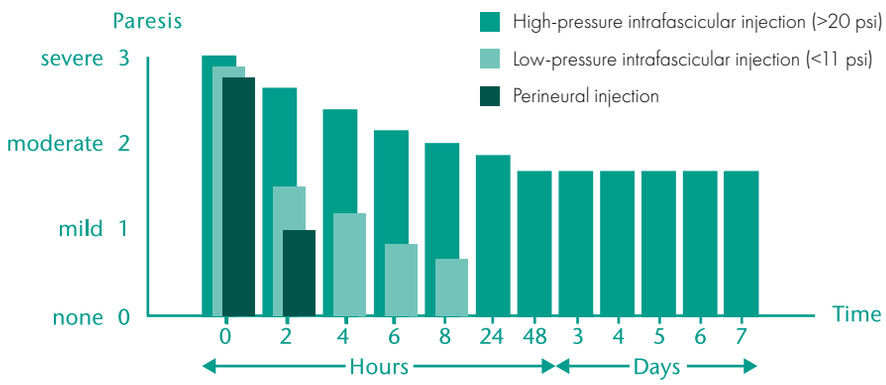
Effects: Injections administered in the wrong tissue layers can cause anesthesia failures. A high opening pressure may indicate occlusion of the tip of the needle due to the fascia in front of it.[8]

→ One approach to avoid misinjections into wrong nerve tissue structures is to limit the opening pressure.

Intrafascicular Injections

Effects: In the case of intrafascicular injection at high pressure lasting several hours, the microvascular blood supply of the nerve is severely restricted, which can lead to degeneration of nerve structures.[6,11]





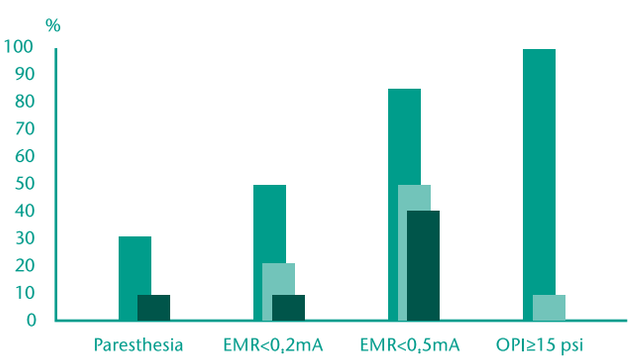
The higher the injection pressure is during injections in the intrafascicular space, the more severe and longer lasting the resulting paresis is.[5]

If the pressure during intrafascicular injections exceeds a critical threshold of 15 psi, such injections may lead to severe long-term neurological complications.[5,6,7] (Kapur 6: > 20 psi, Hadzic[6]: > 25 psi, Hasanbegovic[7]: > 15.9 psi)

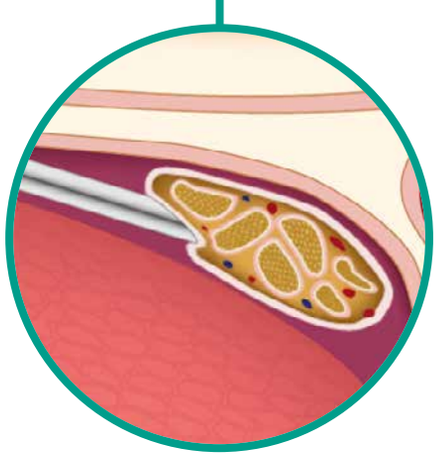
Needle-Nerve Contact

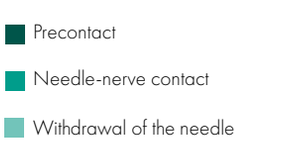
Effects: Direct needle-nerve contact can lead to damage of the neural structures with subsequent transient or permanent neurological impairment.[9,10] Localization control using ultrasound and/or nerve stimulation may not in all cases reliably indicate direct needle-nerve contact. Paresthesia in and of itself is not regularly observed.[9] Avoiding direct needle-nerve contact minimizes the risk of damage to the nerve wall.[10]

→ A reliable indicator of direct needle-nerve contact is a high opening pressure



Incidence of paresthesias, motor evoked responses as well as exceeding the opening pressure threshold in the case of three different needle positions.[9]





EMR = Electrical motor reponse
OIP = Opening injection pressure

NerveGuard

HOW IT WORKS

- Automatically blocks injections when injection pressure exceeds the limit value[12, 13, 14, 15]
- No monitoring and no visual control necessary

BENEFITS

- The NerveGuard injection pressure limiter is easily connected with a syringe and injection tube
- No additional „eye contact" with the NerveGuard is necessary

Description	Item no.	Item no. NRFit®	PU
NerveGuard / single / sterile / For single shot applications in diameters of 22G / 21G / 22G	001151-38M	001163-38M	10

Studies

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5. **Kapur E., Vuckovic I., Dilberovic F., Zaciragic A., Cosovic E., Divanovic K. A., Mornjakovic Z., Babic M., Borgeat A., Thys D. M., Hadzic A.** Neurologic and histologic outcome after intraneural injections of lidocaine in canine sciatic nerves, Acta. Anaesthesiol. Scand. 2007 Jan; 51(1): 101–107
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9. **Gadsden J., Latmore M., Levine D. M., Robinson A.** High Opening Injection Pressure is Associated With Needle-Nerve and Needle-Fascia Contact During Femoral Nerve Block, Reg. Anesth. Pain Med. 2016 Jan–Feb; 41(1): 50–55
10. **Steinfeldt T., Graf J., Schneider J., Nimphius W., Weihe E., Borgeat A., Wulf H., Wiesmann T.** Histological consequences of needle-nerve contact following nerve stimulation in a pig model, Anesth. Research and Practice 2011; Article ID 591851: 0–9
11. **Lundborg G., Myers R., Powell, H.** Nerve compression injury and increased endoneurial fluid pressure: a „miniature compartment syndrome", J. Neurol. Neurosurg. Psychiatry 1983 Dec; 46(12): 1119–1124
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14. **McLeod, G.A.** (2021) Novel approaches to needle tracking and visualisation, Anaesthesia 2021, 76 (Suppl. 1) 160-170.
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PAJUNK® GmbH Medizintechnologie
Global Headquarters
Karl-Hall-Straße 1
78187 Geisingen, Germany
Tel.: +49 7704 9291-0
Fax: +49 7704 9291-600
info@pajunk.com
pajunk.com

PAJUNK® Medical Produkte GmbH
Central Europe
Karl-Hall-Straße 1
78187 Geisingen, Germany
Tel.: +49 7704 8008-0
Fax: +49 7704 8008-150
info@pajunk-medipro.com
pajunk.de & pajunk.eu

PAJUNK® Swiss AG
Switzerland
Neuhofstrasse 5A
6340 Baar, Switzerland
Tel.: +41 417 609 627
info@pajunk.ch
pajunk.ch

PAJUNK® Medical System L.P.
United States of America
4575 Marconi Drive
Alpharetta, GA 30005, USA
Tel.: +1 888 972 5865
Fax: +1 678 514 3388
info@pajunk-usa.com
pajunkusa.com

PAJUNK® UK Medical Products Ltd
United Kingdom
Unit D1 The Waterfront
Goldcrest Way, Newburn Riverside
Newcastle upon Tyne, NE15 8NY, UK
Tel.: +44 191 264 7333
info@pajunk.co.uk
pajunk.co.uk

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