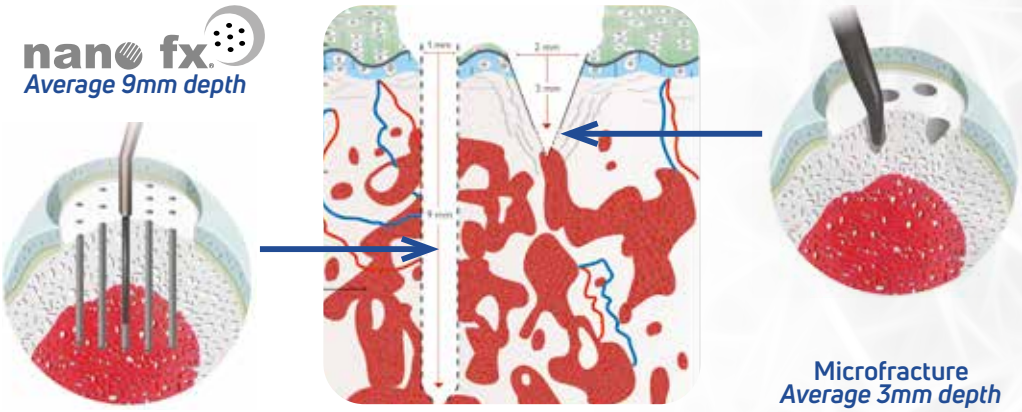
ANIKA

nano fx®

Next generation marrow stimulation technology

nano fx®
Average 9mm depth



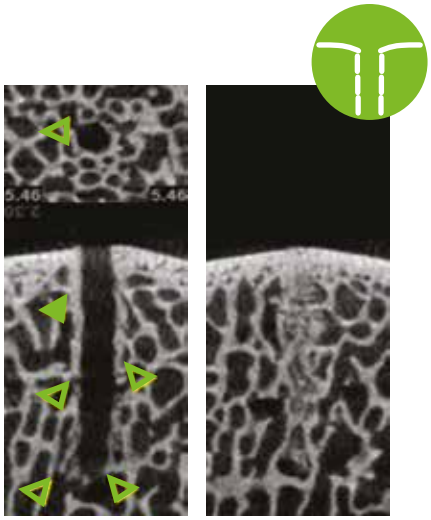
Microfracture
Average 3mm depth

SMALLER
Less trauma, greater perforation density [1,2]

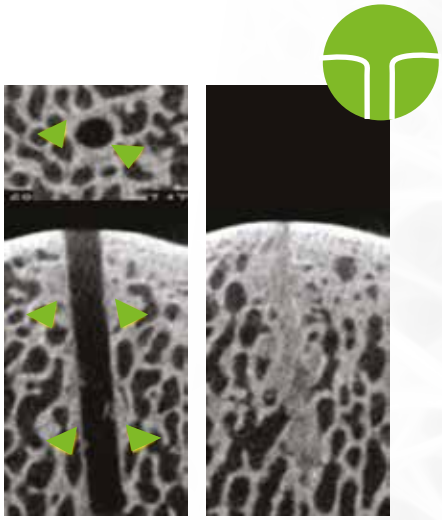
DEEPER
Stop controlled at 9mm for superior bone marrow access [4]

BETTER
Subchondral bone restoration, improved cartilage repair, improved healing [5,6,7,8]

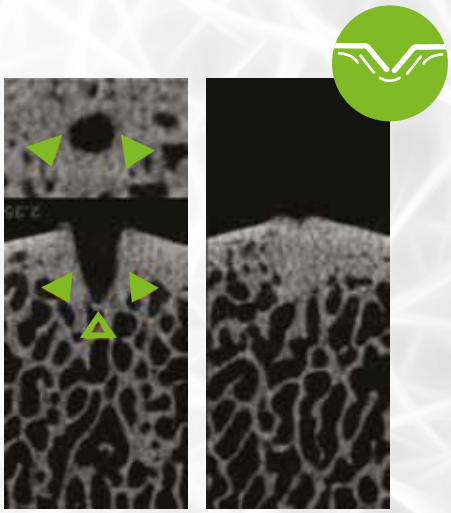
OFFERS A SMALLER, DEEPER, BETTER SOLUTION COMPARED TO K-WIRE DRILLING OR A STANDARD MICROFRACTURE PROCEDURE



NANOFX
- Trabecular wall thickness/ density appears normal
- Large number open trabecular channels
- Anatomic irregularity of trabecular channel borders intact
- Nanofracture channel margins: Course and fragmented trabecular bone deposits (right)[4]



K WIRE DRILLING
- Trabecular wall thickness/ density close to normal
- Limited trabecular channel access
- Trabecular channel borders display non-anatomic regularity
- K-wire channel margins: Pulverized and dense osseous deposits (right) [4]



MICROFRACTURE
- Trabecular wall thickness/ density increased by bone compression
- Limited trabecular channel access
- Trabecular channel borders with non-anatomic regularity
- Microfracture channel margins: Dense, compressed bone deposit (right) [4]

△ *Open trabecular channels*
▲ *Closed trabecular channels*

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PROVEN BY SCIENCE

Smaller, deeper bone marrow stimulation with proven benefits over other techniques

	Title	Author	Journal	Highlights
SMALLER	**Reference 1:** The Effect of Different Bone Marrow Stimulation Techniques on Human Talar Subchondral Bone: A Micro eComputed Tomography Evaluation	Gianakos A et al	Arthroscopy. 2016 Oct; 32(10):2110-2117	Compared to other Bone Marrow Stimulation techniques (BMS), nanofracture results in diminished areas of destruction, sclerosis, and thickening of the subchondral bone in regions adjacent to the defect, thereby limiting the amount of perimeter compaction. BMS using larger diameter devices results in greater microarchitecture disturbances.
SMALLER	**Reference 2:** Reviewing subchondral cartilage surgery: considerations for standardised and outcome predictable cartilage remodeling	Benthien et al	International Orthopaedics (SICOT) 2013	The smaller diameter causes less trauma to the subchondral bone surface and may provide a greater perforation density compared to the much larger 2.5-mm microfracture awl when the reported bone bridge distance of two to four millimeter is maintained
SMALLER	**Reference 3:** Small subchondral drill holes improve marrow stimulation of articular cartilage defects	Eldracher M et al	Am J Sports Med. 2014 Nov;42(11):2741-50	Small subchondral drill holes that reflect the physiological trabecular distance, improve osteochondral repair more effectively than larger drill holes.
DEEPER	**Reference 4:** Bone Marrow Access in Cartilage Repair: Comparison of Microfracture, Nanofracture, K-wire, and Drill in the Adult Ovine Model	Behrens et al	e-Poster: P87 Congress: ICRS 2013	Nanofracture resulted in thin, fragmented cancellous bone channels without rotational heat generation. Compared to microfracture and K-Wire stimulation, nanofracture showed superior bone marrow access with multiple trabecular access channels extending 9 mm into subchondral bone.
DEEPER	**Reference 5:** Depth of subchondral perforation influences the outcome of bone marrow stimulation cartilage repair	Chen H et al	J Orthop Res. 2011 Aug;29(8):1178-84	Drilling deeper to 6 mm versus 2 mm improved repair tissue quantity and quality in a statistically significant fashion, while drilling compared to microfracture at the same 2 mm depth produced similar repair outcomes. Improvement in tissue repair due to deep versus shallow drilling was significant
BETTER	**Reference 6:** Subchondral bone remodeling: comparing nanofracture with microfracture. An ovine in vivo study	Zedde P et al	Joints 2016; 4(2):87-93	Nanofracture is an effective and innovative repair technique allowing deeper perforation into subchondral bone with less trabecular fragmentation and compaction when compared to microfracture; it results in better restoration of the normal subchondral bone architecture at 6 months.
BETTER	**Reference 7:** Second Generation Needling Techniques for the Treatment of Chondral Defects in Animal Model	Zedde P et al	Joints 2017; 5:27–33	Chondral repair assessed after 12 months revealed that nanofracture provided better repair tissue than microfracture, with a better cartilage architecture and tissue having greater type II collagen content
BETTER	**Reference 5:** Depth of subchondral perforation influences the outcome of bone marrow stimulation cartilage repair	Chen H et al	J Orthop Res. 2011 Aug; 29(8):1178-84	Drilling deeper to 6 mm versus 2 mm created more access channels to the marrow and may potentially recruit a greater number of cells and a variety of cell types from the deep marrow stroma, resulting in improved cartilage repair
BETTER	**Reference 8:** Footprint preparation with nanofractures in a supraspinatus repair cuts in half the re-tear rate at 1 year follow up. A randomized controlled trial	Iban et al	Knee Surg Sports Traumatol Arthrosc (KSSTA), 2020 June. https://doi.org/10.1007/s00167-020-06073-7	Adding nanofracture at the footprint during an isolated supraspinatus repair, lowers re-tear rate by 50% at 12-months follow-up. This is due to improved healing at the footprint

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