



# nSTRIDE<sup>®</sup> Autologous Protein Solution

Treating Osteoarthritic Knee Pain



ZIMMER BIOMET  
Your progress. Our promise.<sup>®</sup>



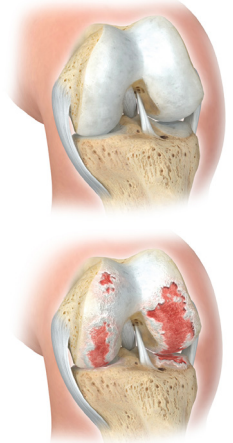
## Do you have knee pain?

Knee pain is a common symptom experienced by people of all ages. It can be caused by a traumatic event, or by normal wear and tear that can become worse over time.<sup>1</sup> The knee is a type of hinge joint formed by the tibia (shinbone), femur (thighbone), and patella (kneecap).

The ends of the bones in the knee joint are covered with cartilage, a tough lubricating tissue that helps provide smooth, pain-free motion to the joint.<sup>2</sup> When knee pain becomes worse over time, arthritis may be the cause.<sup>3,4</sup> Symptoms of arthritis are pain, swelling, or stiffness in the joint and may be caused by inflammation.<sup>3,5</sup> In the United Kingdom, 98% of initial knee replacements are due to osteoarthritis.<sup>4</sup>

### What is Osteoarthritis (OA)?

OA is the most frequent type of arthritis and most commonly affects the knee joint.<sup>3,4</sup> Osteoarthritis is damage done to the joint over time.<sup>3,5</sup> In a normal joint, cartilage provides cushioning between bones. As wear or a traumatic event occur, the cartilage layer can become thinner or frayed resulting in knee pain.<sup>4,5</sup> Over time, pain increases as cartilage wears away and bones rub against each other.<sup>4</sup> Osteoarthritis negatively impacts quality of life through pain, limited mobility, reducing the ability to work and diminishing self-esteem.<sup>4,5</sup>



### What are the Stages of OA?

OA symptoms can range from very mild to very severe and often limit your everyday activities:

#### Early<sup>6</sup>

Cartilage begins to wear down. Symptoms are generally mild, and may include pain that comes and goes.<sup>6,7</sup>

#### Moderate<sup>6</sup>

Joint fluid may lose its ability to lubricate and cushion the affected joint. You may have more pain and difficulty in movement.<sup>6,7</sup>

#### Late<sup>6</sup>

Areas of cartilage may totally wear away, causing bones to rub against each other.<sup>6,7</sup> You may experience significant pain.<sup>6,7</sup>



## Once OA pain starts it is hard to stop

nSTRIDE APS is a novel therapy (from your own body) designed to treat pain<sup>8\*</sup> and slow the progression of cartilage degradation and destruction in the knee.<sup>9\*</sup> nSTRIDE APS processes your own blood to provide a true novel output. The output is injected directly into the knee joint distributing beneficial and good proteins.<sup>10</sup> In laboratory testing, these “good” proteins block and slow the degradation of cartilage treating the underlying cause of OA knee pain, unlike traditional therapies.<sup>9\*</sup> Your results may be different than those obtained in the laboratory.

- **Significantly Reduces Pain Associated with Knee OA up to 2 years**<sup>8\*,11,16</sup>
- **Significantly improves Mobility in the Knee Joint**<sup>8\*,11,16</sup> associated with OA
- **70% Improvement in Knee Pain at 2 years following a Single Injection**<sup>16</sup>



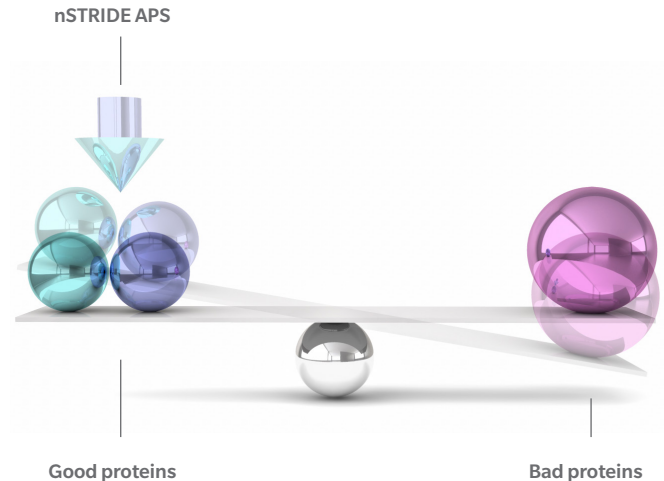
## Science Behind nSTRIDE APS

In an osteoarthritic knee, inflammatory cytokines (“bad” proteins) outnumber anti-inflammatory cytokines (“good” proteins) causing an imbalance resulting in knee pain and cartilage degeneration.<sup>12</sup>

The inflammatory proteins IL-1 and TNF $\alpha$  attack the cartilage.<sup>12</sup> These “bad” proteins must be stopped simultaneously to decrease pain and slow cartilage degeneration.<sup>12</sup>

The nSTRIDE APS output introduces high levels of “good” proteins (IL-1ra, sIL-1R, sTNF-RI, and sTNF-RII)<sup>10</sup> that is designed to overwhelm and block the inflammatory cytokines (bad proteins) IL-1 and TNF $\alpha$ .<sup>13\*</sup>

Animal and human studies have shown that nSTRIDE APS has decreased pain.<sup>8,11,16</sup> In laboratory setting it has also been associated with decreased cartilage degeneration, unlike traditional therapies.<sup>9\*</sup> Again, your results may differ.



While balance is being restored to the knee, anabolic (building) growth factors (IGF-1 and TGF-1) are also introduced for beneficial cartilage health.<sup>10</sup> Therefore, nSTRIDE APS creates a novel therapy which may reduce pain in the knee joint, may improve joint function and slow the destruction of cartilage.<sup>9\*</sup> This therapy is provided in a non-surgical, single injection in the doctor's office.

# Frequently asked questions

## about nSTRIDE APS

### What is nSTRIDE APS?

nSTRIDE APS is an autologous (from your own body) therapy which is designed to treat joint pain associated with knee osteoarthritis. In laboratory testing, nSTRIDE APS has been shown to protect cartilage tissue.<sup>6</sup>

This protective quality may slow the progression of osteoarthritis as well.<sup>9\*</sup>

### How does nSTRIDE APS work?

nSTRIDE APS will be injected directly in the knee joint. Positive outcomes are possible due to the presence of high concentrations of anti-inflammatory proteins.<sup>14</sup> These “good” proteins may help stimulate a biologic cascade which has been shown to block cartilage destruction in osteoarthritis.<sup>9\*</sup> The pain in the joint may be reduced, and the joint function may be improved. The ongoing destruction of cartilage may also be slowed.<sup>9\*</sup> The treatment is designed to be a single injection therapy in the doctor’s office.

### What is nSTRIDE APS made of?

nSTRIDE APS processes the patient’s own blood in the doctor’s office to concentrate white blood cells, platelets, and plasma proteins into a small volume of plasma. The output is approximately 2 to 3 cc of anti-inflammatory solution.

### How is nSTRIDE APS given?

2-3 cc of final output will be injected directly in the knee joint.

### Are there side effects?

You may experience side effects (e.g., bruising, local pain or swelling) associated with the blood draw, knee injection, MRI or X-Ray procedures.

### Will nSTRIDE APS cure my OA?

There is no cure for OA.<sup>15</sup> But successful treatment with nSTRIDE APS may reduce or relieve your pain which may increase your mobility and comfort.<sup>11</sup> Your osteoarthritis may not improve or may get worse.

### What are the main benefits of nSTRIDE APS?

nSTRIDE may significantly decrease or eliminate pain, reduce stiffness and help restore mobility and flexibility.<sup>9\*,11</sup>

### When will the treatment start to work?

Pain relief may be expected after one to two weeks.<sup>8\*,11</sup>

### Is nSTRIDE APS safe?

Yes. Studies have demonstrated the safety of nSTRIDE APS.<sup>8\*,11</sup>

### Will I be able to be active as usual during the course of my treatment?

It is recommended that you minimize your activity level for 14 days (but not to exceed pre-injection levels).

### How long can I expect the benefits to last?

Based on preclinical and early clinical results, patients may expect to see benefits for up to 24 months.<sup>8\*,11,16</sup>

<sup>11,16</sup>

### Who can be treated with the nSTRIDE APS?

Patients with mild to moderate knee osteoarthritis can receive nSTRIDE APS therapy.

### How many injections of nSTRIDE APS are required?

Clinical studies have demonstrated the effectiveness of one injection.

Studies suggest one injection can last up to 24 months.<sup>8,11,16\*</sup>



## References

1. "Knee Pain: MedlinePlus Medical Encyclopedia." U.S National Library of Medicine. U.S. National Library of Medicine, n.d. Web. 11 Aug. 2014. <http://www.nlm.nih.gov/medlineplus/ency/article/003187.htm>.
2. "Research Joint Replacement / Knee Pain Knee Pain Overview." Knee Pain Overview: Knee Surgery, Partial/Total Knee Joint Replacements. Biomet, n.d. Web. 11 Aug. 2014. <[http://www.biomet.com/patients/knee\\_overview.cfm](http://www.biomet.com/patients/knee_overview.cfm)>.
3. Nordqvist, Christian. "What Is Arthritis? What Causes Arthritis?" Medical News Today. MediLexicon International, 16 May 2014. Web. 07 Aug. 2014. <<http://www.medicalnewstoday.com/articles/7621.php>>.
4. "Osteoarthritis in General Practice: Data and Perspectives." Arthritis Research UK | Arthritis Research UK. Arthritis Research UK | Arthritis Research UK, 19 July 2013. Web. 08 Feb. 2015. <<http://www.arthritisresearchuk.org/policy-and-public-affairs/reports-and-resources/reports.aspx>>.
5. "Arthritis of the Knee-OrthoInfo - AAOS." Arthritis of the Knee-OrthoInfo - AAOS. American Academy of Orthopaedic Surgeons, n.d. Web. 08 Aug. 2014. <<http://orthoinfo.aaos.org/topic.cfm?topic=A00212>>.
6. Krueger, Pat. "Stages of Osteoarthritis." EHow. Demand Media, 04 Sept. 2009. Web. 04 Dec. 2014.
7. "Stages of Osteoarthritis: What Everyone Should Know About the Three Stages." Health Guide Info. N.p., 24 Mar. 2011. Web. 04 Dec. 2014.
8. Bertone AL, Ishihara A, Zekas LJ, et al. Evaluation of a Single Intra-articular Injection of Autologous Protein Solution for Treatment of Osteoarthritis in horses. American Journal of Veterinary Medicine 2014 Feb;75(2):141-151.
9. Matuska A, O'Shaughnessey K, King, W., Woodell-May J, "Autologous solution protects bovine cartilage explants from IL-1. and TNF.-induced cartilage degradation." Journal of Orthopaedic Research, 2013;31(12):1929-35.
10. O'Shaughnessey K., Matuska A., Hoepfner J., Farr J., Klaassen M., Kaeding C., Lattermann C., King W., Woodell-May J., "An Autologous Protein Solution prepared from the blood of osteoarthritic patients contains an enhanced profile of anti-inflammatory cytokines and anabolic growth factors," Journal of Orthopaedic Research, 2014, 32(10):1349-55.
11. van der Weegen W, van Drumpt R, Toler KO, Macenski MM, "Safety and Outcomes Following a Single Autologous Protein Solution injection for Knee Osteoarthritis: A Pilot Study." International Cartilage Repair Society, #6471, May 8-11, 2015, Chicago, IL.
12. Goldring S.R., Goldring M.B. "The role of cytokines in cartilage matrix degeneration in osteoarthritis." Clinical Orthopaedics and Related Research, 2004, 427S:S27-S36.
13. Woodell-May J, Matuska A, Oyster M, et al. Autologous protein solution inhibits MMP-13 production by IL-1beta and TNF alpha-stimulated human articular chondrocytes. Journal of Orthopaedic Research, 2011;29(9):1320-6.
14. King WJ, van der Weegen W, van Drumpt R, Soons H, Toler KO, Woodell-May JE, "WBC Concentration Correlates with Increased IL-1ra and Changes in WOMAC Pain Scores in a Safety Study of Autologous Protein Solution." International Cartilage Repair Society, # 6872, May 8-11, 2015, Chicago, IL.
15. "Osteoarthritis." : Symptoms & Treatment. Arthritis Foundation, n.d. Web. 20 Apr. 2015. <<http://www.arthritis.org/arthritis-facts/disease-center/osteoarthritis.php>>.
16. Kon E, Engebretsen L, Peter Verdonk P, Nehrer S and Filardo G. "Two-year Clinical Outcomes of An Autologous Protein Solution Injection For Knee Osteoarthritis." ICRS 14th World Congress, presented 2018.

\* Animal studies are not necessarily indicative of clinical performance.

^ Laboratory testing is not necessarily indicative of clinical outcomes.

# As measured by WOMAC pain scores reported by patients continuing follow-up through 2 years (n = 22).

All content herein is protected by copyright, trademarks and other intellectual property rights, as applicable, owned by or licensed to Zimmer Biomet or its affiliates unless otherwise indicated, and must not be redistributed, duplicated or disclosed, in whole or in part, without the express written consent of Zimmer Biomet.

This material is intended for health care professionals. Distribution to any other recipient is prohibited.

For indications, contraindications, warnings, precautions, potential adverse effects and patient counselling information, see the package insert or contact your local representative; visit [www.zimmerbiomet.com](http://www.zimmerbiomet.com) for additional product information.



**ZIMMER BIOMET**  
Your progress. Our promise.®

**Responsible Manufacturer**  
Zimmer Biomet  
P.O. Box 587  
56 E. Bell Drive  
Warsaw, Indiana 46581-0587  
USA  
[www.zimmerbiomet.com](http://www.zimmerbiomet.com)

**Authorized Representative**  
Zimmer Biomet UK  
Waterton Industrial Estate  
Bridgend, South Wales  
CF31 3XA  
UK