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A BREAKTHROUGH IN NONINVASIVE TREATMENT FOR CHRONIC LOW BACK PAIN AND OSTEOARTHRITIS

Insights from a recent study

BY FRANCISCO CIDRAL, ND, MSC, PHD, POSTDOC

TIME TO READ: 5-6 MIN.

THE TAKEAWAY

Topical stem cell creams offer a promising, noninvasive alternative for treating lumbar osteoarthritis, providing significant pain relief without the risks of invasive procedures. Continued research in this area could greatly enhance quality of life for those with chronic low back pain and revolutionize osteoarthritis treatment.

LOW BACK PAIN (LBP) IS THE MOST PREVALENT

MUSCULOSKELETAL CONDITION GLOBALLY AND THE LEADING CAUSE OF DISABILITY WORLDWIDE. As of 2020, an estimated 619 million people suffered from LBP, with projections suggesting this number could rise to 843 million by 2050.¹ Associated to LBP, lumbar spine osteoarthritis (OA) is particularly common, with prevalence estimates ranging from 40% to 85%.² Such debilitating conditions often diminish quality of life and hinder daily activities. Traditional treatment approaches for OA, including pain management through medication, physical therapy and in severe cases, surgical intervention, offer limited relief and are often accompanied by undesirable side effects.^{3,4} However, recent advancements in regenerative medicine present a promising alternative: noninvasive topical treatments derived from stem cells.

1 GBD 2021 Low Back Pain Collaborators. Global, regional, and national burden of low back pain, 1990-2020, its attributable risk factors, and projections to 2050: A systematic

Accessed September 10, 2024.

4 Urits I, et al. Low Back Pain, a Comprehensive Review: Pathophysiology, Diagnosis, and Treatment Curr Pain Headache Rep. 2019;23(3):23. https://pubmed.ncbi.nlm.nih. gov/30854609/. PubMed. Accessed September 10, 2024.

analysis of the Global Burden of Disease Study 2021. Lancet Rheumatol. 2023;5(6):e316-e329. https://pubmed.ncbi.nlm.nih.gov/37273833/. PubMed. Accessed September 10, 2024. **2** Goode AP, et al. Low back pain and lumbar spine osteoarthritis: how are they related? Curr Rheumatol Rep. 2013;15(2):305. https://pubmed.ncbi.nlm.nih.gov/23307577/. PubMed.

³ Corp N, et al. Evidence-based treatment recommendations for neck and low back pain across Europe: A systematic review of guidelines. Eur J Pain. https://pubmed.ncbi.nlm.nih. gov/33064878/. PubMed. Accessed September 10, 2024.

The significant reduction in pain, combined with the safety profile, positions stem cell creams as a potentially transformative treatment for individuals suffering from lumbar osteoarthritis.

Regenerative medicine: A new horizon

RESEARCH

Regenerative medicine, particularly stem cell therapy, has been hailed as a revolutionary approach to treating a variety of conditions, including OA.⁵ Stem cells, especially those derived from sources such as Wharton's jelly and the amniotic membrane, possess powerful anti-inflammatory properties and the ability to promote tissue regeneration. Traditionally, these stem cells have been applied via invasive procedures, such as autologous stem cell transplantation, which, despite their potential, come with significant challenges. The invasiveness of these procedures, coupled with the difficulty of selecting suitable candidates for intervertebral disc injections, has limited their widespread adoption.^{6,7,8}

The recent focus on bioactive molecules, growth factors, cytokines and telomerase derived from mesenchymal stem cells (MSCs) offers a promising noninvasive alternative. These components, harvested from MSCs, may provide therapeutic benefits without the need for invasive procedures.^{9,10,11} This has led to the development of two topical transdermal creams infused with stem cell-derived biomolecules, designed to alleviate symptoms associated with lumbar OA.



The study: Evaluating the efficacy of stem cell creams To explore the potential of these topical treatments, a groundbreaking study was conducted, enrolling 80 participants aged over 40 years, all clinically diagnosed with lumbar OA. The

- 5 Miranda L, et al. Stem cells and discogenic back pain *Br Med Bull*. 2023;146(1):73-87. https://pubmed.ncbi.nlm.nih.gov/37164906/. PubMed. Accessed September 10, 2024.
 6 Ansari AS, et al. Osteogenic Induction of Wharton's Jelly-Derived Mesenchymal Stem Cell for Bone Regeneration: A Systematic Review. *Stem Cells Int*. 2018;2018:2406462. https://
- pubmed.ncbi.nlm.nih.gov/30534156/. PubMed. Accessed September 10, 2024.

⁷ Main BJ, et al. Umbilical Cord-Derived Wharton's Jelly for Regenerative Medicine Applications: A Systematic Review. Pharmaceuticals (Basel). 2021;14(11):1090. https://pubmed.ncbi. nlm.nihgov/34832872/. PubMed. Accessed September 10, 2024.

⁸ Zhang Q, Lai D. Application of human amniotic epithelial cells in regenerative medicine: a systematic review. Stem Cell Res Ther. 2020;11(1):439. https://pubmed.ncbi.nlm.nih. gov/33059766/. PubMed. Accessed September 10, 2024.

⁹ Roszkowski, S. Therapeutic potential of mesenchymal stem cell-derived exosomes for regenerative medicine applications. *Clin Exp Med.* 2024;24(1):46. https://pubmed.ncbi.nlm. nih.gov/38427086/. PubMed. Accessed September 10, 2024.

¹⁰ Al-Azab M, et al. Aging of mesenchymal stem cell: machinery, markers, and strategies of fighting. *Cell Mol Biol Lett.* 2022;27(1):69. https://www.ncbi.nlm.nih.gov/pmc/articles/ PMC9388978/. NCBI. Accessed September 10, 2024.

¹¹ Panchalingam KM, et al. Bioprocessing strategies for the large-scale production of human mesenchymal stem cells: a review. *Stem Cell Res Ther.* 2015;6(225). https://pubmed. ncbi.nlm.nih.gov/26597928/. PubMed. Accessed September 10, 2024.



With no reported adverse reactions, this topical treatment provides a safe and user-friendly option for managing chronic low back pain.

study spanned four weeks, during which participants applied one cream to their lumbar region before activity or exercise, and another cream after activity or showering.

Pain levels, the primary metric for evaluating the treatment's efficacy, were assessed using the visual analogue scale (VAS) at the beginning of the study and after the treatment period. The study's statistical analysis, performed using GraphPad Prism version 8.0, revealed a significant reduction in pain levels (p < 0.0001) with a large effect size (Cohen's d = 2.25). The results showed a 51% decrease in reported pain levels, indicating the creams' substantial impact.



Visual Analogue Scale

Figure 1. Visual analogue scale scores were significantly reduced in patients with lumbar osteoarthritis after a four-week application of two creams. Each data point represents the average of 80 patients. Data did not pass the Shapiro-Wilk normality test and a Wilcoxon matched-pairs signed rank test was performed. Data are presented as mean \pm SD. **** p < 0.0001, baseline versus post-treatment.

A safe and effective treatment

One of the most compelling findings from the study was the absence of any adverse reactions among participants, underscoring the safety of these topical treatments. The significant reduction in pain, combined with the safety profile, positions these stem cell creams as a potentially transformative treatment for individuals suffering from lumbar OA.

The promising results are believed to be linked to the bioactive biomolecules in the creams, which are derived from human Wharton's jelly mesenchymal stem cells. These biomolecules may support cell differentiation and tissue regeneration, offering a noninvasive solution to a condition that traditionally requires more invasive approaches.

Final thoughts

The development of topical stem cell creams represents a significant step forward in the treatment of lumbar OA. With their noninvasive application, these creams offer a safe and effective alternative to traditional treatments, providing substantial relief from pain without the risks associated with more invasive procedures. As research continues, there is hope that these advancements in regenerative medicine will not only improve quality of life for those suffering from chronic low back pain but also transform the broader landscape of OA treatment.

FRANCISCO CIDRAL, ND, MSC, PHD, POSTDOC, is the founder and CEO of Scientifica Consulting. He holds a master's degree and PhD in neurosciences and a postdoctorate in health sciences. Cidral is a professor of integrative medicine and neurophysiology, with a specialization in laser acupuncture and photobiomodulation. He has authored more than 35 scientific publications and books. Cidral is a board member of various scientific journals and international research groups. He can be contacted at cidral@scientificaconsulting.com.