

# An Analysis of New Approaches and Drug Formulations for Treatment of Chronic Low Back Pain

Karishma Patel Bhangare, MD<sup>a</sup>, Alan David Kaye, MD, PhD<sup>b</sup>,  
Nebojsa Nick Knezevic, MD, PhD<sup>c</sup>, Kenneth D. Candido, MD<sup>c</sup>,  
Richard D. Urman, MD, MBA<sup>a,\*</sup>

## KEYWORDS

- Chronic low back pain • Chemonucleolysis • Platelet-rich plasma injections
- Artemin • Tanezumab • Stem cells • Matrix metalloproteinases • Ethanol
- Collagenase

## KEY POINTS

- The prevalence of chronic low back pain (CLBP) is increasing. Treatment for the disorder is effective in less than 50% of patients after 1 year.
- The safety and efficacy of new treatments for CLBP over the previous 3-year period are evaluated and described in detail in this review.
- This investigation identified new treatments for CLBP, including chemonucleolysis (using collagenase, chondroitinase ABC, matrix metalloproteinases, and ethanol gel), platelet-rich plasma injections, artemin, tanezumab, and stem cells.
- Further research and innovation are needed to implement these methods into practice and assess clinical significance. Current evidence suggests promising new agents for the treatment of CLBP.

## INTRODUCTION

With our aging, overweight, and overworked population, chronic low back pain (CLBP) will continue to be one of the most common chief complaints that results in a patient

---

Disclosure Statement: The authors have nothing to disclose.

<sup>a</sup> Department of Anesthesiology, Perioperative and Pain Medicine, Brigham and Women's Hospital, Harvard Medical School, 75 Francis Street, Boston, MA 02115, USA; <sup>b</sup> Department of Anesthesiology and Pain Medicine, Louisiana State University School of Medicine, LSU Health Science Center, 1542 Tulane Avenue, Room 659, New Orleans, LA 70112, USA; <sup>c</sup> Department of Anesthesiology and Pain Medicine, Advocate Illinois Masonic Medical Center, 836 West Wellington Avenue, Suite 4815, Chicago, IL 60657, USA

\* Corresponding author.

E-mail address: [urmanr@gmail.com](mailto:urmanr@gmail.com)

Anesthesiology Clin ■ (2017) ■–■  
<http://dx.doi.org/10.1016/j.anclin.2017.01.023>

[anesthesiology.theclinics.com](http://anesthesiology.theclinics.com)

1932-2275/17/© 2017 Elsevier Inc. All rights reserved.

visiting a pain physician. In this regard, its prevalence has increased from 3.9% in 1992 to 10.2% in 2006.<sup>1</sup> With more diagnostic tests and therapeutic interventions available, the total cost related to CLBP in the United States is now greater than \$100 billion per year.<sup>2</sup> Workers' compensation expenditure for musculoskeletal disease, mainly low back pain, is greater than \$20 billion per year on its own.<sup>2</sup> The cost is also increasing for employers; an estimated 101.8 million days of work are lost each year secondary to low back pain.<sup>3</sup> This results in decreased productivity and lost wages. By the time an employee has been out of work for 6 months, the likelihood of him or her ever returning to work is 50%. Nevertheless, the prognosis for CLBP is promising. Costa and colleagues<sup>4</sup> found that 47% of patients with CLBP had recovered by 12 months. Therefore, it is prudent that these patients receive appropriate and efficacious treatment early. Pain physicians play a large part in propelling patients to go back to work, live an active lifestyle, carry out activities of daily living, and improve psychological well-being. This review article aims to discuss new approaches and treatment options on the horizon for the treatment of CLBP.

### ***Anatomy and Pathophysiology***

---

There are numerous causes of CLBP, with the most recognized being degeneration and herniation of intervertebral discs (IVDs). Each IVD is composed of a nucleus pulposus (NP) surrounded by an annulus fibrosus (AF). The NP is a gelatinous inner core composed of type II collagen, proteoglycans, and noncollagenous proteins.<sup>5</sup> Glycosaminoglycans and hyaluronic acid chains are linked to the proteoglycans. The NP acts as a "shock absorber." It transmits radial pressure onto the vertebral endplates to reduce internal friction.<sup>6</sup> The AF has fibroblasts that synthesize types I and II collagen into circumferential rings. This orientation gives it the ability to provide tensile strength and resist anterior and posterior sliding of vertebral bodies.<sup>6</sup> Between the vertebral body and the IVD is a thin layer of hyaline cartilage. Also known as the endplate, its function is to distribute intradiscal pressures onto adjacent vertebrae to prevent the NP from bulging into underlying trabecular bone.<sup>7</sup>

In a normal IVD, the synthesis and degradation of tissues are balanced. However, when nutrient supply decreases and/or cellular demand increases, degradation predominates and the disc loses its biomechanical function.<sup>8,9</sup> IVDs are predominantly avascular.<sup>10</sup> Consequently, nutrient supply becomes an issue. The AF receives nutrients from nearby capillaries. Inner disc cells rely on nutrient diffusion from capillaries off vertebral bodies that terminate near the endplates.<sup>11</sup> During times of high disc degeneration, growth factors and cytokines are expressed.<sup>12</sup> This increases glucose consumption and lactic acid production. Nutrient demand increases, which a cell may not be able to keep up with, resulting in more disc degeneration.<sup>13</sup> As the balance is further skewed, proteoglycans and glycosaminoglycans are lost and type II collagen denatures.<sup>14</sup> The discs dehydrate and are more likely to herniate.<sup>15</sup> Furthermore, a decrease in disc height increases loading on nearby joints, resulting in osteoarthritic changes and thickening of the ligamentum flavum.<sup>16,17</sup>

### **CURRENT TREATMENTS**

In 2007, the American College of Physicians and the American Pain Society formulated joint clinical practice guidelines for the diagnosis and treatment of low back pain. Conservative nonpharmacologic treatment includes physical therapy, acupuncture, chiropractic manipulations, yoga, Tai Chi, cognitive behavioral therapy, and meditation.<sup>18</sup> Conservative pharmacologic treatment includes acetaminophen, nonsteroidal antiinflammatory drugs, muscle relaxants, opioids, tramadol, and

Download English Version:

<https://daneshyari.com/en/article/5580536>

Download Persian Version:

<https://daneshyari.com/article/5580536>

[Daneshyari.com](https://daneshyari.com)