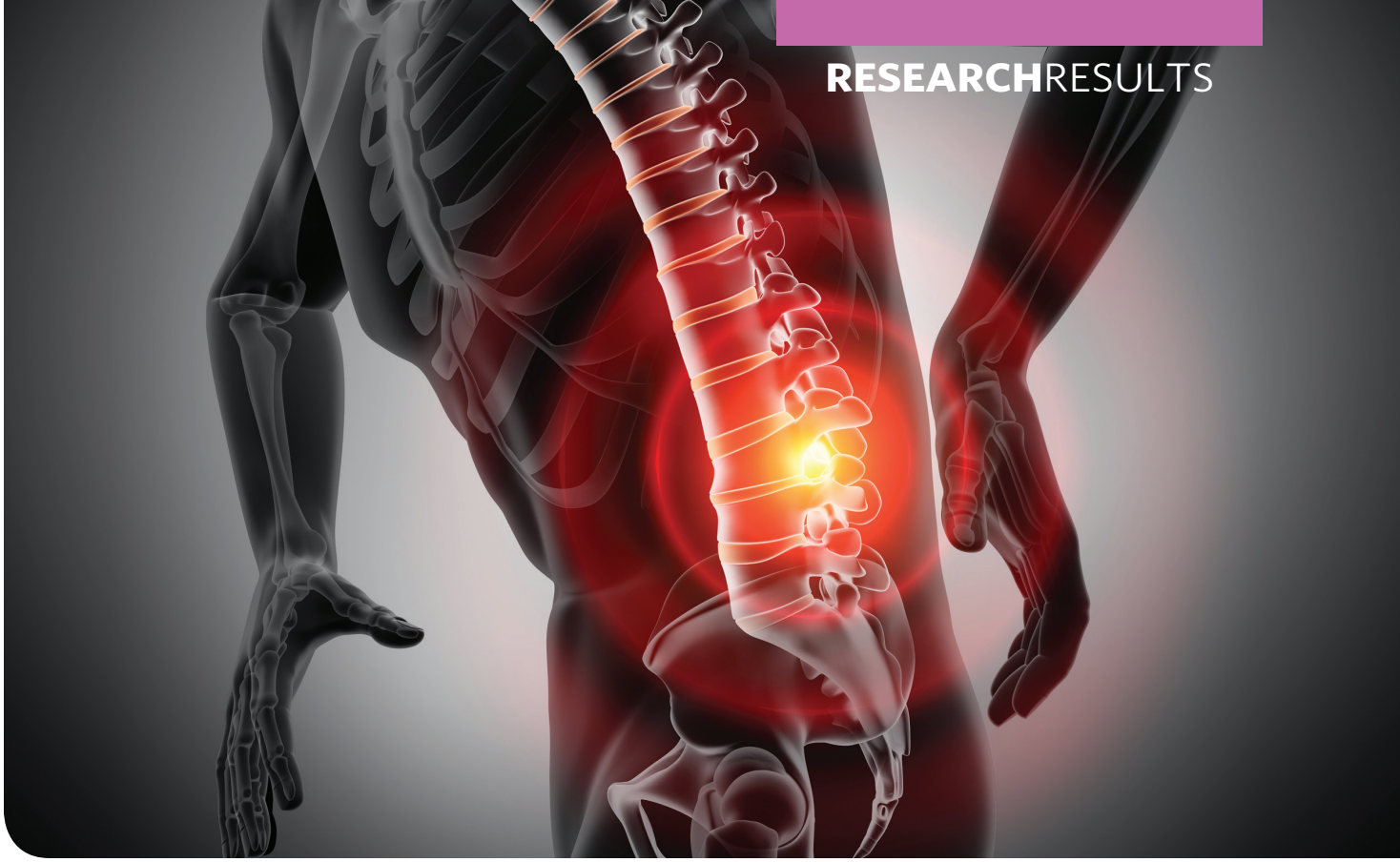

ADOBE STOCK

The light fantastic

Laser therapy can be a non-invasive solution to reducing inflammation.

MARK CALLANEN, PT, DPT, OCS

PAIN MANAGEMENT HAS BEEN GETTING INCREASED ATTENTION in the U.S. health-care market due to the current opioid epidemic. Most healthcare providers are looking for alternatives to pharmaceutical therapies when addressing various musculoskeletal (MSK) pain conditions. Laser therapy is a non-invasive modality that can have effects on both chronic and acute pain through the process of photobiomodulation (PBM).

PBM occurs when an effective dose of light energy is applied to injured tissue. The general mechanism for PBM involves biochemical stimulation of the electron transport chain in eukaryotic cells, which triggers several positive biochemical changes in injured tissue. These changes to MSK tissue and nerve tissue can decrease pain and inflammation, and accelerate tissue healing.[1-6]

Most clinicians understand that by decreasing inflammation and the associated pain mediators, pain can be managed effectively. This is why ice and anti-inflammatory medications are commonly used for acute MSK injuries. But are those the best treatments? While those methods are effective for joint effusion, there is growing debate about the use of ice and nonsteroidal anti-inflammatory drugs (NSAIDs) on injuries to muscle tissue. NSAIDs block the inflammatory cascade at the COX-2 level, which has been shown to have negative effects on the tensile strength of repaired muscle tissue and increases the chances of re-injury.[2]

Although ice delays the inflammatory process by restricting blood flow for a period of time, it may actually slow the process of tissue recovery by restricting blood flow to injured areas that need metabolic activity to recover. A 2016 study looked at delayed-onset muscle soreness where subjects were treated with either ice, laser, or ice used in conjunction with laser after eccentric muscle contractions. When used independently, laser was the best modality for enhancing restitution post-exercise, which led to faster recovery 24 hours after treatment.[7]

Laser research that investigates the mechanisms involved with reducing inflammation at a glance looks similar to pharmacological studies because they impact the inflammatory cascade at similar points. These include reduced COX-2 levels, reduced Bradykinin levels, reduction in interleukin-1 levels, and reduction in Prostaglandin E2 (PGE2).[8-11] However, understand that these reductions are fundamentally different from PBM in that they stem from intrinsic, anti-inflammatory signaling

generated by better cell metabolism and improved microcirculation at the level of the injured tissue.

When considering laser, there are different classes available in the U.S. that are determined by the power of the unit. So what type of laser is best used to treat pain? A common misconception is that higher-powered Class 4 lasers cannot treat acute conditions because surface heat is produced during treatment. Lower-powered lasers under the threshold of 500 milliwatts have commonly been referred to as "cold lasers" or low level laser therapy (LLLT) because they do not produce any heat on the skin surface when applied.

Regardless of power, PBM is the primary desired mechanism of action when lasers are applied to tissue. They effectively hasten the body's ability to process inflammation, which makes laser treatment in general an appropriate treatment option to address pain. While they are both appropriate for use over acute and chronic inflammation, a benefit of Class 4 lasers is that they allow therapeutic doses of photons to be applied over broader areas and to deeper tissues in smaller windows of time, which is a significant consideration for most clinicians.

Some practitioners might wonder why they would want to heat up the skin surface with a higher-powered laser if they could use a lower powered laser to get the same effect. While both types of lasers can help with inflammation, which is significant in the bigger picture of tissue healing, there is an important difference between the two when it comes to pain modulation.

Recent research has shown that treating afferent nerves with higher power densities (irradiance) significantly impacts pain perception.[1,12] When the laser is applied in higher doses, it can slow down conduction rates and increase the size of the action potentials in both C and A delta afferent nerves.[1,12] This can result in quick changes in patients' pain complaints via true analgesia, which is a phenomenon that cannot be easily accomplished with lower powered lasers.

What does this mean to you, the practicing clinician? The analgesic effect from higher powered lasers can open the door to more manual options on the same day when it is applied prior to manual treatments. Clinicians are faced daily with acute and semi-acute presentations that are challenging to treat in the early stages due to muscle guarding and subjective complaints that limit treatment options.

Class 4 laser therapy can help address this problem in the clinic with treatments that take less time to perform in most cases than a standard ultrasound. The second benefit of using laser in the clinic is that it will help accelerate tissue healing, reducing the time needed to return patients to functional activities.

With virtually no side effects and a short list of contraindications, laser therapy is something that should be considered in any plan that involves reducing inflammation. Special consideration should be given to higher powered lasers if immediate pain relief is being targeted or if larger areas of tissue are being treated on a regular basis in your practice.

Understanding the similarities and differences of different laser platforms could be a key to helping your patients move away from their current pharmacological methods of dealing with pain and provide a powerful, new avenue for treating painful conditions in your clinic for both short- and long-term relief. CE

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