


SP4 INFUSION THERAPIES IN CHRONIC HEADACHE
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Headaches are widely prevalent, as more than 50% of the general population will develop headache within a year. Furthermore, headache has a 90% lifetime history in the world population. However, only 3% of population would develop chronic headache. Many treatments do exist that are very effective in reducing headaches. This presentation will discuss infusion therapies, treatment modalities that are less common but very effective in intractable chronic headache conditions. In addition to presentations of current dihydroergotamine and valproate infusion protocols, we will also introduce magnesium as an essential element that, when administered intravenously, can decrease headaches. Additionally, this presentation will describe indications for lidocaine and ketamine infusions to improve pain from intractable chronic headaches.

SP5 RADIOFREQUENCY ABLATION OF VERTEBRAL BODY METASTASES
Magdalena Anitescu. Professor of Anesthesia, University of Chicago, Chicago, IL USA
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Vertebral compression fractures occur due to osteoporosis or malignancy. Diagnosis is best done clinically and by MRI, CT. Most common malignancies associated with vertebral body metastases are breast, lung, prostate cancers. Multiple myeloma is in a special situation as over 70% of patients do have bone pain at diagnosis and about 55–70% have a history of vertebral body abnormalities. In the presence of the vertebral body metastases, back pain is prevalent. The common treatment of vertebral body malignant lesion is a vertebral augmentation procedure that is coupled with radiofrequency ablation of the identified metastases.

In this presentation we will discuss effectiveness of this combined technique in improving clinical outcomes by decreasing pain and control local tumor burden in cancer associated metastases of the vertebral body. We will also describe techniques, analyze potential complications, address managing possible adverse events and review the literature on best approach to this complex cancer related condition.
white blood cells, reparative cells, and progenitor cells. (Figure 1)

Plasma rich plasms (PRP)

Platelet rich plasma products deliver a supraphysiologic concentration of platelets to the affected area; they are used primarily in the acute/subacute musculo-skeletal conditions and some chronic pain states.

Their primary role is not to replace a damaged tissue but to rather facilitate recovery. The platelets, anucleate cytoplasmic fragments derived from megakaryocytes, contain factors that are released during their activation; those are granules containing high level of signaling molecules and growth factors that are capable to signal mesenchymal stem cells and speed healing process. Table 1 summarizes the most common biological active proteins and their functions

PRP derived products bring the platelet concentration of blood to 3–8 times higher, contributing to the high count of growth factors and subsequently high concentration of signaling proteins. Many factors do influence obtaining an effective PRP product; some of them are listed below:

- Volume of blood used
- Use of anticoagulant, pre-procedure platelet and WBC count
- Type of injury or disease treated
- Number and interval between PRP injections
- Host microbiota and immune status

Classification of the PRP products is made based on the presence of platelets, leucocytes, and fibrin. As such 4 categories can be mentioned:

- P-PRP-pure PRP
- L-PRP-leukocytes and PRP
- P-PRF-pure platelet rich fibrin
- L-PRF-leukocyte and platelet rich fibrin

Most common indications for the use of PRP are tendinopathies, ligamentous injuries, muscle injuries, cartilage pathologies, subchondral bone disease and bone injuries. Fitzpatrick et al in a meta-analysis of randomized control studies evaluating the use of PRP in tendinopathies showed that leukocyte rich PRP was more effective than the steroid injections in decreasing pain.1

Effectiveness of the autologous mesenchymal stem cells was shown in a small study by D’Souza et al; the study showed that in knee osteoarthritis and chondropathy, decreased pain and enhanced function with PRP and autologous stem cells from bone marrow aspirate remain stable from end of treatment to 6 months post procedure.2

The technique used for aspiration can be performed using anatomical landmarks or under image guidance (fluoroscopy and ultrasound); regardless of the method, the use of multiple 10 cc syringes is preferred as it allows easy aspiration during many rotations of the aspiration needle placed in the iliac crest. Figure 3 shows our fluoroscopic guided technique for bone marrow aspirate with patient in prone position. By concentrating the bone marrow aspirate, the concentration of the desired cells increases from 2–8 times of original aspirate.

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The use of regenerative medicine therapies is shown in several case series. By utilizing adipose tissue, placenta and amniotic cellular fluid have been used in various small case series and case reports, but those products are not considered autologous and as such their use may be subject to different regulation.

### Abstract SP6 Table 1

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<th>Function</th>
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<td>Fibroblast production, chemotaxis, collagen production</td>
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<td>New blood vessel growth and anti-apoptosis of blood vessel cells</td>
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<td>Fibroblastic growth factor (b-FGF)</td>
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<td>Epidermal growth factor (EGF)</td>
<td>Cell recruitment, proliferation, differentiation, promotion of epithelial cells</td>
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Stem Cell Therapies-Bone Marrow Concentrates (BMC)

Bone marrow aspirates are usually used to concentrate stem cells; one of the common places to recruit those cells is the iliac crest; this location offers an easy accessibility, for needle insertion is easy and predictable. Furthermore, there is a high concentration of mesenchymal cells in the iliac crest aspirate. High volumes of 250cc or more can also be easily drawn from this location.

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Abstract SP6 Figure 1 Naturally occurring healing process with the 3 phases, inflammatory, proliferative and remodeling varying from 3 days to more than 1 year.

Abstract SP6 Figure 2 Effects of the Platelet Rich Plasms (PRP) on the healing process.

Abstract SP6 Figure 3 Aspirate of the stem cells via a Jamshidi needle placed in the left iliac crest of a patient, optimally identified using fluoroscopic guidance

Conclusions Regenerative medicine is a novel, advancing way of treating chronic pain. There are limited studies currently, but evidence is evolving for the use and efficacy of regenerative medicine techniques as powerful tools in treating chronic pain. Indications for the PRP and BMC vary widely and are based on the regenerative technique and substance used. Such, platelet rich plasma (PRP) is more often used in musculo-skeletal conditions while use of mesenchymal stem cells have been reported to effectively treat intervertebral disc pathology.

REFERENCES

SP7 CRYONEUROLYSIS OF CUTANEOUS NERVES: WHAT SHOULD WE KNOW?

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Neuropathic pain after surgery and trauma can be severe and debilitating and lead to low quality of life. The frequency of persistent neuropathic pain after surgery and trauma is as high as 10–50% depending on the type of surgery. Very often the pain problem remains unsolved despite extensive and thorough investigation of possible medical, surgical and traumatic causes of the pain problem including exploratory surgery and other interventions.

A main generator of persistent postsurgical neuropathic pain is cutaneous neuropathy, which is due to injury of peripheral nerves innervating the skin and the pain is localized in the skin area innervated by the injured nerve. Thus, neuropathy can appear in any skin area innervated by a nerve injured by surgery or trauma. Injury of cutaneous nerves during surgery cannot be avoided as the entire skin is innervated by a dense network of ramifications of cutaneous nerves. Often the injured nerve regenerates and normal sensation is reestablished. When this does not happen, the injured nerve endings start constant or intermittent firing of pain signals. Cutaneous neuropathy typically feels intense, burning, sharp, or like electric shock.

Cryoneurolysis for the treatment of neuropathic pain after surgery and trauma is approved by the States and Europe. A purpose-made double-barrel needle (gauged 1–2 mm) is inserted until the needle tip touches the target nerve. The cryoneurolysis system makes the needle tip generate a few-mm-wide ice-ball that interrupts the nerve fibers. The ice-ball is generated by gas (typically carbon dioxide, CO2) driven by high pressure through the inner needle to an opening at the tip of the inner needle. The gas expansion instantly cools the gas (Joule-Thompsons effect) and the needle tip is cooled down to minus 60–80°C depending on the choice of gas. The gas is vented back to the cryoneurolysis system via the outer needle. Thus, the cryoprobe is designed as a ‘closed circuit’, and the gas stays contained inside the double-needle. The duration of the freezing is typically two minutes creating the few mm thick ice-ball at the tip of the needle. Repetition of the freeze/thaw cycle can increase the thickness of the ice-ball.

The virtue of cryoneurolysis with carbon dioxide as opposed to globally neurodestructive techniques such as radiofrequency ablation (RFA) and glycerol injection and surgical transection is that cryoneurolysis with carbon dioxide selectively interrupts the axons in the target nerve and their myelin sheaths but leaves the connective tissue skeleton of the nerve intact securing normal regeneration of the axons and their sheaths. This relieves the neuropathic pain for 4–12 months, while normal nerve fiber regeneration is ongoing.

The neurodestructive effect of extreme cold is well-established. Sunderland expanded Seddon’s classification of nerve injury due to cold from three to five categories in 1953.