LOWER BACK PAIN AND NECK PAIN BY THE NUMBERS
National Institute of Neurological Disorders and Stroke indicated that about 80 percent of adults experience low back pain at some point in their lifetimes. It is the most common cause of job-related disability and a leading contributor to missed work days. In a large survey, more than a quarter of adults reported experiencing low back pain during the past 3 months. An analysis by the Journal of the American Medical Association (JAMA) on United States (US) health care spending, revealed that low back and neck pain accounted for the third highest amount of spending at $87.6 billion (US Spending on Personal Health Care and Public Health, 1996-2013 - December 27, 2016).

Musculoskeletal diseases are by far the most common primary medical condition in the United States. Treatment costs and lost wages are estimated to have reached 7.7% of GDP, 14.47 trillion, and account for the majority of lost work and sick days.

Low back pain (LBP) is one of the major disabling health conditions among older adults aged 60 years or older. As the population ages, the ratio of older adults to working-age adults, also known as the old-age dependency ratio, is projected to rise. By 2020, there will be about three-and-a-half working-age adults for every retirement-age person. By 2060, that ratio will fall to just two-and-a-half working-age adults for every retirement-age person.
An Aging Nation
Projected Number of Children and Older Adults

For the First Time in U.S. History Older Adults Are Projected to Outnumber Children by 2035

Projected percentage of population

- Adults 65+: 23.5% (2035) vs. 23.8% (2016)
- Children under 18: 19.8% (2035) vs. 22.0% (2016)

Projected number (millions)

<table>
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<tr>
<th>Year</th>
<th>Adults 65+</th>
<th>Children under 18</th>
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<tr>
<td>2016</td>
<td>49.2</td>
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<tr>
<td>2035</td>
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<td>2050</td>
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Note: 2016 data are estimates not projections.

WHAT ARE WE LOOKING AT
The vast majority of low back and neck pain is mechanical in nature. Sprains and strains account for most acute back pain. Sprains are caused by over stretching or tearing ligaments, and strains are tears in tendon or muscle. Both can occur from twisting or lifting something improperly, lifting something too heavy, or over stretching. Such movements may also trigger spasms in back muscles, which can also be painful. Intervertebral disc degeneration is one of the most common mechanical causes of low back pain. Radiculopathy is a condition caused by compression, inflammation and/or injury to a spinal nerve root. Pressure on the nerve root results in pain, numbness, or a tingling sensation that travels or radiates to other areas of the body that are served by that nerve. Radiculopathy may occur when spinal stenosis or a herniated or ruptured disc compresses the nerve root. Sciatica is a form of radiculopathy caused by compression of the sciatic nerve, the large nerve that travels through the buttocks and extends down the back of the leg. This compression causes shock-like or burning low back pain combined with pain through the buttocks and down one leg, occasionally reaching the foot. In the most extreme cases, when the nerve is pinched between the disc and the adjacent bone, the symptoms may involve not only pain, but numbness and muscle weakness in the leg because of interrupted nerve signaling. The condition may also be caused by a tumor or cyst that presses on the sciatic nerve or its roots.
Spondylolisthesis is a condition in which a vertebra has moved anterior to the vertebra below and is graded I-IV.

A traumatic injury, such as from playing sports, car accidents, or a fall can injure tendons, ligaments or muscle resulting in low back pain. Traumatic injury may also cause the spine to become overly compressed, which in turn can cause an intervertebral disc to rupture or herniate, exerting pressure on any of the nerves rooted to the spinal cord. When spinal nerves become compressed and irritated, back pain and sciatica may result.

Spinal stenosis is a narrowing of the spinal column that puts pressure on the spinal cord and nerves that can cause pain or numbness with walking and over time leads to leg weakness and sensory loss. Osseous growth, Inflammatory tissues and facet joint hypertrophy are the most prevalent causes.
WHY INNOVATE
High-Deductible Health Insurance: The Good, The Bad And The Ugly

- John C. Goodman
- Contributor at Forbes magazine

• High deductibles are a fact of life. They are becoming higher and more prevalent with each passing day.

• A Kaiser Family Foundation study finds that about half of all people with employer provided coverage have a deductible of at least $1,000. An Avalere study finds that the average deductible for silver plans in the (Affordable Care Act) exchanges this year is almost $4,000. Some employers of fast food workers are only offering plans with the maximum out-of-pocket exposure ACA regulations will allow. Currently, that’s a $7,150 deductible for an individual and double that for a family.

• Medicare incentive programs for short term and long term treatment facilities as well as provider profiling through health insurance companies who all seek to reduce patient visit averages. Health care costs continue to sky rocket.

• Kimberly Amadeo wrote an article regarding on the US Economy for “The Balance”, and noted that in 2017, U.S. health care costs were $3.5 trillion. That makes health care one of the country’s largest industries. It equals 17.9 percent of gross domestic product. In comparison, health care cost $27.2 billion in 1960, just 5 percent of GDP. That translates to an annual health care cost of $10,739 per person in 2017 versus just $146 per person in 1960. Health care costs have risen faster than the average annual income.

• Faster healing times, reducing reoccurrence of treated conditions and improving man power losses are top priorities for treatment of neck and lower back pain.
A NEW IDEA
Method: from the greek word Méthodos (chase, go after), it is a set of processes carried out to achieve a goal or certain results.

Synergy: is a combined and simultaneous cooperation between several elements in the same activity to achieve the same result which leads to better performance than that obtained by the various separate elements.

Accountability: as defined by the NCBI of pubmed.gov entails the procedures and processes by which one party justifies and takes responsibilities for its activities.
CHANGE:
The study of Tecar Therapy and EWST
• The term TECAR stands for Transfer of Electricity – Capacitive and Resistive. The insulated electrode (Capacitive) targets the treatment of muscle for superficial or semi-deep localized action. The metal electrode concentrates on deeper tissues such as tendons, ligaments, fascia and bone. Capacitive transfer for tissues with high water content (muscles), resistive transfer for tissues with the highest resistance and low water content (bones, tendons, adipose tissues).

• TECAR therapy allows for the treatment of joint and muscular diseases that are frequently encountered in rehabilitation and physical therapy. Painless and non-invasive, this technique is comfortable for patients, who experience a soft heat diffused within the tissues. The use of this technology allows therapists to treat many musculoskeletal conditions in a more effective manner.
PHYSIOLOGICAL EFFECTS OF TECAR THERAPY:
• Vasodilation, Anti inflammatory, Endothermic Hyperemia, Analgesic, Increased Joint Mobility, Improved Muscle, Tendon and Ligament elasticity.
Indications

• Musculoskeletal injuries including, sprains/strains, facet arthrosis, brachialgia, lumbago, neck pain, bursitis.

Contraindications

• Epilepsy, Angina pectoris, Cardio-vascular dysfunctions, Insensitivity to temperature, Neoplasms, Pacemakers, Coagulopathies and thrombophlebitis
TECAR THERAPY IN THE TREATMENT OF ACUTE AND CHRONIC PATHOLOGIES IN SPORTS
This study utilized Tecar therapy, a capacitive and/or resistive energy transfer system that operates within the long wave radio frequency range in the treatment of acute and chronic musculo-articular pathology in athletes.

Results: The majority of the patients expressed a reduction in pain and improvement in function at acute and chronic cases and in the three pathology groups observed.
The results obtained are interesting and indicate that Tecar therapy is a useful tool in the treatment of pathologies of the locomotor system in sports.

*Note: Steinbrocker Functional Classification is a four level scale rating physical functional disability from Class I, “complete functional capacity to carry out all usual duties without handicaps, to class IV, “largely incapacitated with (the person) be dridden or confined to wheelchair.

<table>
<thead>
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<th>Number of athletes</th>
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<td>30</td>
<td>9.2</td>
<td>3.0</td>
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</table>

Visual analogue scale evaluation:
• CERVICALGIA, LUMBAGO, SCIATICA: APPLICATION OF CAPACITIVE ENERGY TRANSFER SYSTEM

• Authors: Molina A., Eschacho B., Molina M. V., Mariscal S.
• Affiliations: Rehabilitation Unit, University Hospital of Valladolid Barcelona
• For this study, we selected a total of 23 patients (lumbosciatica, lumbago – 11 patients, cervicobrachialgia, cervicalgia – 12 patients) sent from the Rehabilitation Unit of the University of Valladolid Hospital with diagnoses of simple lumbago, lumbosciatica, cervicalgia, and cervicobrachialgia after treatment with non-steroidal anti-inflammatory drugs and conventional electrotherapy was unsuccessful.

Conclusions:
• Based on the clinical evaluation of the data obtained, it can be concluded that a substantial improvement was achieved in 65% of the patients treated with Capacitive Energy Transfer.
Evaluation of the effects of the application of a 0.485 MHz radiofrequency through a capacitive-resistive energetic transfer system (TECAR) on the muscle tissue. A double-blind crossover study.

From the analysis of the obtained data, it can be observed that the effect of the protocol performed by administering a radio frequency of 0.485 MHz by means of a capacitive-resistive energetic transfer system, applied after a muscular performance, induces an increase in the intramuscular capillary blood flow and lowers the effect on the myofibrillar structures subjected to mechanical stress due to the intensive eccentric work of the test. From these data we could also speculate an effective action of the 0.485 MHz radio frequency, applied with a capacitive-resistive modality, upon the reduction of the recovery time during repeated sequences of muscular exercise.
TECAR THERAPY
IN THE TREATMENT OF ACUTE AND CHRONIC PATHOLOGIES IN SPORTS
G.P. Ganzit, L. Stefanini, G. Stesina
FMSI (Italian Sports Medicine Federation)-CONI Institute of Sports Medicine, Torino
The physiological effects of this increase in energy are represented by:
• Increase in extensibility of the collagenous tissue due to reduction in viscosity.
• Reduction of pain due to anti-irritant action or release of endorphins.
• Reduction of muscular spasms and contractions due to reduced activity of secondary efferents.
• More rapid and complete dissociation of oxygen from haemoglobin with more availability, accompanied by a reduction in activation energy of important chemical and metabolic reactions.
• Vasodilatation with increase of local blood flow contributing to the re-supply of oxygen and nutritional substances as well as the removal of catabolytes.
• Quickening of re-absorption of haemorrhagic masses.

RESULTS:
The results obtained are interesting and indicate that Tecar therapy is a useful tool in the treatment of pathologies of the locomotor system in sports. It overlaps with other therapies in terms of the presence or absence of certain positive effects, but it also has distinct characteristics that are effective even where other treatments have failed.
Speed of recovery—Preventative Therapy—Mental Focus Therapy
A system of capacitive and resistive energy transfer known as Tecar therapy has been developed, operating within the long wave radio frequency range at 0.5 MHz, lower than the frequencies used in short wave diathermy (27.1 MHz), and higher than the frequencies that can cause muscle contractions. Tecar therapy has its own distinguishing characteristic in the field of diathermy equipment, by stimulating energy transfer within tissues by using a capacitive or resistive electrode.
Low Impedance Electrode:
- Tendons
- Ligaments
- Fascia
- Bone

High Impedance Electrode:
- Muscle
- Adipose
- Lymphatic Tissue

Tecar research is currently awaiting a government grant for study at Waterloo University Canada, in the school of engineering.
Extracorpeal Shockwave Therapy (ESWT)
Shock wave therapy (ESWT) is an emerging treatment modality for managing pain caused by various musculoskeletal disorders. There are 3 mechanisms for generating shock waves: electrohydraulic, electromagnetic, and piezoelectric. The piezoelectric mechanism involves the use of numerous piezo crystals which are mounted on the inner surface of a sphere and receive a rapid electrical discharge. This causes contraction and expansion of the crystals. A pressure pulse is induced in the surrounding water and produces a shock wave. Since the year 2014 Piezo Electric devices now use a gel medium and do not require water submersion for treatment, as in kidney stone disintegration or for use of musculoskeletal treatment.

The acoustic wave in a Piezo Electric system is characterized by a high positive pressure of more than 1000 bar, which can be developed within a very short rise time and followed by a low pressure phase of tensile stress equivalent to 100 bar.

**INDICATIONS**
Chronic tendinopathies, bone pathologies, muscle pathologies,

**CONTRAINDICATIONS**
Lung tissue, epiphyseal plate, malignant tumor, severe coagulopathy
The Effects of Extracorporeal Shock Wave Therapy in Patients with Coccydynia: A Randomized Controlled Trial

Published: November 10, 2015

Results:
In this study, ESWT appeared to be useful in relieving the pain of coccydynia and more effective in reducing pain syndromes than the use of physical modalities. Therefore, ESWT is recommended as an alternative method for treating patients with coccydynia.

The effects of extracorporeal shock wave therapy on pain, disability, and depression of chronic low back pain patients


Results:
Extracorporeal shock wave therapy is an effective intervention for the treatment of pain, disability, and depression in chronic low back pain patients.

Effects of Extracorporeal Shockwave Therapy on Patients with Chronic Low Back Pain and Their Dynamic Balance Ability

Journal of Physical Therapy Science 2014

Results:
The purpose of the present study was to examine the effects of extracorporeal shockwave therapy (ESWT) for patients with chronic low back pain and their dynamic balance ability. The exercise program combined with the ESWT relieved chronic back pain more than the exercise program combined with the CPT. The former was also more effective at improving the patients’ dynamic balance ability in terms of SAPLS, SAPRS, SAPFS, and TSA.
CASE STUDY 1

COMBINE FOOTBALL PLAYER

Player is a senior at Tennessee experiencing right lower back and hip pain. Primary concern is limitation in all routine field exercises.

MRI Findings: MRI performed in September 2015 showed acetabular fracture.

Player removed from play schedule and put onto IR. Player is put into rigorous PT regimen.

MRI performed 02/26/2016 with non-union acetabular wall fracture.

Meeting with officials including doctors and physical therapists and plan to provide targeted treatment of right lower back and hip region, player must be ready in 3 weeks for retesting at combine.

MRI performed 03/17/2016 showing union of acetabular fracture and significant improvement in most football field related physical activities. Player returned to Combine for performance testing and was drafted to the Indianapolis Colts.
PATIENT NAME:

DATE OF STUDY:

REFERRING PHYSICIAN:

CLINICAL INDICATION: Previous right acetabular fracture. Right hip pain.

MAGNETIC RESONANCE IMAGING (MRI) OF THE RIGHT HIP/ACETABULUM WITH CONTRAST

TECHNIQUE: Multiphase MRI was performed with sagittal and coronal T1W images.

FINDINGS: Bone marrow edema involving the superior medial aspect of the right femoral head, with mild soft-tissue edema, consistent with the superior aspect of the femoral head. Findings are concerning for avascular necrosis. There is degenerative change, advanced for patient’s stated age, with subchondral cystic changes, with joint space loss and right hip instability involving the superior aspect of the acetabulum. There is joint fluid seen in the right hip. Minimal tearing of the acetabular labrum on the right.

IMPRESS: 1. Bone marrow edema changes involving the superior medial aspect of the right femoral head with subtle overlying cortical irregularities. Findings concerning for avascular necrosis of the femoral head.

2. Advanced degenerative changes involving the right femoral head and acetabulum, advanced for patient’s stated age. Joint fluid in the right hip.

3. Minimal tearing of the acetabular labrum on the right.

Thank you for the courtesy of this referral.

Sincerely,

Dr. Smith, D.O.

Beaches MRI

1760 PGA Boulevard
Palm Beach Gardens, FL 33410
Phone: (561) 625-4770 Fax: (561) 625-4615
CASE STUDY 2

Airbus invivo study during flight demonstration