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Volume 29 Number 2 | Published by Physicians In Physical Medicine and Rehabilitation | February 5, 2021

GLOBAL NEED FOR REHABILITATION

As rehabilitation for those with chronic conditions can improve functional outcomes, this study was designed to assess the needs for rehabilitation using data from the World Health Organization (WHO) report of Global Burden of Diseases (GBD), Injuries and Risk Factors study 2019.

The GBD 2019 study estimated the prevalence and years of life lived with disability (YLD) by age, sex, year, and location. The YLD was calculated as a measure of the burden of non-fatal disease and injury. This was calculated by multiplying the prevalence of each sequela by the estimated level of health loss in the form of a disability weight. Disability weights range from 0 (perfect health) to 1 (death) and represent the severity of the disease. The authors followed the 20 conditions with the highest number of estimated YLDs and included only the conditions for which rehabilitation is a key intervention in the management plan.

In 2019, 2.41 billion individuals were identified as having conditions that would benefit at some point from rehabilitation services, contributing to 310 million YLD. This number had increased by 63% since 1990. Among individuals 15-64 years of age, 1.6 billion had a condition that would benefit from rehabilitation, with musculoskeletal disorders contributing to approximately two-thirds of this number. Low back pain was the most prevalent of these affecting 568 million people globally. The second-largest disease area was sensory impairments, split between vision loss and hearing loss. The third -largest group was neurologic disorders in which stroke represented the highest need including 86 million people.

Conclusion: This study using World Health Organization data found that, in 2019, 2.41 billion people could benefit from rehabilitation services, countering the view of rehabilitation as a service for the few.

Cieza, A., et al. Global Estimates of the Need for Rehabilitation Based on the Global Burden of Disease Study 2019: A Systematic Analysis for the Global Burden of Disease Study 2019.**Lancet.** doi.org/10.1016/ S0140-6736(20)32340-0.

ELDERLY HIP FRACTURE AND EARLY MOBILITY

Hip fractures in the elderly represent a major public health burden worldwide. This study evaluated whether the time to ambulation is correlated with mortality after the surgical repair of a femur fracture.

Subjects were consecutive patients >65 years of age admitted with a hip fracture requiring surgical repair. Data collection included age at admission, gender, time to surgery, height, weight, body mass index (BMI), type of fracture, American Society of Anesthesiologists (ASA) score, ability to walk within 10 days after fracture, and mortality at six and 12 months. Data were compared between those who received surgical treatment within 48 hours (early) and those who underwent surgery later (delayed), as well as by those who walked within 10 days from injury and those who did not.

In a logistic regression analysis, compared with the delayed group, surgery within 48 hours was associated with a reduced risk of mortality at six months (p=0.014) and one year (p=0.027). Compared to late walkers, early walkers had a reduced mortality at six months (p=0.002) and at one year (p=0.009).

Conclusion: This study of patients over the age of 65 undergoing surgical repair for hip fractures found that surgery within 48 hours of injury, and ambulation within 10 days were both associated with a decrease in mortality at six and 12 months.

Aprato, A., et al. No Rest for Elderly Femur Fracture Patients: Early Surgery and Early Ambulation Decrease Mortality. **J Orthop Traumatol.** 2020, Aug 30;21(1):12.

PRIOR ANTICOAGULATION, ISCHEMIC STROKE AND ATRIAL FIBRILLATION

Oral anticoagulation with direct oral anticoagulants (DOACs) or vitamin K antagonists (VKAs) have been found to be effective for the prevention of acute ischemic stroke (IS) in patients with atrial fibrillation (AF). This study of patients with AF, assessed the effect on stroke outcome of prior use of these medications.

Data were obtained from the Swiss Stroke Registry, a compulsory prospective database. Subjects were consecutive patients with AF, hospitalized for IS. Medical intervention for stroke included the use of IVT and/or mechanical thrombectomy. Anticoagulation groups were patients with AF without anticoagulation (controls), patients with AF treated with VKA and patients with AF treated with DOAC. The primary outcome was the association between the three groups and stroke outcomes.

Stroke severity, as measured by the National Institutes of Health Stroke Scale (NIHSS) was lower among patients in the DOAC group than for those in the VKA or control groups (p<0.001). The NIHSS scores were less severe among those within the therapeutic range of VKA than among those outside the therapeutic range (p<0.01). At three months, an adjusted analysis found that modified Rankin Scale scores (mRS) did not differ between groups. However, a favorable outcome was more likely among those in the DOAC group than for those in the other two groups. In addition, large vessel occlusion was present in 51% of controls, 44% of patients of the VKA group and 39% of the DOAC group (p<0.001).

Conclusion: This study of patients with atrial fibrillation, hospitalized for an ischemic stroke found that prior DOAC therapy was associated with a decreased stroke

severity, lower rates of large vessel occlusion and better functional outcome at three months than in those treated with vitamin K antagonists or controls.

Meinel, T., et al. Prior Anticoagulation in Patients with Ischemic Stroke and Atrial Fibrillation. **Ann Neurol.** 2021, January; 89(1): 42–53.

MODIFIABLE RISK FACTORS FOR COGNITIVE FUNCTION IN FORMER AMERICAN FOOTBALL PLAYERS

Given that there are many potentially modifiable or treatable factors associated with cognitive impairment, this study examined the association of these factors with cognitive-related quality of life (C-QOL) among former professional football players.

The Football Players Health Study obtained contact information from the NFL players association for 12,491 players. All were sent the Short Form of The Quality of Life Neurological Disorders, Applied Cognition–General Concerns (Neuro-Quol) to assess C-QOL. In addition, the researchers asked about ten football-related concussion symptoms during player years and documented the frequency of concussions. Assessments were also made of depression, anxiety, pain interference, current exercise, current smoking, weight, height, and medical comorbidities.

In the adjusted analysis, nearly every cognitive risk factor was associated with C-QOL. The healthy concussed had a mean of 2.5 cognitive risk factors while the unhealthy concussed had a mean of 5.6 cognitive risk factors. Significant associations were found between impaired C-QOL and physical functioning, pain, depression, and anxiety ($p<0.001$ for all). The greatest differences between those with normal C-QOL and those with impaired C-QOL were in high pain interference in daily life (21.2% vs 72%), high depressive symptoms (6.3% versus 50.3%), high anxiety symptoms (11.6% versus 53.4%) and physical impairment (12.5% versus 52.4%).

Conclusion: This study of former professional football players found that those who currently report good cognitive-related quality of life had fewer current cognitive risk factors than did those who reported poor cognitive related quality of life.

Roberts, A., et al. Modifiable Risk Factors for Poor Cognitive Function in Former American–Style Football Players: Findings from the Harvard Football Players Health Study. **J Neurotrauma**. 2021, January 15; 38 (2):189–195.

HIGH-INTENSITY SHOULDER ABDUCTION AND SUBACROMIAL PAIN

Subacromial pain syndrome (SAPS), is a term that includes all nontraumatic shoulder problems around the acromion. This study assessed the effect of high-intensity interval training (HIIT) as a treatment for this condition.

This study included adults with painful SAPS, and pain greater than three months in duration. Subjects were randomized to the HIIT group or a group to receive treatment as usual (Control). Both underwent eight weeks of exercise. The HIIT exercise was performed with the same movement and frequency as the abduction time exhaustion test, with a workload corresponding to 80% of WRmax. At eight weeks the groups were compared for changes in incremental abduction of the arm to exhaustion, pain, and disability assessed by the Shoulder Pain and Disability Index (SPDI), and tendon blood flow at the supraspinatus, tested with contrast-enhanced ultrasound.

The SPADI scores improved more in the HIIT than in the control group ($p=0.017$). Those in the HIIT group also experienced less pain during exercise after the intervention compared with controls ($p < 0.001$). The contrast-enhanced ultrasound indicated an increase in tendinous blood flow in the HIIT group ($p = 0.019$).

Conclusion: This study of patients with subacromial pain syndrome found that high-intensity aerobic interval training could improve pain and function more than traditional exercise therapy.

Berg, O., et al. High-Intensity Shoulder Abduction Exercise in Subacromial Pain Syndrome. **Med Sci Sports Exerc.** 2021, January: 53 (1): 1–9.

CERVICAL PLEXUS BLOCK FOR MYOFASCIAL PAIN

As myofascial neck pain and/or shoulder pain originates from muscle innervated by the cervical plexus, this study assessed the efficacy of a deep cervical plexus block as a treatment for this pain.

Subjects were adults with myofascial pain, without radiation to the arm. All had failed treatments with oral analgesics, anti-inflammatory medications, and physical therapy. Data were collected for age, medical history, pain history, characteristics of the pain, and previous treatment. Subjects were randomized to receive a placebo saline injection or to receive a deep cervical plexus block with 7mL of a mixture containing 3mL lidocaine 2%, 3mL lidocaine 2% with epinephrine 1:200,000, 3mL bupivacaine 0.5%, and 1mL clonidine 150 µg/mL. A visual analog scale (VAS) for pain and documentation of pain duration were completed. All patients received the same pharmacologic pain management. Data were analyzed for 66 patients, including 34 in the treatment group and 32 in the placebo group.

Two weeks after the intervention, the average pain duration per day was 1.38 hours in the treatment group and 5.25 hours in the placebo group ($p<0.0001$). Severe pain was reported in 2.9% of the treatment group and in 53.1% of the placebo group ($p<0.0001$).

Conclusion: This study of adults with myofascial pain of the neck and shoulder found that a cervical plexus block could produce a significant reduction in the severity and duration of pain.

Naja, A., et al. Deep Cervical Plexus Block for Neck and Shoulder Pain Due to Myofascial Pain. A Randomized Clinical Trial. **Clin J Pain.** 2021, February: 37 (2): 133-139.

PERGOLIDE VERSUS BROMOCRIPTINE AFTER MILD TRAUMATIC BRAIN INJURY

A long-standing hypothesis for post-TBI cognitive deficits is the dysregulation of the circuitry of the prefrontal cortex (PFC) by disruption of catecholamine levels. As the PFC contains both D1 and D2 receptors, this study compared the effect of treatment with pergolide, a mixed D1/D2 agonist, to that of bromocriptine, a selective D2 agonist.

This prospective placebo-controlled double-blind study included 15 patients with an mTBI and 17 healthy controls. All had blood samples drawn at baseline, and at one, two, three, and four hours after the ingestion of placebo, 1.25 mg bromocriptine, or 0.05 mg pergolide. A functional MRI (fMRI) was obtained after drug/placebo ingestion, followed by neuropsychological testing. During the fMRI scan, a visual-verbal n-back task was presented in a four-condition, blocked design, with variable processing load requirements (0-, 1-, 2-, and 3-back conditions). The number of correct and incorrect responses was recorded, along with reaction times.

For the Trail Making Test, Trial 2/ Trails A condition, the pergolide group performed better than the bromocriptine group ($p=0.03$). In the working memory task (n-back) those with mTBI in the pergolide group performed better than those in the bromocriptine group, whereas controls showed the opposite pattern. The fMRI results demonstrated increased activation relative to controls in working memory circuitry, which was more pronounced in the pergolide group, than in the bromocriptine group.

Conclusion: This study of patients with mild traumatic brain injury suggests that activation of the D1 receptor may improve working memory performance after mild traumatic brain injury.

Flashman, L., et al. Differential Effects of Pergolide and Bromocriptine on Working Memory Performance and Brain Activation after Mild Traumatic Brain Injury. **J Neurotrauma.** 2021, January 15; 38 (2): 225–234.

GERMACRONE FOR NEUROLOGIC DEFICITS FOLLOWING TRAUMATIC BRAIN INJURY

Traumatic brain injury (TBI) has both a direct mechanical effect and an indirect effect caused by a complex pathological cascade. Germacrone is a component of the herb Curcuma zedoaria Roscoe and has been found to reduce the expression of pro-inflammatory cytokines and to promote anti-inflammatory mediators. This study was designed to study the neuroprotective effects of GM in an animal model of TBI.

Using a controlled impact model of TBI, researchers randomized a group of male mice into five different groups. These included a control group (CG), a TBI group (TBI), GM group without TBI (GM), a TBI plus 5 mg/kg of GM (TBI+5), TBI plus 10 mg/kg of GM (TBI+10), TBI plus 20 mg/kg of GM (TBI+20). Motor function and balance were tested with the Rotarod test and Morris water maze assay. After the study, the hippocampus was assessed with Hematoxylin and eosin (HE) staining, for water content, concentrations of inflammatory cytokines TNF-α, IL-1β, and IL-6 in brain tissues, and for activities of myeloperoxidase (MPO), malondialdehyde (MDA), and superoxide dismutase (SOD).

Compared to the CG group, motor function, spatial learning, and memory were impaired in the TBI group. These functions were improved in the GM treated groups in a dose-dependent manner. Measures of edema, activated microglia CD16 and CD11b, pro-inflammatory cytokines, the anti-oxidative and anti-inflammatory response and oxidative stress were worsened by TBI and improved by treatment with GM, often in a dose-dependent manner.

Conclusion: This animal study of TBI found that Germacrone could reduce the secondary pathological processes of edema, neuroinflammation, and oxidative stress.

Zhuang, S., et al. Germacrone Alleviates Neurological Deficits Following Traumatic Brain Injury by Modulating Neuro Inflammation and Oxidative Stress. **BMC Complement Med Ther**. 2021 Jan 5;21(1):6.

TOCILIZUMAB FOR PATIENTS HOSPITALIZED WITH COVID

Respiratory failure is among the leading causes of death in patients with COVID-19. As tocilizumab, an anti– interleukin-6 receptor monoclonal antibody, has been approved for the treatment of multiple inflammatory diseases, this study investigated the safety and efficacy of tocilizumab in hospitalized patients with COVID-19 pneumonia.

This double-blind placebo-controlled trial included patients hospitalized with COVID-19 pneumonia who were not receiving mechanical ventilation. The patients were randomized to receive standard care plus one or two doses of placebo or tocilizumab 8mg/kg. The primary outcome was mechanical ventilation or death by day 28. Secondary outcome measures included hospital discharge, and improvement by two categories in clinical status relative to baseline (clinical improvement).

Subjects were 377 patients from six countries, including 249 in the treatment and 128 in the placebo group. Those who required ventilation or died by day 28 included 12% in the treatment group 19.3% in the placebo group ($p=0.04$). The median time to discharge was six days in the treatment group and 7.5 days in the placebo group. The

median time to clinical improvement was six days in the treatment group and seven days in the placebo group. Adverse events were noted in 50.8% of the treatment group and 52.8% of the placebo group.

Conclusion: This study of hospitalized adult COVID-19 pneumonia patients found that treatment with tovilizumab reduced the likelihood of progression to the composite outcome of mechanical ventilation or death.

Salama, C., et al. Tovilizumab in Patients Hospitalized with COVID-19 Pneumonia. **N Engl J Med.** 2021, January 7; 384 (1): 20–30.

MIGRAINE AND CARDIOVASCULAR RISK FACTORS

Migraine is the most common neurovascular disorder and one of the leading causes of disability. While considered a relatively benign condition, it is related to an increased risk of cerebrovascular disease. This study investigated the association between conventional vascular risk factors and subtypes of migraine.

Data were obtained from the Turkish Headache Dataset, conducted at tertiary headache centers. All had a diagnosis of migraine, with these characterized as migraine without aura (MwoA), migraine with aura (MwA) and chronic migraine (CM). Subjects were queried for vascular risk factors including hypertension, diabetes, coronary artery disease, tobacco abuse, alcohol abuse and hyperlipidemia. These risk factors were compared by age subgroups, and migraine subtypes.

Data were included from 2,712 patients with a mean age of 38.4 years. Of these 68.9% were diagnosed with MwoA, 9.1% with MwA, and 22.1% with CM. No difference was noted between groups for the presence of hyperlipidemia and cardiovascular events. Vascular risk factors occurred more frequently among those with CM compared to those with episodic MwoA or MwA. Among those under 30 years of age, those with CM were significantly more likely to have hypertension, diabetes mellitus, coronary artery disease, tobacco abuse, and frequent alcohol use as compared with the other two groups. In addition, first-degree relatives of those with CM were more likely to have several vascular risk factors than were those with MwoA and MwA.

Conclusion: This study of consecutive patients in the Turkish headache database found that vascular risk factors are more strongly associated with chronic migraine than with episodic migraine with aura or episodic migraine without aura.

Uzuner, G., et al. Migraine and Cardiovascular Risk Factors: A Clinic Based Study. **Clin Neurol Neurosurg.** 2021, January.106375.

ANTIDEPRESSANTS FOR BACK PAIN AND OSTEOARTHRITIS

Back pain and osteoarthritis (OA) are leading causes of disability worldwide. As antidepressants are endorsed by most clinical practice guidelines for the treatment of low back pain, this literature review was designed to further clarify the efficacy of antidepressants for the treatment of patients with back pain, or OA of the knee or hip.

A literature review was completed for randomized controlled trials that compared any antidepressant drugs with placebo for the treatment of patients with back pain or OA of the hip or knee. The primary outcome was pain and disability. Data for the analysis were taken from 33 trials, enrolling 5,318 subjects, with a median treatment duration of eight weeks.

Six antidepressant drug classes were evaluated, including serotonin-noradrenaline reuptake inhibitor (SNRIs), tricyclic antidepressants (TCAs), serotonin reuptake inhibitors (SSRIs), noradrenaline-dopamine reuptake inhibitors (NDRIs), serotonin antagonist and reuptake inhibitors (SARIs), and tetracyclic antidepressants. The risk of bias was assessed with the Cochrane Collaboration's tool and certainty of evidence with the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) framework.

The data analysis found that, with moderate certainty, SNRIs were effective for the treatment of back pain and OA pain at 3–13 weeks. Also, with moderate certainty, SNRIs reduced disability from back pain at 3 –13 weeks and disability due to OA at two weeks or less. The analysis found only low certainty of the efficacy of TCAs and other antidepressants for the treatment of OA or back pain.

Conclusion: This literature review and meta-analysis found that for low back pain and osteoarthritis of the hip and knee, serotonin-noradrenaline reuptake inhibitors could reduce pain and disability, with less certain evidence for the efficacy of other antidepressants.

Ferreira, G., et al. Efficacy and Safety of Antidepressants for the Treatment of Back Pain and Osteoarthritis: Systematic Review and Meta-analysis. **BMJ.** 2021; 372: M4825.

BODY MASS INDEX AND QUALITY OF LIFE RECOVERY AFTER KNEE REPLACEMENT

For end-stage osteoarthritis (OA), total knee arthroplasty (TKA) is an effective procedure for improving pain, activity level, and quality of life (QOL). However, approximately 10% of individuals show no improvement in health-related quality of life (hr-QOL) after TKA surgery. While previous studies have shown no relationship between body mass index (BMI) and QOL, this Japanese study assessed the relationship between BMI and hr-QOL among individuals recovering from a TKA.

This prospective study included 80 patients undergoing TKA, followed by a standardized rehabilitation program. Data collection included demographics, age, sex, and BMI, with BMI categories separated into those with a BMI of 29.9 or less, and those with a BMI of 30 or greater. The Japanese Knee Osteoarthritis Measure (JKOM) was used for assessing hr-QOL. The JKOM is comprised of four categories (pain and stiffness, condition in daily life, general activities, and health conditions) and 25 subcategories. The JKOM was assessed one day before and one month after surgery.

The mean BMI of all participants was 25.3 kg/m². The mean BMI of group one was 24.3 kg/m² and that of group two was 32.1 kg/m². A hierarchical multiple regression analysis found that BMI was not a significant predictor of hr-QOL. Females had a worse hr-QOL recovery than did males ($p<0.05$).

Conclusion: This Japanese study of patients undergoing total knee arthroplasty did not find an association between elevated BMI and subsequent health-related quality of life.

Tanaka, S., et al. Does Body Mass Index Influence Quality of Life Recovery in Individuals who Underwent Total Knee Arthroplasty: A Prospective Study. **J Orthop Trauma Rehabil.** 2020, December: 27(2):107-112.

ACUTE MIGRAINE TREATMENT WITH TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION

Across the globe, migraine is the seventh most common debilitating disease. The most effective treatment options for migraines have success rates under 50%. This study assessed the efficacy of transcutaneous electrical nerve stimulation (TENS) for the treatment of acute migraine.

This prospective double-blind randomized trial included 78 patients presenting at an emergency department with a chief complaint of migraine headache. The subjects were randomized to receive 20 minutes of either sham TENS (S-TENS) or active TENS (A-TENS). The TENS device was placed to deliver current over the supraorbital nerve. The subjects were asked to rate their pain using a visual analog scale (VAS), at baseline, 20, and 120 minutes.

Improvement in the VAS scores from baseline to 20 minutes was 51/100 for the A-TENS group and 1/100 for the S-TENS group ($p<0.001$). At 120 minutes improvement from baseline was 65/100 for the A-TENS group and 9/100 for the S-TENS group ($p<0.001$). At 120 minutes additional analgesic medications were requested by 76.9% of the S-TENS group and 2% of the A-TENS group.

Conclusion: This prospective, randomized trial of patients presenting to the emergency department with a migraine headache found that transcutaneous electrical stimulation over the supraorbital nerve could result in rapid pain reduction.

Hokenek, N., et al. Treatment of Migraine Attacks by Transcutaneous Electrical Nerve Stimulation in the Emergency Department: A Randomized Controlled Trial. **Am J Emerg Med** 2021, January;39:80-85.

BODY WEIGHT SUPPORTED EXERCISE AND OSTEOARTHRITIS OF THE KNEE

Osteoarthritis (OA) of the knee is a prevalent medical condition affecting many individuals over the age of 65 years. Though exercise is recognized as a critical component in the management of knee OA, many have reported that the discomfort of such exercise can inhibit participation. This study explored the efficacy of a treadmill designed to reduce the weight on the knee during gait exercises.

Subjects were 31 overweight patients with knee OA. All underwent a 12-week exercise regimen using a treadmill within a waist-high air chamber filled with positive air pressure (LBPP) designed to unload the lower extremities. The participants exercised twice per week for 30 minutes with the treadmill speed set at 3.1 mph. For each walking session, the legs were unloaded by the LBPP in 5% increments until the pain reached 0/10 on the visual analog scale (VAS). At baseline and at follow up data were recorded for the Knee Injury and Osteoarthritis Outcome Score (KOOS), the pain VAS and strength in the quadriceps and hamstring muscle groups.

Comparing baseline to completion of the 12-week exercise program, significant improvement was noted in KOOS subscales of Pain ($p<0.01$), Symptoms ($p<0.51$), ADLs ($p<0.01$), Sport/recreation ($p<0.05$), and QOL ($p<0.01$). At six months, six of the 19 patients reported no pain. Quadriceps strength demonstrated a similar pattern.

Conclusion: This study of patients with osteoarthritis of the knee found that using a body weight supporting treadmill, participants could improve strength and reduce pain over 12 weeks of exercise with these effects sustained at six months.

Peeler, J., et al. Effect of Body Weight Supported Exercise on Symptoms of Knee Osteoarthritis: A Follow-Up Investigation. **Clin J Sports Med.** 2020, December; 30 (6):e178-e185.

ISCHEMIC PRECONDITIONING AND EXTENSOR FATIGUE

Studies have shown that any loss of complexity in muscle torque output is indicative of neuromuscular system dysfunction. As ischemic preconditioning (IPC) has been found to have a potent effect on muscular output and endurance, this study assessed whether IPC could attenuate the fatigue-induced loss of muscle torque complexity.

Subjects were 10 healthy adults with an average age of 25.9 years. Subjects performed isometric knee extension contractions to task failure, preceded by either a sham treatment or IPC. In each trial, torque output was monitored continuously to allow for the quantification of complexity. Muscle activity was measured at the vastus lateralis using EMG. The muscle oxygen consumption (mVO_2) was measured using near infrared spectroscopy (NIRS). Maximal voluntary contractions (MVC) with supramaximal femoral nerve stimulation were used to quantify global, central, and peripheral fatigue. In the IPC condition the blood pressure cuff was inflated to 225 mmHg for three periods of five minutes, separated by five-minute periods of rest. In the sham condition the cuff was inflated to only 20 mmHg. After each IPC session, the subject rested for 20 minutes and then performed an MVC accompanied by femoral nerve stimulation immediately before commencing the fatigue test.

The time to task failure was increased by 40% in the IPC group ($p=0.47$). The rate of decrease in MVC torque was significantly attenuated in the IPC condition. Complexity decreased in both groups though the rate of decrease was significantly lower after IPC.

Conclusion: This study found that ischemic preconditioning delayed task failure and slowed the fatigue—induced loss of muscle torque complexity.

Pethick, J., et al. Ischemic Preconditioning Blunts Loss of Knee Extensor Torque Complexity with Fatigue. **Medicine Sci Sports Exer**. 2021; 53(2): 306–315.

PLATELET RICH PLASMA FOR ROTATOR CUFF REPAIR

After surgical intervention for rotator cuff tears, incomplete tendon healing has been demonstrated in 20-95% of the cases. To address this a number of interventions have been trialed including the use of platelet rich plasma (PRP), which can be divided into four subtypes. These include leukocyte-poor (LP) pure PRP, leukocyte rich (LR) pure PRP, LP platelet-rich fibrin matrix (PRFM), and LR-PRFM. This literature review and meta-analysis compared the efficacy of these subtypes as an adjunct for rotator cuff surgery.

Authors reviewed 841 studies and chose 13 randomized controlled trials. Overall, those treated with LP-PRP had a significantly reduced rate of retear and/or incomplete tendon healing rate compared with controls (Odds Ratio (OR) 0.42). This was also true for those with medium-large tears (OR 0.17). Also, those in the LP -PRP had the best scores on the VAS pain scales as well as on the Constant shoulder scores.

Conclusion: This study of patients undergoing surgical repair of rotator cuff tear found that the addition of leukocyte poor–platelet rich plasma resulted in a significant reduction in pain improvement in patients' outcomes and a reduction in the rate of incomplete tendon healing and/or retear.

Hurley, E., et al. The Effect of Platelet–Rich Plasma Leukocyte Concentration on Arthroscopic Rotator Cuff Repair. A Network Meta -analysis of Randomized Controlled Trials. **Am J Sports Med.** 2020; DOI: 10.1177/0363546520975435.

PLATELET RICH PLASMA VERSUS HYALURONIC ACID FOR OSTEOARTHRITIS

Osteoarthritis (OA) is a leading cause of chronic disability worldwide. Among treatment options, hyaluronic acid, and platelet-rich plasma (PRP) have been used as alternatives to corticosteroid injections. This systematic review compared the efficacies of these two medications as intra-articular interventions for the treatment of OA of the knee.

A literature review was completed for studies of participants with OA of the knee receiving injections either PRP or HA. The researchers chose 18 studies for the meta-analysis, including a total of 1608 patients. For the PRP, peripheral venous blood was taken, with the PRP separated and then activated by adding calcium chloride through low-level ultraviolet irradiation. For those receiving HA, high molecular weight preparations were used in 13 studies and low molecular weight preparations were used in three studies, with three studies not reporting the molecular weight.

In the pooled analysis, at 12 months, the PRP group had significantly better Western Ontario and McMaster Universities Arthritis Index (WOMAC) scores than did the HA group ($p<0.001$). At 12 months, patients in the PRP group demonstrated significantly better pain scores than did those in the HA group. ($p<0.01$).

Conclusion: This study of patients with osteoarthritis of the knee found that patients treated with platelet-rich plasma had better pain and functional outcomes than did those treated with hyaluronic acid.

Belk, J., et al. Platelet–Rich Plasma versus Hyaluronic Acid for Knee Osteoarthritis. A Systematic Review and Meta-Analysis Randomized Controlled Trials. Clinical Sports Medicine Update. **Am J Sports Med.** 2021, January; 49(1): 249–260.

RETURN TO NFL PLAY AFTER BICEPS TENDON RUPTURE

Players in the national football League (NFL) are routinely exposed to high physical demands, predisposing them to higher injury rates than reported for other sports. This study reported on player performance before and after bicep tendon rupture and surgical repair.

This case series included NFL players who underwent surgical repair of a distal bicep tendon rupture between 1998 and 2017. During this time 25 ruptures were identified in 22 players. All had played in at least one NFL season before the index injury. For a control group, players were matched to similar NFL players without biceps rupture.

Of those injured, defensive linemen accounted for 44% of the injuries followed by offensive linemen with 24%. Defensive players accounted for 76% of the injuries. Of the 25 ruptures, 21 (84%) were able to return to play in the NFL at a mean of 321 days. Players in the control group had a significantly longer career after the index date than did those in the surgical repair group ($p= 0.049$). Also, players in the control group played in more games per season post index data than those who underwent surgical treatment ($p=0.02$).

Conclusion: This study of NFL players who underwent surgical repair of a distal bicep tendon rupture found that 84% were able to return to play in the NFL, though their post-injury careers were shortened, with fewer games played per season compared with matched controls.

Pagani, N., et al. Return to Play and Performance after Surgical Repair of Distal Biceps Tendon Ruptures in National Football League Athletes. **J Shoulder Elbow Surg.** 2021, Feb; 30(2):346–351.

RESISTANCE TRAINING DURING CHEMOTHERAPY WITH DOXORUBICIN

While previous research shows that resistance training (RT) before doxorubicin (DOX) treatment can decrease the decline in muscle dysfunction, the effect of RT during DOX treatment is not as well-studied. This animal study investigated the effects of RT before and during a four -week course of DOX.

Thirty-six adult male Sprague-Dawley rats were randomly assigned to sedentary+saline (SED+SAL), SED+DOX, RT+SAL, or RT+DOX cohorts. The study was conducted over 14 weeks including a ten-week training phase and a four-week treatment phase. At the end of the training phase, the animals received four weeks of either a placebo or DOX (3mg/kg-1). Grip strength was recorded at 0, 10, 12, and 14 weeks. Ex vivo muscle function assessed creatine kinase and creatine transporters from excised soleus (SOL) and extensor digitorum longus (EDL) from the right hind limb five days after the last injection.

At week 10, the animals in the RT + SAL group were significantly heavier than the SED + SAL (432 +/- 12 g) and SED + DOX (435 +/- 13 g) groups ($p<0.05$). The RT + DOX were notably heavier than SED + DOX ($p=0.06$). Also, EDL weight was greater in the SED+ SAL than in the SED+DOX ($p<0.05$) demonstrating an effect of the medication. The mass of the SOL was not affected by either RT or DOX. At week 14 the EDL mass was significantly lower ($p< 0.05$) in the SED + DOX group compared with the SED + SAL, RT + SAL, and RT + DOX treated animals. At 14 weeks, there were no differences in grip strength between the SED+SOL, the RT+SOL, and the RT+DOX groups, indicating resistance training during DOX treatment-maintained muscle strength.

Conclusion: This animal study found that resistance training increased body mass and muscle strength before treatment and minimized the degree of DOX-induced muscle dysfunction and fatigue.

Bredahl, E.C., et al. Resistance Training during Chemotherapy with Doxorubicin. **Med Sci Sports Exerc.** 2020, December;52(12):2529-2537. doi:10.1249/MSS.0000000000002409.

ENDOVASCULAR VERSUS ALTEPLASE PLUS ENDOVASCULAR TREATMENT FOR ISCHEMIC STROKE

Previous studies have demonstrated that patients with large vessel occlusion (LVO) in the anterior circulation benefit from endovascular treatment (EVT) following intravenous thrombolysis (IVT). The DIRECT-MT trial showed that EVT alone was non-

inferior to EVT after IVT. This study, the Direct Endovascular Thrombectomy vs Combined IVT and Endovascular Thrombectomy for Patients with Acute Large Vessel Occlusion in the Anterior Circulation (DEVT), tested the hypothesis that EVT alone was non-inferior to a combination of IVT and EVT in patients treated within 4.5 hours of onset.

This Chinese, multicenter, randomized open-label clinical trial included adults with acute ischemic stroke, eligible for IV alteplase, presenting within 4.5 hours of symptom onset. Eligible subjects had an occlusion of the intracranial internal carotid artery or first segment of the middle cerebral artery. Patients were randomized to either EVT alone or combined with IVT (0.9 mg/ kilogram of body weight). The primary outcome was the proportion of patients achieving functional independence (modified Rankin Scale score of 0–2) at 90 days.

Data were analyzed for 234 participants. Functional independence was achieved by 54.3% in the EVT group and 46.6% in the EVT plus IVT (p=0.003 for noninferiority). In the secondary analysis, the median 90-day mRS score for the EVT group was two, and for the EVT+IVT was three. Death at 90 days occurred in 17.2% in the EVT group and 17.8% in the EVT+IVT group.

Conclusion: This Chinese study of patients with acute ischemic stroke due to proximal anterior circulation occlusion, treated within 4.5 hours of symptom onset, found that endovascular treatment alone was non-inferior to a combination of intravenous alteplase plus endovascular treatment.

Zi, W., et al. Effect of Endovascular Treatment Alone Versus Intravenous Alteplase plus Endovascular Treatment on Functional Independence in Patients with Acute Ischemic Stroke. The DEVT Randomization Clinical Trial. **JAMA.** 2021, Jan 19;325 (3): 234–243.

TRANSCRANIAL DIRECT CURRENT STIMULATION FOR ARM WEAKNESS IN ACUTE STROKE

Structural plasticity processes are maximally active around one week after stroke, then reach a plateau by 3–4 weeks. Transcranial direct current stimulation (tDCS) has been found to be a useful tool for modulating cortical excitability. This study explored the effects of tDCS on upper limb motor recovery in patients with acute stroke with severe motor impairment.

Subjects were recruited from consecutive patients admitted to one of two stroke units in Italy. The subjects were adults with ischemic hemispheric stroke with moderate to severe upper limb motor impairment, as a score of three or higher on the National Institutes of Health Stroke Scale (NIHSS). Subjects were allocated to a sham or an actual tDCS group. The tDCS was applied bilaterally with the anode over the affected primary motor cortex and the cathode over the contralateral motor cortex. The current was set at 2 mA for 15 minutes twice per day. The primary outcome was upper limb motor performance as measured by hand grip strength (HGS) and the Motricity Index-upper limb (MI-UL) score. Secondary outcomes including stroke severity, and functionally independence. An Improvement Index (II) was computed for each test as the difference between baseline and post-treatment scores (Δ post-treatment/baseline).

Both groups made significant improvements from baseline to follow -up. The II for the MI-UL scores was greater for the treatment group than for the sham group (p=0.014). This difference between groups was no longer present at six months. No significant differences were noted for the other tests.

Conclusion: This study of patients with acute ischemic stroke suggests that tDCS may accelerate the rate of motor recovery of the arm during the acute phase of recovery.

Bolognini, N., et al. Bi–Hemispheric Transcranial Direct Current Stimulation for Upper–Limb Hemiparesis in Acute Stroke: Randomized, Double-Blind, Sham Controlled Trial. **Europ J Neurol.** 2020, December; 27 (12):2473–2482.

COGNITIVE COMPLAINT AND OBJECTIVE COGNITION AFTER MILD TRAUMATIC BRAIN INJURY

After a mild traumatic brain injury (mTBI), the principal tools for quantifying the severity of the post-concussion syndrome (PCS) are generic PCS symptom checklists, such as the widely used Rivermead Post Concussion Symptoms Questionnaire (RPQ). The physical and affective complaint items on these measures have substantial item heterogeneity and consequently poor construct validity as measures of cognitive complaints. This study explored whether a measure of cognitive complaints would have a stronger association with measures of objective cognitive performance than widely used PCS questionnaires.

Subjects included 52 individuals with mTBI and 57 healthy controls (HC). Tests of subjective cognitive complaints included the Cognitive Complaint After Mild Closed Head Injury (CCAMCHI) and the RPQ. Objective cognitive ability was measured using the Wechsler Test of Adult Reading (WTAR), the Symbol Digit Modality Test (SDMT), the Rey Auditory Verbal Learning Test (RAVLT), the Controlled Oral Word Association Test (COWAT), and the Trail Making Test. A single variable of psychological distress was estimated by summing the performances on the Inventory of Depressive Symptomatology (IDS) and the Beck Anxiety Inventory (BAI).

In the mTBI group, after controlling for psychological status, neither the CCAMCHI nor the RPQ correlated with any measure of objective cognitive performance. In the HC group, a cognitive complaint was significantly associated with objective cognitive performance and was not associated with psychological status. In contrast, in the HC group, PCS endorsement was unrelated to objective cognition but was associated with psychological status.

Conclusion: This study of patients with a mild traumatic brain injury, found that neither post-concussion syndrome symptom endorsement nor cognitive symptom endorsement were reliably associated with objective cognitive performance.

Anderson, J., et al. Cognitive Complaint and Objective Cognition During the Post-Acute Period after Mild Traumatic Brain Injury in Premorbidly Healthy Adults. **Brain Injury.** 2021. DOI: 10.1080/02699052.2020.1859613.

COMPLICATIONS AFTER CARPAL TUNNEL DECOMPRESSION

Carpal tunnel syndrome (CTS) is the most common peripheral nerve entrapment. While the initial management for CTS is nonsurgical, many patients require surgery to decompress the carpal tunnel and preserve hand function. This study evaluated the complications resulting from surgical intervention for CTS.

Data were obtained from a nationwide cohort of adults

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undergoing carpal tunnel decompression surgery in England from April 1998 until March 2017. Complications within 30 and 90 days were recorded.

During the study period, 665,090 individuals underwent surgical decompression for CTS, of whom 68% were female, with a median age of 57.1 years. The median follow-up was 7.5 years. The rates of serious post-surgical complications were low, with local serious complications occurring in 0.7% within 30 days and 0.82% within 90 days. Of the serious complications, wound dehiscence and tendon injury were the most common. A repeat surgery occurred in 3.18/1000 person-years at a median of 351 days. Male sex was associated with an increased incidence of serious local complications within 90 days.

Conclusion: This large observational study of English patients found that the risk of serious complications after carpal tunnel decompression surgery is quite low.

Lane, J., et al. Serious Postoperative Complications and Reoperation after Carpal Tunnel Decompression Surgery in England: A Nationwide Cohort Analysis. **Lancet Rheumat.** 2021, January;3:e49-e57.

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ISSN # 1081-1303

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