REHAB IN REVIEW

TM

WWW.REHABINREVIEW.COM

Volume 28 Number 5 Published by Physicians In Physical Medicine and Rehabilitation May 5, 2020

DANCE INTERVENTION FOR FRAILTY AMONG OLDER ADULTS

Frailty is an emerging geriatric syndrome characterized by decreased multidimensional biological reserves due to an age associated decline in multiple physiological symptoms with impaired homeostatic reserve. This phenomenon results in an increased risk when facing minor stressors. As exercise can reverse frailty, this study investigated the effect of dancing as an intervention for frailty.

Subjects were nursing home residents 60 years of age or older, with less than three hours per week of physical exercise, able to walk, and without significant neurologic impairment. Patients were assigned to a dance group, or a control group based on the floor of their nursing home residence. Patients in the dance group participated in 40-minute Chinese Square dance sessions, three times per week for 12 weeks. Assessments of frailty, using the Fried Criteria, were made at baseline, six and 12 weeks by researchers held blind to the group assignment.

Data were completed for 66 eligible individuals, with a mean age of 81.8 years. For the frailty criteria, predominant slowness (77 %) and weakness (71 %), followed by low physical activity (61 %), exhaustion (33 %) and weight loss (15 %) were most prevalent. At 12 weeks the mean frailty scores improved in the dance group compared to the control group ($p<0.001$). Compared to the control group, the prevalence of frailty decreased over time in the dance group ($p=0.002$), as did the prevalence of slowness ($p = 0.002$) weakness ($p = 0.005$), and low physical activity ($p=0.0001$).

Conclusion: This study of elderly nursing home residents found that 12 weeks of dance intervention could improve frailty measures including slowness, weakness, and low physical activity.

Meng, X., et al. Effects of Dance Intervention on Frailty Among Older Adults. **Arch Gerontol Geriatr.** 2020:88. https://doi.org/10.1016/j.archger.2019.104001.

METABOLIC LESION DEFICIT MAPPING OF HUMAN COGNITION

Metabolic lesions are areas of chronic cerebral hypometabolism identifiable by interictal F-fluorodeoxyglusoe PET (F-FDG PET). This study was designed to quantify the relationship between focal cortical metabolism and neuropsychological test scores.

Subjects were 189 patients undergoing clinical evaluation for epilepsy surgery and a cohort of patients with no evidence of structural pathology on high-resolution 3T MRI, for whom both F-FDG PET imaging and neuropsychological data were available. The presurgical patients underwent neuropsychological evaluations, with commonly used measures used to quantify four broad psychological areas. These included intelligence, memory, fluency and affect. The F-FDG PET images served to identify metabolic lesions on a continuous scale by degree of metabolism. Multivariate analyses quantified the prediction of neuropsychological scores from F-FDG PET imaging.

Areas of metabolic activity were significantly related to specific neuropsychological test results. Specific areas were identified for design learning ($p<0.001$-$p=0.002$), recognition memory for words ($p=0.009$-$p=0.004$), recognition memory for faces ($p<0.001$), vocabulary ($p<0.001$-$p=0.008$), similarities ($p<0.001$-$p=0.019$), arithmetic ($p=0.007$), digit span ($p<0.001$-$p=0.002$), matrix reasoning ($p<0.001$), verbal IQ ($p<0.001$-$p=0.008$), performance IQ ($p<0.001$-$p=0.005$), depression ($p<0.001$-$p=0.023$), semantic fluency ($p<0.001$-$p=0.003$), and phonemic fluency ($p<0.001$ - $p=0.006$).

Conclusion: This study demonstrates that a metabolic lesion deficit map technique can be used to predict cognitive and affective function.

Jha, A., et al. Metabolic Lesion-Deficit Mapping of Human Cognition. **Brain.** 2020, March; 143: 877-890.

NEUROPATHIC PAIN AND HIV

Studies have estimated that approximately 54% to 83% of people with HIV experience pain. Pharmacological treatments for HIV-related neuropathic pain have demonstrated limited efficacy. This study was designed to better understand the experience and impact of neuropathic pain in people living with HIV.

Subjects were 18 years of age or older, each living with HIV and positive for chronic peripheral sensory neuropathy. Each was queried for age, gender, ethnicity, employment, living status, HIV duration, pain duration, history of having received antiretroviral therapy, CD4 count, viral load, pain medications and current alcohol and illicit drug use. The subjects were then administered the Clinical HIV-Associated Neuropathy Test (CHANT). In a subsequent interview, all were asked about the impact of pain on their lives.

Of the 26 participants, 25 had a positive screen result on the CHANT, indicative of peripheral neuropathy. The average pain intensity was 6.21 on a 10-point scale. The responses in the interviews clustered into four themes. First, patients perceived their neuropathic pain to be complex, unusual and to have an unclear diagnostic etiology. Second, they perceived that pain disrupted their relationships and further threatened their social inclusion. Next, all had pursued a continuous search for an effective treatment for their pain. Finally, they indicated that pain management was complicated by issues inherent to living with HIV.

Conclusion: This qualitative study of patients with HIV found that the patients perceived their

neuropathic pain as unusual, without diagnostic clarity and without a clear treatment, all of which was complicated by living with HIV.

Scott, W., et al. A Qualitative Study of the Experience and Impact of Neuropathic Pain in People Living with HIV. **Pain.** 2020, May; 161(5): 970-978.

TRANSCRANIAL MAGNETIC STIMULATION FOR CENTRAL NEUROPATHIC PAIN

High-frequency repetitive transcranial magnetic stimulation (hrTMS) is a noninvasive brain stimulation technique found to be effective in treating a number of pain conditions. This study assessed the effect of hrTMS in reducing chronic, central, neuropathic pain (CNP).

Subjects were 42 adult patients with CNP, refractory to drug therapies. Those participants were randomly assigned to an active or sham phase of hrTMS. Each phase included four sessions of hrTMS or sham TMS, separated by three weeks. Each hrTMS session consisted of 20 trains of 80 pulses delivered at 20 Hz at 80% of the motor threshold. The primary outcome measure was the percentage of pain relief from baseline. Secondary outcome measures included the percentage of pain reduction between each session and the change in pain intensity, as assessed by a visual analog scale and the Neuropathic Pain Symptom Inventory (NPSI). The EuroQol5 was used to evaluate quality of life.

At four weeks, as compared with baseline scores, the percentage of pain relief was significantly greater in the hrTMS (33.8%) group than in the sham (13 %) group ($p<0.001$). Pain reduction of at least 50% was noted in 36% of the hrTMS group and 12% of the sham group. NPSI scores improved significantly in the hrTMS group between baseline and week three ($p=0.036$), week four ($p=0.016$) and three weeks after the last hrTMS session ($p=0.004$).

Conclusion: This study of patients with chronic central neuropathic pain found that four, consecutive hrTMS sessions over the course of two months resulted in significant pain relief.

Quesada, C., et al. New Procedure of High-Frequency Repetitive Transcranial Magnetic Stimulation for Central Neuropathic Pain: A Placebo-Controlled, Randomized, Crossover Study. **Pain**. 2020, April; 161(4): 718 -728.

ANODAL TRANSCRANIAL DIRECT CURRENT STIMULATION AND HAND FUNCTION

As the excitability of M1 changes with age, this study evaluated the effect of daily sessions of transcranial direct current stimulation (tDCS) on the manual dexterity of healthy, elderly adults.

This randomized, double-blind, sham controlled, clinical trial included 32, right-handed, healthy subjects ranging in age from 60 to 91 years. The tDCS was delivered with the anode placed over the left M1 and the cathode over the right supraorbital region. In the active condition, 1 mA was delivered for 20 minutes. In the sham group, the same configuration was used, with the tDCS device turned off after 30 seconds. Both groups were treated for five consecutive days, separated by a 24-hour interval. Hand function was assessed with the Purdue Pegboard Test (PPT), first with the right hand (PPT-R), and then with the left hand (PPT-L) and then with both hands (PPT-B). Outcomes were measured before stimulation, on the fifth day immediately after the tDCS session (T1), 30 minutes after the tDCS session (T2) and one week following the fifth session (T-W).

Compared to baseline, all scores in the PPT had significantly increased at T1, T2 and T3 in the a-tDCS group ($p<0.05$), except for PPTL at T1 ($p=0.38$). Compared to sham, significant improvement was noted with active tDCS for PPT ($p<0.05$) at all post-test values except for PPTL at T1.

Conclusion: This study of healthy, elderly patients found that transcranial direct current stimulation may be useful for improving fine motor movement of the hand.

Rostami, M., et al. The Effects of Consecutive Sessions of Anodal Transcranial Direct Current Stimulation over the Primary Motor Cortex on Hand Function in Healthy, Older Adults. **Arch Gerontol Geriatr.** 2020, July-August; doi.org/10.1016/j.archger.2020.104063.

TRANSCRANIAL DIRECT CURRENT STIMULATION FOR DEPRESSION AND INSOMNIA

Insomnia is considered a common symptom of depression. Previous

studies have demonstrated a potential benefit of transcranial direct current stimulation (tDCS) for the treatment of depression. This study explored the effects of tDCS and sleep quality and depression among patients with major depressive disorders who complained of insomnia.

Subjects included 90 patients with depression and insomnia, 18-65 years of age. The subjects were randomized to receive a sham tDCS or active tDCS on 20 consecutive weekday sessions, for 30 minutes each followed by four weekly treatments. The sham group underwent the same procedure with the current turned off after a 30 second stimulation. The clinical assessment was completed at baseline and at day 28, using the Pittsburgh Sleep Quality Inventory (PSQI), Self-rating Depression Scale (SDS), and the Self-rating Anxiety Scale (SAS). Sleep quality was assessed with the Pittsburgh Sleep Quality Inventory (PSQI). All subjects completed a polysomnography evaluation (PSG).

At day 28, better scores were noted in the treatment group than in the sham group for SDS ($p<0.05$) and SAS ($p<0.05$) scores. The PSQI improved with treatment ($p=0.041$), with significant effects noted for subscores of sleep duration ($p=0.028$), and sleep efficacy ($p=0.01$).

Conclusion: This study of patients with major depression and insomnia found that transcranial direct current stimulation could improve depression and anxiety as well as improve sleep duration and efficacy.

Zhou, Q., et al. The Effects of Repeated Transcranial Direct Current Stimulation on Sleep Quality and Depression Symptoms in Patients with Major Depression and Insomnia. **Sleep Med.** 2020, June; 70: 17–26.

OXYGEN COSTS OF HEMIPARESIS VERSUS CEREBRAL ATAXIA

Walking efficiency can be quantified by measuring the oxygen cost of walking, expressed in mL kg^{-1}. This study compared the oxygen cost of walking (Cw) between patients with cerebellar and hemispheric stroke.

All recruited subjects had a diagnosis of either an MRI confirmed single stroke in the cerebellum or a single stroke in the cerebral hemisphere. Motor function was assessed with the Demeurisse Motricity Index (DMI), spasticity with the modified Ashworth Scale (mAS), walking autonomy with the Functional Ambulation Classification (FAC) and ataxia while standing with the postural and walking sections of the International Cooperative Ataxia Rating Scale (ICARS). Walking speed was assessed using a six-minute walk test. Oxygen consumption while walking was measured by a portable indirect calorimetry.

When the subject was ambulating faster than 0.4 ms $^{-1}$, the mean Cw was found to be 30.6%-39.9% higher in patients with cerebellar stroke than in those with hemispheric stroke. Factors significantly related to Cw included, in the cerebellar group, ataxia ($p<0.001$), and, in the hemispheric group, motor impairment ($p<0.01$), spasticity ($p<0.01$) and ataxia ($p<0.01$).

Conclusion: This study found that patients with cerebellar strokes expend significantly more energy while walking than do those with hemispheric strokes.

Compagnat, M., et al. Oxygen Cost During Walking in Individuals with Stroke: Hemiparesis versus Cerebellar Ataxia. **Neurorehab Neural Repair.** 2020, April; 34(4): 289-298.

SHOCKWAVE THERAPY FOR SPASTICITY OF THE ARM

Recent studies have suggested that radial extracorporeal shock wave therapy (rESWT) is an effective treatment for spasticity. This trial investigated the effects of rESWT on agonist and antagonist muscle groups in patients with spasticity due to stroke.

All subjects had a history of cerebral infarction or hemorrhage, resulting in left limb hemiplegia and elbow flexor spasticity. Each was assessed for spasticity with the Modified Ashworth Scale (MAS) and the modified Tardieu scale (MTS), for pain with a Visual Analog Scale (VAS) and for motor function with the Fugl-Meyer Assessment (FMA). Evaluations were performed at baseline, 24 hours after the final treatment and at four-week follow-up. Those randomized to the experimental group were given five, consecutive treatments at four-day intervals, with ultrasound at 6,000 impulses at 0.06-0.07 mJ/mm^2 at 18 Hz, applied to either the agonist (group B) or antagonist (group C) muscles. Changes in the MAS were scored as complete response (reduced to zero), partial response (improved by one) or no response.

In group B, 7.4% of the participants achieved a complete response, 63% achieved a partial response and 29.6% had no response, with the effective rate of the group at 70.4%. In group C, 3.3% of patients achieved a complete response, 60% achieved a partial response and 36.7% had no response, with an effective rate of 63.3%. At four weeks after the final session, the significant difference between groups remained ($p<0.01$). Better improvements in pain scores ($p<0.01$) were noted in the treatment group as compared to the controls, with no significant difference in FMA scores.

Conclusion: This study of patients with spasticity due to stroke found that radial extracorporeal shockwave therapy reduced spasticity, with lasting effects in both agonist and antagonist muscles after four weeks.

Li, G., et al. Effects of Radial Extracorporeal Shockwave Therapy on Spasticity of Upper Limb Agonist/ Antagonist Muscles in Patients Affected by Stroke: A Randomized, Single-Blind, Clinical Trial. **Age Ageing**. 2020, March; 49(2): 246-252.

POSTCONCUSSION SLEEP DURATION AND RECOVERY IN COLLEGIATE ATHLETES

Recent studies have suggested that as many as 70% of contact athletes report sleep disturbances. This study compared symptom recovery and concussion assessment performance between those who experience post-concussive changes in sleep patterns and those who do not.

Subjects were 151 collegiate athletes from 16 testing sites, each diagnosed with a concussion. All completed the Sport Concussion Assessment Tool Version 3 (SCAT3). Those participants were assigned to sleep categories by subtracting the preinjury (PI) sleep duration from the post-injury sleep duration, to determine sleep change. The number of days from injury until symptom relief was compared between sleep categories (longer, shorter or no change). Concussion assessments included the Standardized Assessment of Concussion (SAC), the Balance Error

Scoring System (BESS) and the Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT).

Of the 151 participants, 23.2% reported shorter sleep, 23.2% reported no sleep change and 53.6% reported longer sleep after their concussion. At up to 48 hours post-injury, higher symptom severity was reported among those with shortened sleep duration, as compared to those with no change (p=0.007), and as compared to those with longer sleep duration (p=0.004). A similar pattern was found at four days post-injury. Worse performance was noted in the short sleep group for up to 48 hours on the ImPACT neurocognitive domains of processing speed and reaction time. These differences were no longer detected at the time of return to play. The groups did not differ in number of days until asymptomatic.

Conclusion: This study of concussed collegiate athletes found that, post-injury, those with a shorter sleep duration reported higher symptom severity and demonstrated more impaired reaction time and slower processing speed, as compared to those with other sleep patterns.

Hoffman, N., et al. Influence of Post-Concussion Sleep Duration on Concussion Recovery in Collegiate Athletes. **Clin J Sports Med**. 2020, March; 30 Supplement 1: S29–S35.

RECOVERY FOLLOWING SPORTS RELATED MILD TRAUMATIC BRAIN INJURY

The most recent Concussion in Support Group (CISG) meeting recommended rest for a period of 24 to 48 hours following concussion. This prospective cohort study followed the outcomes of 600 patients over a period of two years in an effort to quantify the length of clinical recovery and factors associated with slower recovery following traumatic brain injury.

Subjects were patients presenting between January of 2017 and December of 2018 with a possible sports related mild traumatic brain injury (SR-mTBI). All were seen within 14 days of injury. During the initial evaluation, an age appropriate SCAT5 assessment was performed, accompanied by a physical examination which included cranial nerve assessment and targeted peripheral neurologic assessments for reflexes and motor and sensory function. A vestibular ocular motor screening and a cervical spine assessment were also performed. The participants were provided a period of 24 to 48 hours of rest, followed by controlled cognitive and physical loading guided by symptom exacerbation.

Data were complete for subjects with ages ranging from seven to 64 years. Only 45% of the participants recovered within two weeks of injury. At four weeks, this number increased to 77%, and by eight weeks to 94%. No significant associations were noted among the length of recovery and the number of previous concussions or age group. The average number of days until clinical recovery was 43% longer in females.

Conclusion: This prospective study found that fewer than half of all patients presenting acutely with a sports-related mild traumatic brain injury demonstrated clinical recovery within 14 days.

Kara, S., et al. Less than Half of Patients Recover within 2 Weeks of Injury after a Sports Related Mild Traumatic Brain Injury: A Two-Year Prospective Study. **Clin J Sports Med.** 2020, March; 30(2): 96-101.

DIAGNOSTIC DELAYS AND DISABILITY IN DEGENERATIVE CERVICAL MYELOPATHY

Degenerative cervical myelopathy (DCM) is a progressive disease of cervical spinal cord compression resulting from degeneration of discs, ossification of ligaments and spondylosis. Patients with this disorder may be at risk for a delayed diagnosis. This large, cross-sectional cohort study examined the incidence of delayed diagnosis, and sought to determine whether groups of the population are at risk for such delays.

Patients with DCM were recruited to complete an online questionnaire. Questions focused on demographics, disease and treatment characteristics, including age, gender, country of residence, ethnicity, household income, educational status and time between onset of symptoms and diagnosis. Current disability was assessed based on employment status, dependence on the support of others for activities of daily living, and the modified Japanese Orthopedic Association (JOA) Score.

Subjects were 778 adults with a mean age of 54 years. Of these, 40.7% had undergone surgery to treat DCM. Severe disability was reported by 37.3%, with 35.7% unable to work due to the disability, and 41.9% reporting being dependent on the support of others for activities of daily living. A number of patients reported significant delays in their treatment, with 55.4% claiming more than a year before diagnosis, with more than 20% having waited for more than five years. A greater time to diagnosis was associated with worse JOA scores, reduced employment, and an increased likelihood of dependence on others. A multivariate analysis showed that black patients were more likely to face a delay in diagnosis than were white or Asian patients (p=0.017).

Conclusion: This study of patients with degenerative cervical myelopathy found that many report a delay in diagnosis, with delayed diagnosis associated with a worse outcome.

Pope, D., et al. Diagnostic Delays Lead to Greater Disability in Degenerative Cervical Myelopathy and Represent a Health Inequality. **Spine.** 2020, Mar 15;45 (6): 368-377.

SURGERY VERSUS PHYSICAL THERAPY FOR PERSISTENT SCIATICA

Sciatica, caused by acute herniation of the lumbar disc, is expected to improve with conservative care within four months in 90% of the cases. This study was designed to determine whether lumbar discectomy is superior to standardized nonsurgical care in patients with sciatica lasting for 12 months.

Subjects were 18 to 60 years of age, with a history of unilateral radiculopathy symptoms of four to 12 months duration. All had MRI findings of posterolateral disc herniation from L4 to S1, resulting in compression of the corresponding nerve root. The subjects were randomized to undergo either surgery within three weeks or standardized nonsurgical care while remaining on the surgical wait list. Nonsurgical care included oral analgesics and the use of active physiotherapy provided by a physiotherapist not associated with the trial. The primary outcome was the leg-pain intensity score on the visual analogue scale (VAS), assessed for up to one year after treatment. Secondary outcomes, analyzed at six months and 12 months, were a combination of intensity and frequency of leg pain and back pain on the VAS; scores on

the Oswestry Disability Index, and the Physical Component Summary (PCS) and Mental Component Summary (MCS) of the 36-Item Short-Form General Health Survey (SF-36).

Subjects were 128 patients. At six months' follow-up, VAS pain intensities were 2.8/10 in the surgery group and 5.2/10 in the nonsurgical group ($p<0.01$). Secondary outcomes generally occurred in the same direction as the primary outcome. At one-year, VAS leg pain intensities were 2.6 in the surgery group and 4.7 the nonsurgical group. At 12 months, the Oswestry Disability Scores were 22.9 in the surgery group and 34.7 in the nonsurgical group.

Conclusion: This study of patients with sciatica secondary to lumbar disc compression found that surgery resulted in better leg pain relief at six months than did physical therapy.

Bailey, C., et al. Surgery versus Conservative Care for Persistent Sciatica Lasting four to 12 Months. **N Engl J Med.** 2020, March 19: 382 (12): 1093-1102.

SPRIFERMIN AND OSTEOARTHRITIS

Osteoarthritis (OA) is characterized by the loss of articular cartilage. The phase II FGF-18 Osteoarthritis Randomized Trial with Administration of Repeated Doses (FORWARD) study demonstrated a statistically significant, dose-dependent modification of cartilage thickness change by intra-articular injection of sprifermin. This *post hoc* exploratory analysis evaluated whether sprifermin reduces cartilage loss, independent of location, in a given knee.

This multicenter, randomized, double-blind, placebo-controlled, phase II study included patients 40 to 85 years of age, all with symptomatic radiographic knee OA (Kellgren-Lawrence grade of two to three). The subjects were randomized to one of five groups to receive three, weekly intra-articular injections of 30 µg sprifermin every six months (30q6), every 12 months (30q12), 100 µg every six months (100q6), 100 µg every 12 months (100q12) or placebo (P). The primary outcome variable was the change in the total femorotibial joint (TFTJ) cartilage thickness from baseline to two-year follow up. The MRI assessed 16 regions, with the ratio calculated of thickening to thinning for each region in each patient.

Compared to the placebo group, the 100q6 group had significantly lower thinning scores, noted to be similar to those of healthy subjects. Thickening scores were significantly greater for the 100q6, 100q12 and 30q6 groups, as compared with the placebo group. Compared to healthy subjects, the thickening scores more than doubled. The thickening: thinning score ratio was 1.06 in healthy reference subjects, indicating no net loss or gain of cartilage. For the 100q6 and 100q12 groups, these values were 1.98 and 1.48, respectively, indicating cartilage thickness gain, while that for the placebo group was 0.56, indicating cartilage thickness loss.

Conclusion: This study of patients with osteoarthritis of the knee found that recombinant human fibroblast growth factor XVIII, sprifermin, increased cartilage thickness and reduced cartilage loss.

Eckstein, F., et al. Intra-Articular Sprifermin Reduces Cartilage Loss in Addition to Increasing Cartilage Gain Independent of Location in the Femorotibial Joint: Post-Hoc Analysis of a Randomized, Placebo Controlled, Phase II, Clinical Trial. **Ann Rheum Dis.** 2020, April; 79(4): 525-528.

.

PARTIAL LATERAL MENISCECTOMY AND KNEE STABILITY

Previous animal and cadaveric studies have suggested that the meniscus plays a role in the stability of the knee. However, little is known about the effects of partial lateral meniscectomy on knee stability in anterior cruciate ligament intact knees. This cadaveric study was designed to quantify the effects of different lateral meniscectomy surgeries on the kinematics of the knee.

Ten, fresh frozen, cadaveric knees were evaluated using a robotic testing system. Preloading conditions applied to the intact knee included A) 134-N anterior tibial load + 200-N axial compression, B) 5-Nm internal tibial torque + 5-Nm valgus torque and C) 5-Nm external tibial torque + 5 -Nm valgus torque. Sequential meniscectomies were then performed, each followed by repeat of the robotic testing. These procedures included a one third partial lateral meniscectomy of the posterior horn, a two thirds partial lateral meniscectomy of the posterior horn and, finally, a total lateral meniscectomy. A universal force moment sensor was used to measure the forces and moments under each condition.

In condition A, a significant decrease was found after surgery in the lateral translation of the tibia after the one third meniscectomy surgery (up to 167%), as compared with the intact knee ($p<0.05$). After the two thirds meniscectomy, similar significant decreases were noted from baseline as seen in the one third meniscectomy, with no significant difference between the two surgical conditions. After the total lateral meniscectomy, further decreases in lateral translation (up to 316.6%) were noted as compared to the intact knee ($p<0.05$). In condition B, significant increases in medial translation of the tibia were noted as compared to the control condition in a pattern, similar to that of condition A ($p<0.05$). In condition C, a significant decrease in lateral translation of the tibia was found at full extension after the one third partial meniscectomy surgery, as compared to that of the control condition ($p<0.05$). After the two thirds meniscectomy condition, a decrease in lateral translation of the tibia was noted at 0°, 30° in 90° of knee flexion ($p<0.05$). After total lateral meniscectomy, the decrease in lateral translation of the tibia was found at all angles ($p<0.05$).

Conclusion: This cadaveric study found that even a small partial lateral meniscectomy can reduce the stability of the knee.

Novaretti, J., et al. Partial Lateral Meniscectomy Affects Knee Stability Even in Anterior Cruciate Ligament Intact Knees. **J Bone Joint Surg Am.** 2020, April; 102(7): 567-573.

ACUPUNCTURE FOR MIGRAINE PROPHYLAXIS

In 2017, an estimated 1.25 billion people in the world suffered from migraine headaches. This study assessed the efficacy of acupuncture for migraine prophylaxis.

Subjects were patients with episodic migraine without aura, 15 to 65 years of age, all of whom were naïve to acupuncture. The patients were randomized to receive usual care, manual acupuncture or sham acupuncture, undergoing 20, daily sessions of 30-minute treatments, completed over eight weeks. Non-penetrating sham acupuncture was performed at four, bilateral non-acupuncture points, located on the back at segments distant from the headache area. The primary

outcome variables were change in the mean number of migraine days and migraine attacks per four-week cycle during weeks one to 20 after randomization. Secondary outcomes included the proportion of patients achieving at least a 50% reduction in the mean number of migraine days or migraine attacks during weeks 17 to 20.

Data were completed for 447 subjects. The mean number of days with migraine was fewer in the manual acupuncture group than in either the sham group or the usual care group at all times measured ($p<0.001$-$p=0.005$). This finding also held true for the number of migraine attacks. All subscales of the Migraine-Specific Quality-of-Life Questionnaire improved significantly more in the manual acupuncture group than in the two control groups at week 20.

Conclusion: This randomized, controlled study of patients with episodic migraine found that 20 sessions of acupuncture reduced the number of migraine days and the number of migraine attacks.

Xu, S., et al. Manual Acupuncture versus Sham Acupuncture and Usual Care for Prophylaxis of Episodic Migraine without Aura: Multicentre, Randomized Clinical Trial. **BMJ.** 2020; 368:M679.

TARGETED OCCIPITAL HEADACHE PAIN INJECTIONS

Headaches are the fifth leading cause of hospital emergency department visits, with the greater occipital nerve (GON) being the most commonly implicated nerve for headache pain. Occipital nerve blockade has been found to be an effective treatment for headaches. As a consistent relationship has been found between the GON and the occipital artery, this study proposed a single skin insertion as a means to improve the accuracy of injections to block both the GON and the lesser occipital nerve (LON).

The subjects were 50 adults reporting pain in the distribution of the GON, with some reporting pain in the distribution of the LON. For anatomical location, in line with the tragus, a point two finger breadths lateral to the cervical spinous process was used to approximate the occipital artery. The injection of 2mL of 0.25% bupivacaine at the GON was made 1-2 mm lateral to that point. For those with LON symptoms, the needle was repositioned laterally to bone for a second injection of 2mL of 0.25% bupivacaine. Pain was assessed with a numerical rating system (NRS) before and after the injections.

The mean NRS score fell from 6.04 at baseline to 2.74 post-injection ($p<0.001$). A clinically significant reduction in pain, defined as 30% or higher, was observed in 80.9% of the subjects, with 29.8% experiencing a 70% or greater reduction in pain.

Conclusion: This study of patients with occipital headaches found that using anatomical landmarks for a single insertion injection to the greater and lesser occipital nerves could significantly reduce headache pain.

Vanterpool, S., et al. Targeting Occipital Headache Pain: Preliminary Data Supporting an Alternative Approach to Occipital Nerve Block. **Clin J Pain.** 2020, April; 36(4): 289-295.

INTRACEREBRAL NEURAL STEM CELLS AND MOTOR RECOVERY FOLLOWING STROKE

Stroke is the second most common cause of death and a leading cause of long-term disability worldwide. This study explored the efficacy of intracerebral implantation of the allogeneic human neural stem cell line CTX0E03 for the treatment of chronic stroke.

Subjects were 40 years of age or older with ischemic stroke and stable arm weakness. Under general anesthesia, a single intracerebral dose of 20 million cells was implanted by stereotaxic injection into the putamen, ipsilateral to the ischemic stroke, with five deposits completed within three hours. The patients were assessed for up to three months for change in arm function with the Action Research Arm Test (ARAT). The primary outcome was the response (improvement by ≥2 points within three months on ARAT item 2.

Of the 23 participants, one demonstrated clinically significant improvement (two or more points on the ARAT) at three months, while three demonstrated such improvement at six and 12 months. Of the patients with no arm movement at baseline, none demonstrated a change in ARAT scores after stem cell injection. Improvement in the modified Rankin Scale by one grade or more was seen in seven of 20 participants at 12 months. A change in Barthel Index scores of nine or more points was seen in eight of 20 participants at 12 months.

Conclusion: This unblinded study of patients with chronic ischemic stroke found that stereotactic injections of stem cells to the ipsilateral putamen were possible, although significant improvements in arm function were only found among those with residual upper limb movement prior to the injections.

Muir, K., et al. Intracerebral Implantation of Human Neural Stem Cells and Motor Recovery after Stroke: Multicenter, Prospective, Single Arm Study (PISCES–2). **J Neurol Neurosurg Psych.** 2020, April; 91(4): 396- 401.

BIOMARKERS FOR PREDICTING SERIOUS EVENTS FOLLOWING SYNCOPE

Syncope is a symptom with many clinical presentations and many underlying causes. When syncope occurs out of the hospital, a promising biomarker for assessing the patient's condition is point-of-care lactate (pLA), a reliable indicator of hypoperfusion states due to anaerobic metabolism. This study evaluated the predictive capacity of the National Early Warning Score2 (NEWS2) and pLA to detect patients with syncope at risk for early mortality.

This prospective, multicenter, cohort study included patients with syncope who were over the age of 18 and were provided advanced life support prior to arrival at the hospital. For each patient, the NEWS2 was calculated using respiratory rate, body temperature, oxygen saturation, systolic blood pressure, heart rate and mental status, the latter as assessed with the Glasgow Coma Scale (GCS). Venous blood was used to determine pLA levels. To obtain the combined value of NEWS2 and pLA, the numerical value of the pLA was added to the numerical value of the NEWS2, generating a new scale, the NEWS2-L.

Data were complete for 361 patients with a median age of 74 years. After prehospital care, 21 (5.8%) with syncope died within 48 hours. In 61.9% of these cases, the primary cause of mortality was cardiovascular, followed by infectious and neurologic processes. The NEWS2-L had the best prognostic precision for predicting two-day mortality, the need for prehospital advanced life support and the need for ICU services.

Conclusion: This multi-center, observational, cohort study of patients hospitalized for syncope found that the NEWS2-L may be helpful in predicting mortality within the first 48 hours.

Martin–Rodriguez, F., et al. Role of Biomarkers in the Prediction of Serious Adverse Events after Syncope in Prehospital Assessment:

A Multi-Center, Observational Study. **J Clin Med.** 2020, March; 9(3): 651.

LONG-TERM OUTCOME IN TREATED CHRONIC INFLAMMATORY DEMYELINATING POLYNEUROPATHY

Treatment of chronic inflammatory demyelinating polyneuropathy (CIDP) includes immune modulating therapy, which has been available for decades. This study evaluated the outcomes of patients with CIDP with a disease duration of more than 10 years.

Subjects with probable or definite CIDP were recruited through the Danish National Patient Register. All had been treated with immune modulating therapy between 1985 and 2006. These patients were compared with a group of 20 matched control subjects. Disability was assessed with the Rasch-Built Overall Disability Scale for Immune-Mediated Peripheral Neuropathies (I-RODS). Neurologic impairment was evaluated using the Neuropathy Impairment Score (NIS). Isokinetic strength (IKS) was measured at the wrist, knee and ankle, with grip strength assessed with a hand-held dynamometer. Ambulation was determined by a Timed, 25-foot walk test (T25FW), upper extremity dexterity with Nine Hole Peg Test (9-HPT) and weakness and ataxia with a Six-Spot Step Test (SSST). Aerobic capacity was also measured. Finally, fatigue was gauged with a fatigue severity scale.

The authors identified 129 patients with CIDP, with a median disease duration of 16 years. Of 23 who died, the mean age of death was 71.1 years. Twenty-seven patients (53%) had discontinued therapy and 46 walked independently. Of the primary endpoints, five demonstrated moderately more impairment than controls. These included the I-RODS ($p=0.0004$), NIS ($p<0.0001$), IKS ($p<0.0001$), T25FW ($p=0.001$), and EuroQol Five-Dimension, Five-Level (EQ-5D-5 L) visual analog scale and index value scale. ($p<0.001$). However, 90% had preserved ambulation without the need for support.

Conclusion: This long-term follow-up of patients with CIDP found that 90% were independent ambulators but, overall, with diminished capacity compared to healthy controls.

Al-Zuhairy, A., et al. A Population Based Study of Long-Term Outcome in Treated Chronic Inflammatory Demyelinating Polyneuropathy. **Muscle Nerve.** 2020, March;61 (3):316-324.

RIMABOTULINUMTOXINB FOR TREATMENT OF SIALORRHEA

Previous studies using botulinum toxin injected into the parotid and submandibular glands found significant improvement without dysphagia. This study assessed the efficacy of rimabotulinumtoxinB for treatment of sialorrhea.

Subjects were 18 to 85 years of age with sialorrhea for at least three months. The participants were randomized at baseline to receive placebo, RimabotulinumtoxinB (RIMA) 2,500 units or RIMA 3,500 units, injected into the submandibular and parotid glands bilaterally. The primary endpoint was the change from baseline in the unstimulated salivary flow rate (USFR).

A total of 176 adults completed the study. At four weeks, compared to placebo, a significant reduction was seen in the USFR for both doses of RIMA ($p<0.001$ for both), with no significant difference between the two groups. This difference was noted beginning at week one and continuing through week eight, and then continuing through week 15, only for the 3,500-unit dose. Patient reported outcome measures mirrored the primary efficacy findings. Most of the subjects had an adverse event, with the most common including dry mouth, dysphagia, and dental caries.

Conclusion: This study of patients with chronic sialorrhea found RimabotulinumtoxinB to be effective in reducing saliva flow beginning at one-week post-injection.

Isaacson, S., et al. Safety and Efficacy of RimabotulinumtoxinB for Treatment of Sialorrhea in Adults: A Randomized Clinical Trial. **JAMA Neurol.** 2020, April: 77 (4): 461-469.

SHORT BOUTS OF MODERATE INTENSITY EXERCISE FOR SEDENTARY OLDER ADULTS

High peak maximal oxygen consumption (VO_2 max) is correlated with reduced cardiovascular morbidity and mortality. This study investigated the effect of moderate intensity exercise for less than 10 minutes per session on blood pressure, heart rate and VO_2 max among sedentary adults.

Subjects were 53, sedentary healthy adults, all 50 years of age or older. All underwent measurements of blood pressure, heart rate, and VO_2 max at baseline and at eight weekly intervals. The participants were randomized by gender to perform short-duration exercise bouts (male (Ms) and female (Fs)) or long-duration exercise bouts (male (Ml) and Female (Fl)), three to five days per week for 24 weeks. The short-duration sessions included moderate intensity jogging three times daily for five to 10 minutes each. The long-duration exercise group performed moderate intensity jogging for 30 to 60 minutes, once per day.

At the 24th week, although 50% of M_S group had SBP ≥120 mm Hg, their mean SBP decreased from 147±19.2 mm Hg to 132.3±9.6 mm Hg. In the M_L group, the percentage with SBP ≥120 mm Hg dropped from 61.5% to 23.1% (144±12.3 mm Hg to 128±7.0 mm Hg). Although the percentage with SBP ≥120 mm Hg in F_S group did not change, the mean values decreased from 143.1±9.6 mm Hg to 128.0±7.0 mm Hg.

In the F_L group, the percentage with SBP ≥120 mm Hg dropped from 53.8% to 30.8% (152.3±23.7 mm Hg to 129±3.7 mm Hg). The VO_2 max across all groups rose from baseline to the 24th week, with no significant difference between the groups of the same sex at each of the four data collection points

Conclusion: This study of sedentary individuals 50 years of age or older found that moderate intensity exercise, divided into three sessions per day of less than 10 minutes per session, is similar in efficacy to the recommended 30 minutes per session for reducing systolic blood pressure and improving maximal oxygen consumption.

Magutah, K., et al. Effect of Short, Moderate Intensity Exercise Bouts on Cardiovascular Function and Maximal Oxygen Consumption in Sedentary Older Adults. **BMJ Open Sport Exerc Med.** 2020; 6(1): doi:10.1136/bmjsem-2019-000672.

TOPICAL AND LOCAL ANALGESICS FOR CHRONIC LEG ULCERS

Pain associated with chronic leg ulcers can negatively impact wound healing and health-related quality of life. This literature review was designed to better understand the effect of topical anesthetic or local anesthetic agents used in the treatment of chronic leg ulcers.

The medical literature review included manuscripts published between January of 1990 and August of 2019. Studies were chosen which investigated topical local anesthetics (lidocaine or prilocaine) and topical analgesic agents in patients with chronic leg ulcers. For the final

(Continued from page 2)

Jonathon Teng, M.D.
Ryan Turchi, M.D.
Univ. of California/Irvine, CA

*Chloe McCloskey, M.D.
Univ. of Pennsylvania, Phila, PA

*Andrew Minkley, M.D.
Lyndsey Booker, M.D.
Kayli Gimarc, M.D.
Jami Montagnino, M.D.
Univ. of Washington, Seattle, WA

* Bonnie Weigert, M.D.
Christopher Lynch, M.D.
University of Wisconsin, Madison, WI

*Adem Akatas, D.O.
*Michael Krill, M.D.
Brian Hyun Kang, M.D.
Washington University, St. Louis, MO

analysis, 23 articles were selected, including 19, randomized, controlled trials. Venous leg ulcers were the predominant ulcer type, all with surface areas of less than 54 cm².

In six of the seven studies investigating ibuprofen foam, the use of ibuprofen foam resulted in a significant reduction in wound-related pain when compared with placebo. The 12 studies of lidocaine/prilocaine cream found significant improvement in wound pain as compared with all other agents studied. Plasma concentrations were not found to reach toxic levels after repeat applications.

Conclusion: This literature review found that lidocaine/prilocaine cream and ibuprofen foam appear to be effective agents for reducing wound-related pain associated with the treatment of chronic leg ulcers.

Purcell, A., et al. Pain Associated with Chronic Leg Ulcers: A Systematic Review. **Adv Skin Wound Care.** 2020, May (33): 240-251.

Rehab in Review (RIR) **is produced monthly by physicians in the field of Physical Medicine and Rehabilitation (PM&R), with the cooperation and assistance of Emory University School of Medicine, Department of Rehabilitation Medicine. The summaries appearing in this publication are intended as an aid in reviewing the broad base of literature relevant to this field. These summaries are not intended for use as the sole basis for clinical treatment, or as a substitute for the reading of the original research.**

The Emory University School of Medicine designates this journal based activity for a maximum of 3 AMA PRA Category 1 Credits™. Physicians should only claim credit commensurate with the extent of their participation in the activity. The Emory University School of Medicine is accredited by the ACCME to provide continuing medical education for physicians. The journals are offered as a CME accredited activity for 3 years from the date of original publication.

RIR **is affiliated with the Association of Academic Physiatrists, the World Health Organization, and the Chinese and Indian Societies of PM&R and endorsed by the International Society of Physical and Rehabilitation Medicine.**

Private subscriptions are available by email at rehabinreview@aol.com or by fax or phone at (417) 779-9101.

ISSN # 1081-1303

REHAB IN REVIEW

Produced by the Department of Rehabilitation Medicine, Emory University School of Medicine

EMORY UNIVERSITY SCHOOL OF MEDICINE | Department of Rehabilitation Medicine

Expanding the frontier of rehabilitation sciences in research, teaching, and patient care