REHAB IN REVIEW

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VITAMIN K ANTAGONIST AND OSTEOARTHRITIS

Osteoarthritis (OA) is the fourth leading cause of years lived with disability, worldwide. Some researchers have hypothesized that vitamin K may play a role in the pathogenesis of OA. This study evaluated the relationship between vitamin K antagonist (VKA) use and OA.

Data were obtained from the Rotterdam study (RS), a prospective, population-based cohort study, ongoing since 1990, involving adults 55 years of age or older at the time of recruitment. Baseline data included medical history and socio-demographics. This analysis included participants with radiographs of the knee and hip at baseline and at follow -up visits. The use of a VKA was determined through computerized pharmacy data. Duration of use was divided into tertiles: ≤180 days, between >180 days and ≤556 days of use, and >556 days. A DNA analysis was completed to determine the effect of VKA exposure, stratified by VKORC1 and MGP genotype/ haplotype.

Data were completed for 3,494 participants, including 239 new users of a VKA. The incidence/progression of OA was greater in VKA users for both the hip (OR 2.74) and knee joints (OR 2.34). Genetic analysis revealed that the high VKORC1 (BB) expression haplotype, together with the MGP OA risk allele (rs1800801-T), were associated with an increased risk of OA incidence and progression (OR 4.18).

Conclusion: This study found that vitamin K antagonists increase the risk of osteoarthritis of the knee and hip, an effect which was aggravated among those with a VKORC1 BB-haplotype and among those with the MGP OA risk allele.

Boer, C., et al. Vitamin K Antagonist Anticoagulant Usage is Associated with Increased Incidence and Progression of Osteoarthritis. **Ann Rheum Dis**. 2021, 80(5): 598-604.

LIRAGLUTIDE FOR HEALTHY WEIGHT LOSS

While diet management programs have been shown to provide participants with a large initial weight loss, regain often occurs. Liraglutide, a glucagon like peptide-1 (GLP-1), receptor agonist, has been used in the treatment of obesity through appetite inhibition. This study assessed the efficacy of subcutaneous (SC) liraglutide for healthy weight loss maintenance.

This placebo-controlled trial included adults with a body mass index (BMI) of 32-40 kg/m^2 who had participated in an 800 kcal per day diet for eight weeks. Those who completed this eight-week trial and who had lost at least five percent of their body weight were eligible to participate in this study. These subjects were assigned to one of four treatment groups. These included exercise plus placebo (exercise group), sc liraglutide (3.0 mg per day) plus usual activity (liraglutide group), exercise plus liraglutide (combination group) or placebo plus normal activity (placebo group). The mean exercise frequency was 2.5 times per week in the exercise group and 2.4 times per week in the combination group, averaging 112 minutes per exercise session. The primary endpoint was the change in body weight (in kilograms) from randomization to week 52.

Participants demonstrated an average weight loss of 12% in the beginning eight-week program. All groups gained weight thereafter. Compared to baseline, the liraglutide group had a weight loss of 6.8 kg, significantly greater than that of the placebo group ($p<0.001$). The combination strategy decreased body fat percentage twice that of the decrease in the exercise group ($p=0.02$) and the liraglutide group ($p=0.009$).

Conclusion: This study demonstrates that combining exercise and liraglutide therapy improves healthy weight loss maintenance more than either treatment alone.

Lundgren, J., et al. Healthy Weight Loss Maintenance with Exercise, Liragulide or Both Combined. **N Eng J Med.** 2021, May 6; 384: 1719-1730.

TEA CONSUMPTION ATTENTION AND PSYCHOMOTOR SPEED IN THE ELDERLY

Several studies have demonstrated that modifiable risk factors, including diet, can play a role in maintaining cognitive function and preventing decline. This study examined the association between tea consumption and cognitive function using data from the Newcastle 85+ longitudinal study.

The Newcastle 85+ study is a multidimensional, longitudinal health and aging study of persons 85 years of age and older, living in England in 2006. Interviews occurred at baseline and at follow-up visits at 1.5, three and five years. Total daily tea intake was calculated, with type of tea consumed recorded. As black tea with or without milk was consumed by 97% of tea drinkers, other teas were excluded from the evaluation.

Those who consumed 4.56 to 11.85 cups per day (tertile 3) were compared to those who consumed 0.25 to 4.55 cups per day (tertile 1+2). The Mini-Mental State Examination (MMSE) was used to assess global cognitive function at baseline, 36 months, and 60 months. Domain specific cognitive performance, including speed, attention, and episodic memory, was assessed using the Cognitive Drug Research (CDR) computerized system.

Of the participants, 738 had information concerning tea consumption. Compared to those in the low consumption group, the high consumption group displayed significantly better scores over five years' follow-up on measures of attention and speed in complex tasks.

No association was found with measures of memory or speed in simple tasks.

Conclusion: This study of adults 85 years of age or older found that increased black tea consumption is associated with better attention and speed during complex task performance over time.

Okello, E., et al. Tea Consumption and Measures of Attention and Psychomotor Speed in the Very Old: The Newcastle 85+ Longitudinal Study. **BMC Nutr.**2021; 7 (5):https://doi.org/10.1186/s40795-021-00409-3.

EARLY APATHY ASSOCIATED WITH POOR OUTCOME AFTER STROKE

Studies have demonstrated that, after a stroke, depression is associated with an unfavorable outcome. However, the impact of apathy on outcome remains unclear. This study was designed to disentangle the relationship between early symptoms of depression and apathy and post-stroke outcome.

The Prospective, Observational Polish Study on Post-Stroke Delirium (PROPOLIS) recruited patients with ischemic stroke or transient ischemic attack within 48 hours of admission. Depression was measured using the Patient Health Questionnaire-9 (PHQ-9), with apathy assessed using the Apathy Evaluation Scale (AES). The participants were divided into four groups, including those with neither depression nor apathy (A-D-) those without depression and with apathy (A+D-), those with depression and without apathy (A-D+) and those with both apathy and depression (A+D+).

The National Institutes of Health Stroke Scale (NIHSS) was used to assess neurologic deficits, with the modified Rankin scale (mRS) used to assess functional outcome. Unfavorable outcome was defined as an mRS of three to six. Scores on tests of apathy and depression scales were compared to functional outcome.

Of the 443 assessed, depression and apathy were found in 25.3% and 35.0%, respectively. Univariate analyses revealed that both depressive and apathetic symptoms were associated with three- and 12-month poor functional outcome. Multivariate analysis indicated that apathetic, but not depressive, scores remained an independent predictor of poor outcome at 12 months. Twelve-month case fatality was the highest in the A+/D+ group.

Conclusion: This ischemic stroke study found that early apathetic symptoms are associated with a poorer outcome after stroke.

Lopatkiewicz, A., et al. Early Apathetic, but Not Depressive, Symptoms are Associated with Poor Outcome after Stroke. **Europ J Neurol.** 2021, June; 28(6): 1949-1957.

ASPIRIN VERSUS CLOPIDOGREL AFTER PERCUTANEOUS CORONARY INTERVENTION

After a percutaneous coronary intervention, current guidelines recommend 12 months of dual antiplatelet therapy. The HOST-EXtended Antiplatelet Monotherapy (HOST-EXAM) study compared the efficacy of treatment with either aspirin or clopidogrel monotherapy after completion of 12 months of dual therapy.

This prospective, randomized, open label study included patients 20 years of age or older who had undergone percutaneous coronary intervention (PCI) with drug-eluting stents (DES) and had maintained post-procedure dual antiplatelet therapy (DAPT) for up to 18 months. The participants were randomized to receive daily doses of clopidogrel, 75mg, or aspirin, 100 mg. The primary endpoint was a composite of all-cause death, non-fatal myocardial infarction, stroke, readmission due to acute coronary syndrome and major bleeding during the 24-month follow-up period.

During the 24-month follow-up, the primary endpoint occurred in 152 patients (5.7%) who received clopidogrel and in 207 (7.7%) who received aspirin (HR 0.73, p=0.0035). A secondary composite thrombotic endpoint of cardiac death, non-fatal myocardial infarction, stroke, readmission due to acute coronary syndrome or definite or probable stent thrombosis occurred in 99 (3.7%) in the clopidogrel group and 146 (5.5%) in the aspirin group (HR 0.68, p=0.0028).

Conclusion: This study of patients who had received percutaneous coronary intervention with drug-eluting stents found that, after one year of dual antiplatelet therapy, clopidogrel monotherapy was superior to aspirin monotherapy for the prevention of future clinical events.

Koo, B., et al. Aspirin versus Clopidogrel for Chronic Maintenance

Monotherapy after Percutaneous Coronary Intervention (HOST-EXAM): An Investigator-Initiated, Prospective, Randomised, Open-Label, Multicentre Trial. **Lancet.** 2021: 1 https://doi.org/10.1016/S0140-6736 (21)01063-1.

SYSTEMATIC MONITORING FOR ATRIAL FIBRILLATION AFTER ACUTE ISCHEMIC STROKE

Atrial fibrillation (a-fib) is thought to account for every fifth ischemic stroke globally. The pragmatic impact of standardized monitoring for detection of a-fib and ischemic stroke (MonDaFIS) investigated the diagnostic yield of routine, prolonged and systematic EKG monitoring in stroke survivors.

The MonDaFIS study was a randomized, multicentered trial involving adults seen within 72 hours of an ischemic stroke, or hospitalization for a transient ischemic attack. The patients were randomized to undergo either continuous Holter ECG recording for up to seven days during hospitalization or usual diagnostic procedures. The primary outcome variable was the proportion of patients alive and taking oral anticoagulants at 12 months after the index stroke.

Of the patients enrolled between December 9, 2014, and September 11, 2017, 2,920 were included in the full analysis. Atrial fibrillation was newly detected in patients in hospital in 97 (5.8%) of 1,714 in the intervention group versus 68 (4.0%) of 1,717 in the control group (p=0.024).

Conclusion: This study of patients hospitalized for ischemic stroke or transient ischemic attack found that Holter ECG recording for up to seven days during hospitalization increased the detection of atrial fibrillation.

Wasserlauf, J., et al. Monitoring for Atrial Fibrillation after Stroke. **Lancet Neurol.** 2021, June; 20(6): 410-411.

INTRAVENOUS ALTEPLASE AND POST-STROKE DEPRESSION

Post stroke depression (PSD) has been reported, with the estimated prevalence ranging from 29% to 43%. This study investigated the effect of intravenous alteplase on PSD at three months after stroke onset.

The WAKE-UP is a multicentre, randomized, double-blind, placebo-controlled clinical trial of MRI-based intravenous thrombolysis in unknown onset stroke. Subjects presenting with a mismatch between an acute ischemic lesion visible on diffusion-weighted imaging, with no marked parenchymal hyperintensity in the corresponding region. The primary outcome variable was a score of zero or one assessed on the modified Rankin Scale (mRS). This post-hoc analysis investigated the relationship between PSD symptoms at 90 days, as determined by the Beck Depression Inventory (BDI), and functional outcome, as measured by the modified Rankin Scale (mRS).

Data were complete for 438 patients. Of these, 224 were assigned to an alteplase group and 214 to a placebo group. Treatment with alteplase was associated with significantly lower rates of post-stroke depression (p=0.022). In the fully adjusted analysis, significant predictors of PSD at 90 days after stroke included stroke lesion volume (OR 2.24, p<0.001), a history of depression (OR 6.54, p=0.045), medication with antidepressants (OR 6.10, p=0.005) and treatment with placebo (OR 1.70, p=0.024).

Conclusion: This post-hoc analysis of the WAKE-UP trial found that treatment with intravenous alteplase was associated with lower rates of post-stroke depression.

Königsberg, A., et al. Effect of Intravenous Alteplase on Post-Stroke Depression in the WAKE-UP Trial. **Europ J Neurol.** 2021, June; 28 (6): 2017-2025.

OPTIMAL BLOOD PRESSURE CHANGE AND CLINICAL OUTCOME AFTER THROMBECTOMY

Studies have demonstrated that poor outcomes are associated with both high and low systolic blood pressure (SBP) after mechanical thrombectomy (MT). The effects of a change in the SBP (∆SBP) and outcome are not well understood. This study reviewed the association between the ∆SBP after MT and the efficacy and safety outcomes.

Systolic blood pressure was recorded on admission, post-procedure and up to 24 hours post-thrombectomy. The ∆SBP was defined as the mean SBP at different time points (zero to two, two to four, four to 12 and 12 to 24 h) post-MT minus baseline SBP. The primary outcome was a 90-day unfavorable functional outcome, defined as a modified Rankin Scale (mRS) score of three to six.

Subjects were 5,835 patients with an average age of 69.9 years. The mean ∆SBPs were −12.3, −15.7, −17.2 and −16.9 mmHg for time intervals zero to two, two to four, four to 12 and 12 to 24 hours, respectively. After adjusting for potential confounders, higher values of ∆SBP were significantly associated with unfavorable outcomes (mRS scores of 3-6) at each time interval. Steeper slopes were seen with higher values of ∆SBP for most time intervals and outcomes, suggesting an even stronger association with unfavorable outcomes for higher values of ∆SBP.

Conclusion: This large, prospective study found that the greater the systolic blood pressure increase after thrombectomy, the higher the risk for unfavorable outcome, death, and neurological deterioration.

Anadani, M., et al. Magnitude of Blood Pressure Change and Clinical Outcomes after Thrombectomy in Stroke Caused by Large Artery Occlusion. **Europ J Neurol**. 2021, March: 1922-1930.

NEUROANIMATION IN SUBACUTE STROKE

Recent studies of patients with chronic stroke have shown promising effects of increased intensities and doses of upper limb therapy. This study compared the efficacy of intense rehabilitation using neuroanimation therapy (NAT) with that of intense conventional occupational therapy (COT).

Patients were recruited from acute stroke and inpatient rehabilitation units. The NAT group used an immersive, animation-based experience, with the arm supported by an upper-limb exoskeleton device. The COT group received stretching and strengthening exercises of the paretic arm and training in activities of daily living. The primary outcome measure was the change from baseline to post-training day three in upper limb impairment, as measured with the Fugl Meyer-upper extremity (FM-UE). Secondary evaluations were performed with the Action Research Arm Test (ARAT). These results were compared with a historical control of usual care from the EXPLICIT trial.

No significant difference was found between groups in FM-UE changes from baseline to follow-up

day three (p=0.797), day 90 (p=0.316) or day 180 (p=0.312). For secondary outcome measures, there was no significant difference between the groups in changes on the ARAT or in grip strength. Compared to the historic control, researchers found a greater improvement in ARAT scores (p=0.011), but not FM-UE scores (p=0.564).

Conclusion: This study of patients with chronic stroke found that intensive therapy could improve upper extremity strength and function, with no significant difference in gains between those using a neuroanimation program and those undergoing traditional occupational therapy.

Krakauer, J., et al. Comparing a Novel Neuroanimation Experience to Conventional Therapy for High-Dose Intensive Upper Limb Training in Subacute Stroke: The SMARTS2 Randomized Trial. **Neurorehab Neural Repair.** 2021, May; 35(5): 393-405.

SPINAL CORD STIMULATION FOR PAINFUL DIABETIC NEUROPATHY

Pharmacologic treatments for painful diabetic neuropathy (PDN) often produce insufficient symptom relief. As spinal cord stimulation (SCS) has shown some efficacy in relieving pain, this study compared 10 -kHz SCS to conventional treatment for the treatment of PND.

Subjects were patients with PDN symptoms for over 12 months who had been refractory to treatment with gabapentin or pregabalin and at least one other class of analgesic. The patients were randomized to receive conventional medical management (CMM) or 10-kHz SCS plus CMM. The primary endpoint was 50% pain relief or more on the visual analogue scale (VAS) without worsening of baseline neurological deficits at three months.

At three-month follow-up, the composite primary endpoint was met by five percent in the CMM group and 78% in the intervention group (p<0.001). At six months, neurologic improvements were found in three percent of the CMM group and 60% of the treatment group (p<0.001). In the SCS group, there were three study-related infections and two episodes of wound dehiscence. Of the 90 patients with implants, two required device removal.

Conclusion: This study of patients with recalcitrant, painful, diabetic neuropathy found that a high-frequency spinal cord stimulator could provide safe and effective relief.

Petersen, E., et al. Effect of High-Frequency (10-Khz) Spinal Cord Stimulation in Patients with Painful Diabetic Neuropathy. A Randomized, Clinical Trial. **JAMA Neurol.** 2021, April 5; e210538. doi: 10.1001/ jamaneurol.2021.0538. Epub ahead of print.

REFRACTURE OF CEMENTED VERTEBRAE AFTER PERCUTANEOUS VERTEBROPLASTY

Percutaneous vertebroplasty (PVP) is a minimally invasive technique for the treatment of vertebral compression fracture (VCF). While studies have reported that this treatment can provide immediate pain relief and biomechanical stability, complications including refracture have been reported. This study assessed the risk factors of patients who experience refracture after PVP.

This retrospective cohort study included patients seen from January 1, 2012, to January 1, 2019, at one spine surgery department. Subjects were 1,303 patients diagnosed with VCF (T4-L5) who had received a single level PVP, using formulated polymethylmethacrylate (PMMA). Prior to the procedure, and then at least two years post-procedure, all underwent spinal MRI examination. Radiographs of the spine were taken at baseline and at two weeks post-procedure. Forty-eight patients with refracture of the cemented vertebrae and 45 non-refractured patients were included for a comparative analysis.

The multivariate analysis indicated that factors associated with refracture were an intervertebral cleft (IVC), defined as an area of signal loss (gas-containing space) or showing marked hyperintensity (fluid collection), seen on T2 weighted images (p=0.005), endplate cortical disruption (p=0.037), larger reduction rate, defined as the difference between preoperative and immediate postoperative compression rate (p=0.007), and procedures during which injected PMMA did not come into contact with the upper and lower endplates (p=0.006).

Conclusion: This study of patients who had undergone vertebroplasty of vertebral compression fractures found that factors associated with refracture included intravertebral cleft, non-PMMA-endplate-contact, increased reduction rate and endplate cortical disruption.

Xiong, Y., et al., Refracture of the Cemented Vertebrae after Percutaneous Vertebroplasty: Risk Factors and Imaging Findings. **BMC Musculoskel Disord** 22, 459 (2021). doi.org/10.1186/s12891-021-04355-w.

WHIPLASH INJURIES AND RISK OF DEGENERATIVE CHANGES

Whiplash associated disorder (WAD) covers a variety of clinical manifestations including neck pain and stiffness, neurologic signs, and dizziness, often resulting from a motor vehicle accident. This study evaluated the long-term impact of whiplash injury.

Between 1993 and 1996, 506 patients with whiplash injuries were identified, of whom 220 were contacted, with 81 agreeing to participate. For a control group, 193 subjects without whiplash or neck symptoms were recruited. At both baseline and follow-up, subjects underwent MRI evaluation and completed questionnaires relating to spine symptoms and daily habits.

At 20-year follow-up, the prevalence of neck pain and arm numbness did not differ significantly between the whiplash patients and the controls. Compared to controls, the prevalence of shoulder stiffness (p<0.01), headache (p<0.01) and arm pain (p<0.01) were higher in the whiplash group at follow- up.

Conclusion: This study of patients with whiplash associated disorder found that, at 20 years, this population is at increased risk of shoulder stiffness, headaches, and arm pain.

Watanabe, K., et al. The Long-Term Impact of Whiplash Injuries on Patient Symptoms and the Associated Degenerative Changes Detected Using MRI. **Spine** 2021, June 1; 46 (11): 710-716.

MOTOR SKILL TRAINING VERSUS STRENGTH AND FLEXIBILITY EXERCISE FOR BACK PAIN

While chronic low back pain (LBP) is the most prevalent type of chronic pain in adults, there is no clear optimal method of management. This study compared specific motor skill training (MST) with traditional strength and flexibility exercise (SFE) for the treatment of chronic LBP.

Subjects were between 18 and 60 years of age with low back pain for at least 12 months. After baseline testing, the participants were randomized to one of four groups, MST with no booster, MST plus a booster, SFE with no booster or SFE plus a booster. Treatment comprised six, weekly, one-hour sessions. Data collected included self-report and laboratory measurements. The primary outcome measure was the modified Oswestry Disability Questionnaire (MODQ).

During the acute treatment phase, MODQ scores were more improved in the MST group than in the SFE group ($p<0.001$), an advantage that was maintained at six and 12 months. Booster sessions had no further effect in either group. As compared to the SFE group, the MST group had higher satisfaction with care, greater improvements in average and worst low back pain, physical function, and less absenteeism from usual activities.

Conclusion: This study of patients with chronic low back pain found that person-specific motor skills training was superior to traditional strength and flexibility exercise for achieving improvements in function and patient satisfaction.

Van Dillen, L., et al. Effect of Motor Skill Training in Functional Activities versus Strength and Flexibility Exercise on Function in People with Chronic Low Back Pain: A Randomized, Clinical Trial. **JAMA Neurol.** 2021, April; 78(4): 385-395.

EXPLOSIVE RESISTANCE TRAINING WITH PARTIAL RANGE OF MOTION

Resistance training is typically performed with relatively slow movement against constant loads over the full range of motion (f-ROM). This study assessed whether explosive strength training performed with partial range of motion (p-ROM) is as effective for functional and structural adaptations as that with p-ROM.

Fifteen recreational strength trained adults were recruited. For each subject one leg was randomly assigned to exercise with f-ROM, with the other assigned to p-ROM. Exercise occurred three times per week for ten weeks, with each session including three to six sets of concentric contractions for both legs. Subjects were asked to perform all repetitions as fast as possible, at a self-perceived load of at least 8/10, starting the knee at 90° and the hip at 80° of flexion. Before and after training, measurements were made of leg press performance, and vastus lateralis muscle architecture.

Leg peak power increased by 69% in the p-ROM condition and by 61% in the f-ROM condition. Isokinetic strength increased by four to six percent in the p-ROM condition and one to six percent in the f-ROM condition. Explosive torque after 100 ms increased by 47 in the p-ROM condition and by 35 in the f-ROM condition, while that at 150 ms increased by 57 in the p-ROM condition and by 42 in the f-ROM condition. Statistical noninferiority was achieved for each comparison. Vastus lateralis fascicle length increased by 12% following p-ROM and by nine percent following f-ROM training, while pennate angulation decreased by 13% following p-ROM and 10% following f-ROM training. These were also significantly noninferior.

Conclusion: This study of found that explosive, heavy resistance training, with partial range of motion is not inferior to that with full range of motion, for muscle function and structural adaptations.

Werkhausen, A., et al. Adaptations to Explosive Resistance Training with Partial Range of Motion are not Inferior to Full Range of Motion. **Scand J Med Sci Sports**. 2021, May; 31 (5): 1036-1035.

VITAMIN B12 AND DEGENERATIVE ROTATOR CUFF TEARS

Degenerative rotator cuff tears typically involve the supraspinatus tendon. As vitamin B12 has antioxidant properties, a deficiency has been found to contribute to oxidative stress and the onset of age-related diseases. This study assessed the relationship between vitamin B12 levels and degenerative rotator cuff tears.

This prospective study enrolled patients 55 to 80 years of age with a rotator cuff tear (RC group) and a matched control group (Control) without such a tear, presenting with minor trauma in any area other than the shoulder. The RC group had a full-thickness tear involving the supraspinatus or other rotator cuff tendons. A nonoperative treatment protocol was followed for at least three months before surgery. Blood levels were determined for glucose, magnesium (Mg), calcium (Ca), phosphorus (P), zinc (Zn), homocysteine (HCY), vitamin D (Vit D), folate and vitamin B12. Subjects were divided into quartiles based on their vitamin B12 levels.

The control group had significantly higher serum vitamin B12 levels than did the RC group ($p=0.007$). The mean vitamin D level was also lower in the RC tear group ($p = 0.002$). A logistic regression showed that factors found to be independently associated with an RC tear included male gender ($p=0.008$), diabetes mellitus ($p=0.035$), older age ($p=0.009$), higher glucose ($p=0.031$), lower vitamin D levels ($p=0.006$) and lower vitamin B12 levels ($p=0.044$).

Conclusion: This prospective study found that factors independently associated with a degenerative rotator cuff tear included lower levels of vitamin B12, vitamin D, older age, male gender, and diabetes.

Kim, J., et al. Low Serum Vitamin B12 Levels are Associated with Degenerative Rotator Cuff Tear. **BMC Musculoskelet Disord.** 2021, April 17; 22(1): 364. https://doi.org/10.1186/s12891-021-04231-7.

TRENDS IN MENISCAL REPAIR AND DEBRIDEMENT

Knee arthroscopy is one of the most common orthopedic surgeries. Recent studies have found no difference in benefit between sham surgery and arthroscopic debridement of meniscal and chondral lesions. This study evaluated the trends in arthroscopic meniscal debridement and repair among surgeons graduating since 2002.

Surgeons were identified from the American Board of Orthopaedic Surgery (ABOS) database, to identify those who passed the ABOS Part II examination from 2001 to 2017. Current Procedural Terminology (CPT) codes related to arthroscopic meniscal debridement and/or meniscal repair were tallied for each surgeon. Surgeon data included examination year, age of the patient, geographic region of practice and examinee subspecialty.

Between 2001 and 2017, 11,814 ABOS Part II candidates performed 117,049 meniscal debridement surgeries. In 2001, there were 9,330 meniscal debridements. At the end of the study period, 3,805 debridements had been performed. The number of meniscal debridement procedures, as a percentage of total surgeries,

reported by candidates steadily decreased from 10.3% in 2001 to 4.4% in 2017 (p<0.01). There were 13,998 meniscal repairs which increased during the study period, from 821 in 2001 to 931 in 2017 (p = 0.001).

Conclusion: This study of orthopedic surgeons, board certified between 2001 and 2017, demonstrates a decreasing trend in the number of meniscal debridement surgeries performed over that time.

Wasserburger, J., et al., Long-Term National Trends of Arthroscopic Meniscal Repair and Debridement. **Am J Sports Med.** 2021, May; 49 (6): 1530-1537.

HEAD PRECOOLING AND RUNNING PERFORMANCE

Previous studies have suggested that cooling prior to a sporting event may improve subsequent performance. This study assessed the effect of cooling of the head prior to a 5 km time trial among amateur runners.

Subjects were 15 amateur runners who were scheduled to compete in two, five km trials performed in 35°C heat. The trials were randomized so that one was performed after 20 minutes of head cooling at 23°C. For the second trial, the run was preceded by 20 minutes of rest without head cooling. The run times were compared between the conditions.

Exercise time was shorter after head cooling (25 min) than in the control (CON) condition (27 min). Rectal temperature was reduced during the pre-exercise head cooling (p< 0.001), but not in the CON condition (p= 0.55).

Conclusion: This study suggests that exercise time in a hot environment may be improved by head cooling just prior to exercise.

Coelho, L., et al., Head Precooling Improves 5 Km Time Trial Performance in Male Amateur Runners in the Heat. **Scand J Med Sci Sports**. 2021, May 7: doi: 10.1111/sms.13985.

TOPICAL KETAMINE FOR VENIPUNCTURE PAIN

Many studies have supported the topical use of EMLA cream (2.5% lidocaine and 2.5% prilocaine) to mitigate the pain of venipuncture. Since the recognition of NMDA receptors in the sensory afferent nerve endings, ketamine has also been used as a topical analgesic. This study compared the pain relief resulting from ketamine with that of EMLA.

This prospective, double-blind trial included adults seen in an emergency room who required venipuncture. The subjects were randomly allocated to one of three groups, including topical ketamine, EMLA cream and placebo cream. The test substance was applied over the site of cannulation 50 minutes before the procedure. Immediately after the venipuncture, the patients were asked to rate the pain associated with the venipuncture using the 10-Point Numeric Rating Scale (NRS).

Data were completed on 300 patients with a mean age of 46 years. The pain associated with venipuncture was significantly lower in the intervention groups than in the control group. No significant difference was seen in pain intensity between the ketamine and the EMLA groups. The rates of erythema (p=0.047), pruritus (p=0.032) and irritation (p= 0.008) were higher in the EMLA group than in the ketamine group.

Conclusion: This study of patients undergoing venipuncture found that the reduction in procedure-related pain was equal in those treated with ketamine and those treated with EMLA cream. The side effects of EMLA were greater than those of ketamine.

Heydari, F., et al. Topical Ketamine as a Local Anesthetic Agent in Reducing Venipuncture Pain: A Randomized, Controlled Trial. **Am J Emerg Med**. 2021, April 3:48-53.

STEM CELLS VERSUS PLATELET RICH PLASMA FOR CHRONIC PATELLA TENDINOPATHY

Patella tendinopathy is common in jumping athletes and is often resistant to conservative treatment. Among alternative treatments, leukocyte poor/platelet rich plasma (Lp-PRP) and bone marrow mesenchymal stem cells (BM-MSCs) have shown reasonably good effects. This study compared the efficacy of these two interventions as adjuncts to conventional therapy.

This prospective, double-blind study included adults, 18 to 48 years of age, with chronic patella tendinopathy and with an intratendinous lesion of >3 mm at the proximal insertion. The participants were randomized to receive BM-MSC or Lp-PRP injections into the area of patellar tendon pathology. All underwent a supervised rehabilitation program. The primary efficacy outcome variable was resolution of pain and functional symptoms by patient report using a visual analogue scale (VAS) and the Victorian Institute of Sport Assessment for pain (VISA-P) scores. Quadriceps strength was recorded and pain levels during the test were recorded for both legs.

After six months of treatment, improvement in the VISA-P was significant for both the BM-MSC (p=0.007) and the Lp-PRP (p=0.009) group, with no significant difference between the two. In addition, both produced a significant reduction in VAS scores for pain during sporting activities (p < 0.05). Only the Lp-PRP produced a significant improvement in VAS for daily life (p=0.083).

Conclusion: This pilot study of patients with chronic patella tendinopathy found that both leukocyte poor, platelet rich plasma and bone marrow derived mesenchymal stem cells could improve symptoms.

Rodas, G., et al., Effect of Autologous Expanded Bone Marrow Mesenchymal Stem Cells or Leukocyte Poor/Platelet Rich Plasma in Chronic Patellar Tendinopathy (with Gap >3 mm): Preliminary Outcomes after Six Months of a Double-Blind, Randomized, Prospective Study. **Am J Sports Med**. 2021, May; 49(6): 1492-1504.

SUICIDE AMONG SURVIVORS OF CRITICAL ILLNESS

Sequelae experienced by survivors of critical illness include muscle weakness, reduced exercise capacity, fatigue, cognitive impairment, pain, poor quality of life and financial hardship. This study assessed the risk of suicide among survivors of critical illness.

This population level cohort study used health administrative databases from Ontario, Canada. Nine databases were linked from January 1, 2009, to December 31, 2017. Date and the cause of death were obtained from the final statistics database. Subjects included all hospital admissions who survived to hospital discharge.

All participants who were admitted to an ICU during hospitalization were compared to those hospitalized without ICU treatment (non-ICU). Collected data included age, gender,

Charleston Comorbidity Index scores and number of hospital admissions in the previous year. The primary outcome was the composite of death by suicide and deliberate self-harm events after discharge.

Data were analyzed for 423,060, consecutive ICU survivors and 3,081 111 consecutive non-ICU hospital survivors. Among the hospital survivors, death by suicide was recorded in 0.2% of the ICU group and 0.1% of the non-ICU group. Self-harm was noted in 1.3% of the ICU survivors and 0.8% of the non-ICU group. The increased risk was evident almost immediately after hospital discharge.

Conclusion: This study of hospitalized patients found that those treated in an ICU had a greater risk of suicide or self-harm than did those hospitalized without ICU treatment.

Fernando, S., et al. Suicide and Self-Harm in Adult Survivors of Critical Illness: Population Based, Cohort Study. **BMJ**. 2021; 373: N973.

OXYGEN-OZONE INJECTIONS FOR LOW BACK PAIN

Epidemiologic data have suggested that radicular symptoms are associated with low back pain in up to 40% of patients. In the last 20 years, oxygen-ozone (O_2-O_3) therapy (OOT) has emerged and gained popularity as an alternative treatment option.

Subjects were adults with acute and chronic low back pain radiating in the territory of the sciatic nerve as paresthesias or numbness, with the presence of a herniated disc at L5-S1. All participants underwent ultrasound-guided peri-radicular O_2-O_3 injections, twice per week, with a O_3 concentration of 20 µg per mL for 10 administrations. The primary outcome measure was the Numerical Rating Scale (NRS) for pain. Secondary outcome measures included the Short-Form Health Survey (SF-12), the Tampa Scale of Kinesiophobia (TSK) and the Italian version of the Oswestry Disability Index (OSW).

Data were completed for 52 patients with an average age of 52 years and a mean duration of low back pain of 20.5 months. At one-month follow-up, significant improvement was found on the NRS, the TSK and the OSW ($p<0.001$ for all). Significant improvements were also observed on the NRS for pain and on the TSK at six months follow-up.

Conclusion: This uncontrolled, retrospective trial found that periradicular oxygen-ozone treatment under ultrasound guidance may assist with the treatment of chronic low back pain.

Sconza, C., et al. Ultrasound-Guided Periradicular Oxygen-Ozone Injections as a Treatment Option for Low Back Pain Associated with Sciatica. **Int Orthop.** 2021, May; 45 (5): 1239-1246.

INTENSIVE VERSUS STANDARD BLOOD PRESSURE CONTROL

The Systolic Blood Pressure Intervention Trial (SPRINT) was designed to assess whether a systolic blood pressure (SBP) target of less than 120 mmHg is associated with a lower rate of clinical events than a SBP target of less than 140 mmHg.

Subjects 50 years of age or older who were at increased risk for cardiovascular disease but did not have diabetes or previous stroke were assessed. Participants with a SBP of 130-180 mmHg with or without hypertensive treatment were recruited and randomized to either an intensive treatment (IT) goal of 120 mmHg or to the standard treatment (ST) goal of 140 mmHg. The primary outcome was a composite of myocardial infarction, acute coronary syndrome, stroke, acute decompensated heart failure or death from cardiovascular causes.

A total of 9,361 patients underwent randomization. The rates of the primary outcome were 1.77% per year in the IT group and 2.40% per year in the ST group (hazard ratio (HR), 0.73; $p<0.001$). Adverse events were more common in the IT group and included hypotension, electrolyte abnormalities, acute kidney injury and syncope. In the posttreatment phase, rates of myocardial infarction remained significantly lower in the IT group than in the ST group (HR 0.71; $p=0.005$).

Conclusion: This study of patients 50 years of age or older with at least one additional cardiovascular risk factor found that compared to the traditional systolic blood pressure goal of 140 mmHg or less, a goal systolic blood pressure of 120 mmHg resulted in fewer serious cardiac or cerebrovascular events.

The SPRINT Research Group. Final Report of a Trial of Intensive versus Standard Blood Pressure Control. **N Eng J Med.** 2021, May 20: 1921-1930.

FAST TRACK CLINIC FOR POLYMYALGIA RHEUMATIC

Polymyalgia rheumatic (PMR) is a frequent rheumatic disorder affecting people 50 years of age and older. This study assessed the efficacy of a fast-track clinic (FTC) for patients with suspected PMR.

An FTC was introduced in August of 2016. Subjects were patients who were over 50 years of age, with symptoms of PMR and elevated C-reactive protein, referred by their general practitioners. The clinic required a same-day, low-dose CT of the thorax, ultrasound of the abdomen, a broad biochemical screening, and a physical examination.

Patients referred to the FTC (n=97) were compared to a historical cohort of PMR patients (n=113). In the FTC group, 73% were diagnosed with PMR and 79% with either PMR, giant cell arteritis (GCA) or PMR and GCA. The median (interquartile range) time from symptom onset to PMR diagnosis was 53 days for patients in the FTC group and 80 days for patients in the historical cohort ($p < 0.001$). Prednisolone was prescribed before rheumatologic assessment for 42% in the historic cohort and for 11% in the FTC group. Patients in the FTC had fewer contacts with the hospital before diagnosis.

Conclusion: This study of patients with symptoms consistent with polymyalgia rheumatica found that a fast-track clinic could accelerate the diagnosis and result in earlier initiation of treatment, with fewer hospital visits.

Frolund, L., et al., Fast-Track Clinic for Early Diagnosis of Polymyalgia Rheumatica: Impact on Symptom Duration and Prednisolone Initiation. **Joint Bone Spine.** 2021, October; 88 (5): 105185.

DONANEMAB IN EARLY ALZHEIMER'S DISEASE

The accumulation of amyloid-β (Aβ) peptide in the form of amyloid plaques in the brain is an early event in Alzheimer's disease (AD). This phenomenon is thought to lead to neurodegeneration, with cognitive and functional impairment. Donanemab is a humanized IgG1 antibody directed at an N-terminal pyroglutamate Aβ epitope which is present only in established plaques. This phase II trial evaluated the safety and efficacy of donanemab for

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safety and efficacy of donanemab for those with early, symptomatic AD.

Subjects were 60 to 85 years of age with early symptomatic AD and a Mini Mental State Exam (MMSE) score of 20 to 28. At baseline, all underwent screening using the MMSE, magnetic resonance imaging (MRI) and positron-emission tomography (PET). Those randomized to a treatment arm received donanemab monthly, 700 mg IV for the first three doses and 1400 mg IV for up to 72 weeks. The primary outcome variable was the change from baseline to 76 weeks in scores on the Integrated Alzheimer's Disease Rating Scale (iADRS).

Of the 257 patients enrolled, 131 were assigned to receive donanemab and 126 to receive placebo. The changes from baseline in the iADRS score at 76 weeks were −6.86 in the donanemab group and −10.06 in the placebo group(p=0.04). At 76 weeks, the reduction in the amyloid plaque level was greater in the treatment group (−69.64 versus −1.82 centiloids).

Conclusion: This phase II trial of patients with early Alzheimer's disease found that donanemab, a humanized IgG1 antibody, may slow the progression of the disease by at least half.

Mintun, M., et al. Donanemab in Early Alzheimer's Disease. **N Eng J Med.** 2021, May 6; 384: 1691-1704.

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