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ELECTRICAL STIMULATION AFTER ACL SURGERY

After anterior cruciate ligament (ACL) surgery, interventions must be started early to counteract quadriceps muscle inhibition, an ongoing reflex inhibition of knee extensor muscles. As neuromuscular electrical stimulation (NMES) is a tool that can be used to create extremity generated muscle contractions, this study investigated the efficacy of adding NMES of the quadriceps muscle superimposed on sit to stand exercises (STSE) after ACL reconstruction.

Subjects were 63 adult male patients who underwent unilateral ACL reconstruction. After surgery all groups underwent a standardized rehabilitation protocol, five days per week. The patients were randomized to one of three groups: NMES + STSTS group, the STSTS-only group, and the no additional treatment group (control). The NMES and STSTS were initiated from the 15th to the 60th day. During NMES, to stimulate both slow and fast twitch muscle fibers, the stimulation was delivered 35 and 50 Hz on alternative days, at a maximum intensity of 120mA. Measurements of maximal isometric strength were made at 60 and 180 days after surgery.

Patients in the NMES + STSTS group had significantly higher knee extensor muscle strength when compared to the other two groups at 60 and 180 days after surgery ($p < 0.001$ for all comparisons). In addition, the NMES + STSTS group had significantly higher knee flexion strength than did the control group at

60 days after surgery. Knee strength symmetry between legs was also better in the NMES + STSTS group as compared to the other two groups at both 60 and 180 days after surgery. **Conclusion:** This study found that after anterior cruciate ligament reconstruction, the addition of neuromuscular electrical stimulation superimposed on a functional movement exercise could improve muscle strength and reduce limb asymmetry.

Labanca, L., et al. Neuromuscular Electrical Stimulation Superimposed on Movement Early after ACL Surgery. *Med Sci Sports Exerc.* 2018, March; 50(3): 407-416.

EPIDEMIOLOGY OF OUTPATIENT PEDIATRIC HEAD INJURY

Cases of head trauma and treatment outside of emergency departments remain largely underreported. This study investigated the epidemiology of head injuries, their temporal and seasonal variability and overall burden in patients seeking care.

Data for this study were derived from the Truven Health Analytics MarketScan Research Databases, which represent the largest national record of pediatric outpatient data. Included were children who presented for clinic, urgent care or emergency department (ED) visits with an ICD-9 code consistent with traumatic brain injury (TBI), and who were not admitted for further care.

Of the 1.7 million ambulatory pediatric visits, 32% were initially evaluated at an ED, 66% at a clinic and two percent at an urgent care facility. Temporal variation was

consistent with school sports schedules, with peaks in March through April and September through October. The overall, annual rate of presentation for outpatient treatment of head trauma increased from 1,021.3/100,000 in 2004 to 1,575/100,000 in 2013.

Conclusion: The frequency of outpatient visits for pediatric traumatic brain injuries increased by more than 50% between 2004 and 2013, with more than half of the initial medical visits occurring in non-hospital outpatient settings.

Zogg C., et al. The Epidemiology of Pediatric Head Injury Treated Outside of Hospital Emergency Departments. *Epidem.* 2018, March; 29 (2): 269-279.

HIP FOCUSED THERAPY FOR ACL INJURY PREVENTION

Studies have shown a steady increase in anterior cruciate ligament (ACL) injuries among physically active youth. Few studies have demonstrated an effective training strategy to reduce the incidence of these injuries among athletic populations. This study reviewed the effect of a hip-focused injury prevention training protocol on the risk of knee injuries in basketball players.

This prospective study assessed the incidence of ACL injury by following 309 female collegiate basketball players. After an observation period of four years, intervention was initiated for a period of eight years. The intervention included education three times per

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week and a hip-focused training protocol. The training program was designed to enhance hip joint function through jump-landing maneuvers, hip strength training and balance exercises. The sessions were 20 minutes in duration, performed three times per week.

During the observation period, ACL injuries occurred at a rate of 0.25 per 1,000 athletic exposures (AEs). During the intervention period, those injuries were reduced to a rate of 0.10 per 1,000 athletic exposures. Thirteen, noncontact ACL injuries (0.21/1000 AEs) were recorded during the observation period, while eight noncontact ACL injuries (0.08/1000 AEs) were documented during the intervention period.

Conclusion: This study found that a hip-focused injury prevention program resulted in a 62% reduction in the incidence of ACL injuries among female, collegiate basketball players.

Omi, Y., et al. Effect of Hip-Focused Injury Prevention Training for Anterior Cruciate Ligament Injury Reduction in Female Basketball Players. A 12-Year, Prospective Intervention Study. **Am J Sports Med.** 2018, March; 46 (4): 852-861.

KINESIO TAPE FOR STROKE RELATED SHOULDER PAIN

Following stroke, estimates of the incidence of hemiplegic shoulder pain (HSP) range up to 70%. One treatment, Kinesio tape (KT), developed by Kenzo Kase, has seen increasing popularity. This study investigated the potential benefits of KT for patients with HSP.

Subjects were 21 adults with HSP following unilateral stroke and within six months of onset. The participants were randomized to a KT group or to a sham KT group. Both groups participated in conventional rehabilitation programs. The KT was applied using the insertion origin muscle and space-correction technique. The control group underwent similar taping patterns without tension, and without crossing the joints. The tape was left in place for three days, removed for one day, with the pattern repeated for three weeks. All subjects were assessed for pain intensity, using the Shoulder Pain and Disability Index (SPADI), and by ultrasound examination.

Scores on the ten-point numerical rating scale for pain improved between baseline and follow-up in the KT group by 2.36 points and in the sham group by 1.3 points ($p=0.008$). In addition, significantly better improvement was noted for the KT group than for the control group for SPADI total score ($p<0.001$), as well as for internal rotation ($p=0.04$) and external rotation ($p=0.006$) scores.

Conclusion: This double blind, randomized, placebo controlled study found that Kinesio tape is effective for decreasing pain and increasing range of motion in patients with stroke-related shoulder pain.

Huang, Y., et al. Effects of Kinesio Taping for Stroke Patients with Hemiplegic Shoulder Pain: A Double Blind, Randomized, Placebo Controlled Trial. **J Rehab Med.** 2017, March; 49: 208-215.

EARLY SURGERY AFTER HIP FRACTURE

Globally, the incidence of hip

fracture is expected to climb from 1.6 million to 4.5 million by the year 2050. Hip fractures are the second leading cause of hospitalization for the elderly and are often the sentinel event for the individual's overall decline. This study reviewed the effect of the timing of surgical intervention on one-year mortality after hip fracture.

Subjects were 720 patients, all over 65 years of age, consecutively admitted for treatment of a hip fracture. The time from hospital admission to surgery was identified as a continuous variable. This variable was compared to one-year mortality.

Of the 720 patients, 68% were female, with an average total sample age of 82 years. Within one year, 22% had died. The median time from hospital admission to the beginning of surgery was 30 hours. The odds ratio for increased death was 1.05 for each 10-hour increase in time to surgery ($p=0.001$). An adjusted analysis, revealed that those who underwent surgery over 60 hours after admission were more likely to die within one year, compared with those receiving surgery within 18 hours (odds ratio 2.81), as well as compared with those receiving surgery with 18 to 24 hours (odds ratio 2.9).

Conclusion: This study of elderly patients hospitalized for hip fracture repair found a linear relationship between a delay in surgery and one-year mortality.

Maheshwari, K., et al. Early Surgery Confers One-Year Mortality Benefit In Hip Fracture Patients. **J Orthop Trauma.** 2018, March; 32(3):10 5-110.

LONG-TERM OUTCOMES OF MICROFRACTURE OF THE SHOULDER

The incidence of glenohumeral chondral defects reported incidentally at arthroscopy has been within the range of five to 17%. As microfracture has been used in knee surgery, this study was designed to determine the effect of this procedure on patients

with articular cartilage defects at the glenohumeral joint.

This retrospective review included consecutive patients with chondral defects of the humeral head and/or glenoid who received microfracture surgery after failed conservative treatment. Participants were contacted by phone for postoperative assessments, including a visual analogue scale (VAS) for pain, the Single Assessment Numeric Evaluation (SANE), subsequent surgery, willingness to undergo the surgery again, the Simple Shoulder Test (SST), the American Shoulder and Elbow Surgeons (ASES) form and the Short Form-12 (SF-12). The average follow-up time was 10.2 years.

Of the 13 patients available for follow-up, three had progressed to failure, with 10 available for follow-up questionnaires. The adjusted VAS scores were significantly improved at long-term follow-up as compared with baseline ($p=0.004$), as were scores on the ASES ($p=0.009$) and SST ($p=0.009$). Survivorship was 93.8% at one year, 87.5% at three years and 76.6% at nine years.

Conclusion: This study of patients with shoulder joint chondral defects, treated with microfracture, found a reoperation rate of 28.6% and a long-term clinical failure rate of 24.2%.

Wang, K., et al. Long-Term Clinical Outcomes after Microfracture of the Glenohumeral Joint. Average 10- Year Follow-Up. *Am J Sports Med.* 2018, March; 46 (4): 786-794.

KINESIOPHOBIA AND PHYSICAL THERAPY RELATED PAIN

Kinesiophobia describes avoidance and fear of movement. This seems to be important to the development of chronic musculoskeletal pain. This study examined the impact of kinesiophobia at the onset of physical therapy (PT), and the effect of analgesia on kinesiophobia.

This French, multicenter study included consecutive, adult patients, referred to PT for the treatment of musculoskeletal pain. All were assessed for kinesiophobia using the

Tampa Scale of Kinesiophobia (TSK). Data collected included medical history, demographic data, pain assessed at baseline and at the fifth PT session using the Numerical Rating Scale (NRS), medication use and patient view of pain. The subjects were asked about pain during PT sessions and of level of satisfaction.

Participants were 700 patients with a mean age of 50.3 years. The level of initial pain was significantly higher for those with kinesiophobia than for those without. Patients with kinesiophobia received a higher number of PT sessions. The proportion of subjects who received a prescription for pain medications was significantly greater ($p<0.001$) for those with as compared to those without kinesiophobia (95.4% versus 85.0%). A significant increase in PT satisfaction was observed in the 25.6% who had been given preventative analgesics before PT sessions.

Conclusion: This study of consecutive patients seen in a musculoskeletal clinic found that kinesiophobia is frequent among patients receiving physical therapy and is associated with higher levels of pain, with improved satisfaction in those given preventative analgesics before therapy.

Perrot, S., et al. Kinesiophobia and Physical Therapy-Related Pain in Musculoskeletal Pain: A National, Multicenter, Cohort Study on Patients and their General Physicians. *Joint Bone Spine*; 2018; 85: 101-107.

OBESITY TRENDS IN THE UNITED STATES

The prevalence of overweight and obesity has increased since the 1980s, with the prevalence plateauing among youth between 2005 and 2014. This study analyzed the obesity prevalence among youth and adults in the United States between 2007 and 2016.

Data were obtained from the National Health and Nutrition Examination Survey (NHANES) a cross-sectional survey of civilian, noninstitutionalized individuals in the United States. For the survey, obesity was defined as a body mass index of

30 m/kg² and severe obesity as 40 m/kg² or more. Data were compared between the surveys obtained in 2007-2008 and those obtained in 2015-2016.

Data from 16,875 youth and 27,449 adults were analyzed. The prevalence of obesity in youth was 16.8% in 2007-2008, and 18.5% in 2015-2016. The age standardized prevalence of obesity among adults was 33.7% in 2007-2008 and 39.6% in 2015-2016. This increase was significant among women and in adults 40 years of age or older. Severe obesity in adults increased from 5.7% in 2007-2008 to 7.7% in 2015-2016 ($p=0.001$).

Conclusion: This study, using data from the NHANES, found that, over the most recent decade, increases in obesity and severe obesity have continued among both youth and adults.

Hales, C., et al. Trends in Obesity and Severe Obesity Prevalence in U.S. Youth and Adults by Sex and Age, 2007-2008 to 2015-2016. *JAMA.* Published online March 23, 2018. doi:10.1001/jama.2018.3060.

TEN-YEAR OUTCOMES AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

A number of reports have documented the short-and intermediate-term success after anterior cruciate ligament (ACL) reconstruction. Less discussion has focused on patient specific risk factors and patient reported outcome measures after ACL repair. This study explored individual characteristics which convey an increased risk for poor outcome after these surgeries.

This multisite study included all patients who underwent unilateral, primary or revision ACL reconstruction between 2002 and 2004. All subjects completed a 13- page questionnaire encompassing demographics, injury descriptors, sports participation, comorbidities, medical history including surgeries and patient reported outcomes, using the International Knee Documentation Committee (IKDC), the Knee injury and Osteoarthritis Outcome Score (KOOS) and an

activity scale. At two, six and 10 years, patients were mailed the same questionnaire. Of the 1,592 patients initially enrolled, 83% were available for 10- year follow-up. Both the IKDC and KOOS scores significantly improved for the entire cohort, as measured at two years. This improvement was maintained at six and 10 years. Risk factors for inferior outcome at 10 years were lower baseline scores, higher body mass index, being a smoker at baseline, having medial meniscal repairs during the index surgery and a history of meniscal procedures before the index surgery. While the IKDC and KOOS scores at 10 years were similar to those at two and six years, the activity scores steadily declined over time.

Conclusion: This study of 1,592 patients undergoing ACL reconstruction found that the patients were able to perform sports-related functions and maintain high knee-related quality of life for up to 10 years after surgery, although activity levels declined over time.

The MOON knee group. Ten-Year Outcomes and Risk Factors after Anterior Cruciate Ligament Reconstruction: A MOON Longitudinal, Prospective, Cohort Study. *Am J Sport Med.* 2018, April; 46 (4): 815-825.

OUTCOME AFTER MICROFRACTURE VERSUS MOSAICPLASTY

Focal chondral lesions at the knee have been shown to impair quality of life and clinical function. As these lesions have little potential for spontaneous healing, surgical treatment options have often included microfracture and autotransplantation of osteochondral cylinders (mosaicplasty). This study compared the clinical outcomes of these two procedures.

Subjects were 40 patients, 18 to 50 years of age, presenting for repair of chondral lesions at the knee. The participants were randomized to receive either

microfracture or mosaicplasty. For both procedures, continuous passive motion was started within hours after surgery, and continued for the duration of the hospitalization. The patients used crutches with toe-touch weight bearing for six weeks, progressing thereafter to full weight bearing. At baseline, and yearly up to 15 years postoperatively, the subjects completed a standardized form with questions concerning symptoms and function.

At 15 years, the mean Lysholm score improved 21 points from baseline in the mosaicplasty group and was significantly better than the microfracture group at one, five, 10 and 15 years. The mosaicplasty group contained a significantly higher number of patients who reported good/excellent outcomes (p=0.01), and a lower percent who reported a poor outcome (p=0.08), as compared with the microfracture group.

Conclusion: This study of patients with chondral defects of the knee found that mosaicplasty results in better short- and long-term outcomes, as compared to microfracture.

Solhheim, E., et al. Randomized Study of Long-Term (15 to 17 Years) Outcome after Microfracture versus Mosaicplasty in Knee Articular Cartilage Defect. *Am J Sports Med.* 2018, March; 46 (4): 826-831.

CARDIOVASCULAR SAFETY OF FEBUXOSTAT OR ALLOPURINOL IN GOUT

Previous studies have demonstrated that gout is associated with an increased risk of cardiovascular and chronic kidney disease. Febuxostat is an inhibitor of xanthine oxidase, used for the management of hyperuricemia in patients with gout. This study compared the cardiovascular safety of febuxostat with that of allopurinol.

This randomized, multicenter, double-blind, non-inferiority trial included patients with gout and a

history of major cardiovascular disease. The subjects were randomized to receive either allopurinol, with doses modified according to kidney function, or febuxostat at 40 mg per day, titrated to 80 mg per day as needed. The primary endpoint was a composite of the first occurrence of cardiovascular death, nonfatal myocardial infarction, unstable stroke or urgent revascularization for unstable angina. Subjects were 6,198 patients from 320 sites. Overall, 56.6% of the patients discontinued treatment prematurely. The primary endpoint was realized in 10.8% of the febuxostat group and in 10.4% of the allopurinol group (p=0.66). Cardiovascular mortality and death from any cause were greater in the febuxostat group than in the allopurinol group (p=0.03 and p=0.04, respectively).

Conclusion: This study of patients with gout found higher risks of cardiovascular death and death from any cause among those using febuxostat than among those using allopurinol.

White, W., et al. Cardiovascular Safety of Febuxostat or Allopurinol in Patients with Gout. *N Engl J Med.* 2018, March 29; 378 (13): 1200-1210.

CHRONIC INFLAMMATION, ACHILLES TENDINOPATHY AND RUPTURE

Achilles tendinopathy and rupture are frequent causes of pain and disability. As recent studies have found immune cells in specimens of non-ruptured chronic Achilles tendinopathies, this study was designed to better understand the association between inflammation and tendon rupture.

Subjects were 17 adults, ranging from 41 to 74 years of age, all with Achilles tendinopathy, presenting for treatment, and 19 adults, presenting with Achilles tendon rupture. For the control, healthy hamstring tendons were studied of 15 patients

presenting for ACL repair. Specimens from each group were studied using immunohistochemistry, in order to assess the expression of CD14 and CD68 cells, with those findings compared to those of controls.

Compared to controls, an increased expression of CD14+ ($p=0.0015$) and CD68+ ($p=0.0015$) cells was noted in tendinopathic and ruptured Achilles (collectively labelled *diseased*). Using antibodies associated with macrophage activation, the diseased specimens revealed markers of interferon (IRF5, IRF1), STAT-6 (CD206) and glucocorticoid receptor (GCR) (CD163) macrophage activation pathways. Using CD31 as a marker of vascularization, an increased expression was noted in tendinopathic ($p=0.02$) and ruptured tendons ($p=0.0002$).

Conclusion: This study found that chronic inflammation is a feature of both Achilles tendinopathy and Achilles tendon rupture.

Dakin, S., et al. Chronic Inflammation Is a Feature of Achilles Tendinopathy and Rupture. **Br J Sports Med.** 2018, March; 52 (6): 359-367.

DO PHYSICAL ACTIVITIES TRIGGER ACUTE LOW BACK PAIN

Low back pain (LBP) is a leading cause of years lived with disability (YLD) worldwide. This longitudinal, case crossover study examined whether physical activities are associated with a transient risk of pain flare-ups in patients who are experiencing acute low back pain (LBP).

The participants were adults experiencing a new episode (flare-up) of LBP, preceded by at least one month without LBP. The subjects were asked to specify age, gender, race, employment status and LBP history at the initial

consultation. Back pain intensity was measured on an 11-point numerical rating scale. Functional limitations were assessed using the Oswestry Disability Index (ODI). The patients reported specific physical activity exposures and emotional triggers during the most recent 24 hours.

The 48 adult patients had a mean age of 50 years and reported 81 flare-up periods and 247 control periods. Of the physical activities, prolonged sitting was the only activity significantly associated with a LBP flare-up, with an odds ratio (OR) of 4.4 ($p<0.001$). The multivariate analysis revealed that prolonged sitting (OR 4.2; $p<0.001$) and stress or depression (OR 2.8; $p=0.02$) were independently and significantly associated with an increased risk, while involvement with PT (OR 0.4; $p=0.05$) was associated with a decreased risk.

Conclusion: This study of patients with acute low back pain found that the only physical activity associated with an exacerbation (flare-up) of this condition was sitting for more than six hours.

Suri, P., et al. Do Physical Activities Trigger Flare-ups During an Acute Low Back Pain Episode? A Longitudinal, Case-Crossover, Feasibility Study. **Spine.** 2018, March 15; 43 (6):427-433.

FRANKINCENSE EXTRACT FOR RELAPSING-REMITTING MULTIPLE SCLEROSIS

Previous studies of frankincense derivatives have shown some positive activity in targeted multiple sclerosis (MS) inflammatory molecules and pathways. This study assessed the efficacy of standardized frankincense extract (SFE) as an anti-inflammatory and immunomodulatory therapy for patients with MS.

Subjects were 28 patients with relapsing remitting MS (RRMS). After a three-month baseline observation, the participants

underwent an eight-week introduction period with SFE capsules of 400 mg, titrated up to a maximum of 4,800 mg per day. During the baseline, contrast-enhanced lesions (CELs) were assessed by MRI scans, with clinical follow-up and MRI studies completed monthly until month eight, and again at month 12 and every three months thereafter. The main outcome variable was the change in CELs from baseline to treatment phase.

The number of monthly CELs was reduced from a baseline median of 1.00 to a follow-up median of 0.50 ($p<0.0001$), realized at months five to eight. In addition, brain atrophy was noted at baseline scan, with increased volume found during the treatment phase ($p=0.0081$). An immunological evaluation demonstrated that CD4+ T cells showed an increase in CTLA-4 surface expression, with the frequency of CD4+ CD25 FoxP3+ T cells increasing significantly during treatment. The IL-17A-producing CD8+ T cells decreased, while the frequency of IL-10-producing CD8+ T cells increased simultaneously, during treatment ($p<0.001$ for all). Of these, only the frequency of CD4+ CD25 FoxP3+ T cells showed a significant, negative correlation with the number of CELs.

Conclusion: This phase II trial of patients with relapsing remitting multiple sclerosis found that standardized frankincense extract is safe and demonstrates beneficial immunomodulatory effects.

Strürner, K., et al. A Standardized Frankincense Extract Reduces Disease Activity in Relapsing-Remitting Multiple Sclerosis (The SABA Phase IIa Trial). **J Neurol Neurosurg Psychiatry,** 2018; 89 (4):330-338.

YOGA INJURIES

Though promoted as physically and emotionally therapeutic, some have questioned the safety of the practice of yoga. This systematic

review was completed to better understand the prevalence of injuries associated with yoga.

A literature review was conducted, with nine observational studies chosen for inclusion in this study. Subjects were 9,129 yoga practitioners and 9,903 non-yoga practitioners. Injury was defined as a trauma requiring discontinuation of participation for that day.

The risk of yoga associated injuries was estimated to be 1.45 per 1,000 hours of yoga practice. The lifetime prevalence of yoga-associated injuries or other adverse events ranged from 21-35%. Those yoga moves commonly associated with injuries were the headstand, shoulders stand, lotus posture, handstand, and forward or backward bending.

Conclusion: This systematic review of nine observational studies found that the risk of injury was 1.45 per 1,000 hours of yoga practice.

Crameret, et al. Injuries and Other Adverse Events Associated with Yoga Practice: A Systemic Review of Epidemiological Studies. *J Sci Med Sport*. 2018, February: 21(2) 147-154.

HEALTH OF THE UNITED STATES FROM 1990 THROUGH 2016

According to the Global Burden of Disease Study 2010 (GBD 2010) US Burden of Disease Report, the main causes contributing to total disability – adjusted–life–years were poor diet, smoking, high blood pressure and obesity. This study used the GBD 2016 to evaluate the change and distribution of burden of disease from 1990 to 2016.

The GBD study used a systematic analysis of published studies and available data. From these sources, calculations were made of the incidence, prevalence, mortality, cause of death, years of life lost (YLL) and years lived with disability (YLD) and the sum of these, disability-adjusted life-years (DALYs).

Between 1990 and 2016, death

rates in the U.S. declined from 745.2 per 100,000 to 578 per 100,000. Hawaii had the highest (81.3 years) and Mississippi the lowest (74.7 years) life expectancy in 2016. The ten leading causes of disability-adjusted life-years (DALY) in 2016, from greatest to least, (with percentage change from 1990) were ischemic heart disease (-49.7%), lung cancer (-32.5%), COPD (+5%), diabetes (+11%), low back pain (-12.1%), Alzheimer's disease (+4%), opioid use disorders (+47.9%), other musculoskeletal disorders (-2.6%), major depression (+0.1%) and migraine (-1.4%).

Conclusion: This study demonstrates a rising life expectancy in United States, with great discrepancies among regions, and a shifting landscape of years lived with disability.

The U.S. Burden of Disease Collaborators. The State of U.S. Health, 1990-2016. Burden of Diseases, Injuries and Risk Factors among US States. *JAMA*. 2018, April 10; 319(14): 1444-1472.

PROTEIN INTAKE AND LEAN BODY MASS IN OLDER MEN

While studies of protein intake greater than the recommended daily allowance (RDA) have been shown to enhance training effects in some athletes, it is not known whether higher protein intake can help preserve muscle mass in vulnerable populations. This study was designed to determine whether increasing protein intake in older adult males with functional limitations would increase lean body mass (LBM) and performance measures.

Subjects were 92 men 65 years of age and older whose average daily protein intake was less than or equal to 0.83 g/kg/d. The men were divided into four groups: a) 0.8 g/kg per day of protein with placebo, b) 1.3 g/kg per day of protein with placebo, c) 0.8 g/kg per day of

protein plus testosterone supplementation, and d) 1.3 g/kg per day of protein plus testosterone supplementation. The primary outcome measure was the change in LBM with secondary outcome measures including muscle strength and quality of life.

At six-month follow-up, no significant difference in LBM was noted based upon level of protein. However, fat mass decreased in men receiving higher doses of protein (p=0.02). Men randomized to receive testosterone gained significantly more LBM than did those randomized to the placebo group, regardless of protein intake (p<0.001). Changes in leg press strength, chest press strength and leg press power did not differ significantly between the protein groups but were greater among those administered testosterone. No significant effects of testosterone or protein supplementation were found in scores of overall health-related quality of life or physical component scores of quality of life.

Conclusion: This study of men 65 years of age or older found that protein intake above the recommended daily allowance did not increase lean body mass, muscle performance, physical function or well-being, unless accompanied by testosterone supplementation.

Bhasin, S., et al. Effect of Protein Intake on Lean Body Mass in Functionally Limited Older Men. A Randomized, Clinical Trial. *JAMA Intern Med*. 2018, April; 178(4): 530-541.

RISK FACTORS FOR PROGRESSION OF RADIOGRAPHIC KNEE OSTEOARTHRITIS

Osteoarthritis (OA) of the knee is the most common form of OA affecting the elderly. This study assessed the incidence, progression and worsening of radiographic knee OA over time, and explored prospective risk factors for this progression.

Subjects were participants in the Hallym Aging Study, which began in 2004, and assessed residents 50 years of age or older. Subjects completed face-to-face interviews for socioeconomic and medical data, with a subgroup undergoing radiographic studies of both knees. The participants were divided into four age groups; 50 to 59 years, 60 to 69 years, 70 to 79 years and 80 to 89 years of age. Age specific, three-year incidence, progression and worsening of radiographic OA were calculated and compared with risk factors.

The subjects were a median age of 71 years, with incident OA of the knee observed in 10.2%. Progression was noted at three years in 13.6%. Univariate analysis revealed progression (defined as an increase of the Kellgren/Lawrence grade at follow-up from grades 2 or 3 at baseline) of OA for females (OR 4.4) and those with osteoporosis (OR 1.18). Factors associated with less progression were smoking (OR 0.79), alcohol consumption (OR 0.78), marriage (OR 1.11 for singles) and higher education level (OR 0.59 for 10 or more years of education). A body mass index of 25 or more was not associated with progression of OA. However, the multivariate analysis indicated that the only risk factor for progression of radiographic knee OA was female gender (OA 4.4), and the only risk factor for worsening (defined as an increase in the K-L grade at follow-up from any other grade (including grades 0 and 1) of OA, was being female (OR 4.4) and having a lower level of education (OR 0.52)

Conclusion: This prospective Korean study of 50-80 years of age found that 10.2% had OA of the knee at baseline, and that yearly progression was greater among females, and yearly worsening was greater in those with less than 10 years of education.

Yoo, J., et al. Risk Factors for Progression of Radiographic Knee Osteoarthritis in Elderly Community

Residents in Korea. **BMC Musc Disord.** 2018; 19: 80.

SURGICAL TREATMENT OF LATERAL EPICONDYLITIS

Many agree that the structure responsible for the symptoms of lateral epicondylitis is the origin of the extensor carpi radialis brevis (ECRB). While this condition is usually self-limiting, surgical excision of the degenerated portion of the ECRB has been introduced as an intervention for recalcitrant cases. This study assessed the efficacy of this surgery.

This prospective, randomized, double-blind, placebo-controlled trial included adults with a diagnosis of lateral epicondylitis persisting after six months of medical therapy. The subjects were randomized to a placebo surgical arm or a surgical arm to receive surgical excision of unhealthy tendinosis tissue, with both groups undergoing identical postoperative rehabilitation protocols. The patients were assessed preoperatively and post-operatively at two, six, 12, and 26 weeks.

Both groups reported a significant reduction in the frequency of pain with activity, as well as the frequency of pain at rest at 26 weeks and at 2.5 years. There was no significant difference between the placebo and the surgical groups at any time, on measures of frequency or severity of pain, or on clinical tests of function.

Conclusion: This prospective, randomized, placebo-controlled study of patients with lateral epicondylitis demonstrates no better improvement with surgical intervention than with conservative treatment.

Krosiak, M., et al. Surgical Treatment of Lateral Epicondylitis. A Prospective, Randomized, Double-Blinded, Placebo-Controlled, Clinical Trial. **Am J Sports Med.** 2018, May; 46 (5): 1106–1113.

TRANSCRANIAL DIRECT CURRENT STIMULATION FOR STUTTERING

Researchers have found that the left inferior frontal cortex (LIFC) is underactive during speaking among patients who stutter. This study assessed the effect on stuttering of stimulating the LIFC using transcranial direct current stimulation (tDCS).

Subjects were 30 male adults who stuttered. Those participants were randomized to receive behavioral fluency intervention by a speech pathologist with or without tDCS. Anodal stimulation was delivered at one mA over the left inferior frontal cortex for 20 minutes per day for five consecutive days, while a control group received sham stimulation. Fluency was assessed at one and six weeks after intervention.

The change from baseline in percent of dysfluent syllables decreased significantly more in the tDCS group than in the sham group (p=0.012) as measured at one week after the intervention. At six weeks, this improvement was maintained during reading, but not during conversation. Outcomes on the stuttering severity instrument at one and six weeks demonstrated significantly greater improvement in the treatment than did the sham treatment group.

Conclusion: This study demonstrates that anodal transcranial current stimulation is effective in improving speech fluency in patients who stutter.

Chesters J., et al. Transcranial Direct Current Stimulation over Left Inferior Frontal Cortex Improves Speech Fluency in Adults Who Stutter. **Brain.** 2018, April; 141(4): 1161-1171.

KAATSU FOR KNEE OSTEOARTHRITIS

In patients with osteoarthritis (OA) of the knee, quadriceps weakness is associated with progression of the OA. Strengthening can be difficult, however, due to the pain associated

with knee loading. As blood flow restriction (BFR) exercise (also known as Kaatsu) can allow strengthening at much lower loads, this study assessed the effect of BFR exercises on patients with OA of the knee.

Subjects were women, 50 to 65 years of age, diagnosed with OA of the knee. The participants were randomized to perform either 12 weeks of strengthening with high loads (HL), defined as 80% of the one repetition maximum (1 Rep Max), or strengthening at a low load (LL), defined as 20% of the 1Rep Max, without or with blood flow restriction (LL-BFR). The BFR was achieved by BP cuffs at 70% of the systolic blood pressure during exercise. Measurements made at baseline and follow up included quadriceps cross-sectional area, function (the timed-stands test and the timed-up-and-go test) and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC).

Increases in knee strength were

found in the HL and LL-BFR groups, with no significant gains in the LL group. No significant difference in gains was found between the LL-BFR and HL groups. WOMAC pain scores were significantly improved in the HL and LL-BFR groups ($p=0.001$ and $p=0.02$, respectively), but not in the (LL) group. WOMAC stiffness scores and physical function scores were significantly improved in the LL-BFR and HL conditions but not in the LL condition.

Conclusion: This study of patients with osteoarthritis of the knee found that blood flow restriction training was similar in efficacy to traditional strengthening for increasing muscle strength, quadriceps muscle mass and functionality while inducing less joint pain.

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