MAXIMAL STRENGTH TRAINING FOR OSTEOPOROSIS IN HIV

The use of antiretroviral therapy to treat human immunodeficiency virus (HIV) has been shown to reduce bone mineral density (BMD). This study was designed to determine the effects of 12 weeks of maximal strength training on the BMD of patients living with HIV (PLHIV).

Subjects were adults, 18 to 45 years of age, each with HIV, and each having received ART for more than 12 months, with a documented reduced BMD. The participants were randomized to an exercise training group (TG) or to a control group (CG). The exercise group engaged in four sets of three to five repetitions at 85 to 95% of their one-repetition maximum (1 Rep Max). The 1 Rep Max was reevaluated every week to guide the progression of exercise intensity. Those in the control group were instructed to continue their usual lifestyle. Baseline and follow-up data included BMD, maximum strength, body weight, height, heart rate and body mass index.

Twenty-six participants were randomized, with 15 in the TG and 11 in the CG group. Compared to the CG, changes in BMD were significantly greater in the TG group for the lumbar spine (p=0.027) and the femoral neck (p=0.006). In addition, heart rate fell by 8.1 bpm in the TG and increased by 1.9 bpm in the CG (p=0.044).

Conclusion: This study of patients living with HIV receiving antiretroviral therapy found that maximum strength training three times per week for 12 weeks could significantly improve bone mineral density.


RADIATION VS INDOMETHACIN FOR HETEROTOPIC OSSIFICATION PROPHYLAXIS

Formation of heterotopic ossification (HO) after surgery can lead to decreased mobility and poor functional outcomes. The most common methods of prophylaxis include nonsteroidal anti-inflammatory drugs (NSAIDs) and external beam radiation therapy (XRT). While previous studies have shown no difference in their efficacy for preventing HO, NSAIDs have been associated with an increased risk of fracture nonunion, and XRT with impaired wound healing and risk of nonunion. This study compared these two treatments for the risk of wound complications.

This retrospective study included 473 adult patients treated surgically for acetabular fractures. Of these, 167 received indomethacin, 104 received XRT, and 202 receive no prophylaxis. All patients received preoperative antibiotics within one hour before incision, and were made non-weight-bearing or toe-touch weight-bearing with posterior hip precautions postoperatively. Outcomes of interest included surgical site infection (SSI) and noninfectious wound complications defined as hematoma, seroma, wound dehiscence, or increased drainage that required use of incisional wound vacuum-assisted closure (VAC).

An SSI occurred in 4.8% of the indomethacin group, 7.7% of the radiation group, and 8.9% of the no prophylaxis group (p=0.28). Significant differences were noted in noninfectious complications which occurred in 20.2% of the XRT group, 6.6% of the indomethacin group and 5.0% of the no prophylaxis group (p=0.0007).

Conclusion: This study of patients undergoing surgical repair for an acetabular fracture found no difference in surgical site infection between those treated with prophylactic indomethacin and those treated with radiation treatment. Those treated with radiation however had a significant increase in the risk of noninfectious wound complications.


BLOOD FLOW RESTRICTION AND KIDNEY DISEASE PROGRESSION

Recent studies have demonstrated that physical exercise can contribute to the prevention and treatment of chronic kidney disease (CKD). This study compared the effect of blood flow restriction (BFR) exercise to conventional exercise on the progression of CKD.

Subjects were 229 male and female patients with stage II CKD. Subjects were randomized to one of three groups: Control group (C), resistance training group (RT), or a RT plus BFR (RT-BFR) group. Randomization was stratified according to baseline variables including sex, body weight, body mass index and medication. Patients were assessed for their individual one repetition maximum (1-Rep Max) at each selected muscle group. Both treatment groups underwent six months of programming with intensity adjusted every two months. In the RT-BFR group resistance was set at 50% of the measured systolic blood pressure. Blood samples were collected at baseline and after six months to analyze renal function and inflammation. In the RT group resistance was set at 50-70% of the 1-Rep Max and for the RT-BFR group it was set at 30-50% of the 1-Rep Max.

At follow up 70% of the control group progressed from stage two to stage three CKD, compared to 25.7% in the RT and 17.1% of the RT+BFR. Improved uremic parameters, as well as inflammation (IL-6; IL-10; IL-15; IL- 17a; IL-18; TNF-α) and the Klotho- FGF23 axis...
Among athletes with neck pain, proprioception has been shown to be impaired. This study evaluated the efficacy of kinesiotape (KT) as an intervention for athletes with mechanical neck pain (MNP).

Subjects were 66 athletes with MNP, referred for physical therapy. MNP was defined as pain of the cervical and shoulder region, aggravated by neck movements, sustained posture or palpation of the neck musculature. Cervical range of motion was measured, with pain intensity recorded on a visual analog scale (VAS) and functional neck disability assessed using the Neck Disability Index (NDI). Proprioception was calculated as cervical joint position errors in degrees as the subject was asked to actively reposition the head to a target position. After baseline assessment, the patients were randomized to a group using KT with appropriate tension or the same tape without tension (control). Outcomes were recorded before intervention (baseline), after placement and at three and seven days.

Sixty-six participants completed this study. Compared with the control group, position errors were significantly better in the KT group at seven days, when testing flexion, extension, left rotation and right rotation (p < 0.001 for all comparisons). Compared to the control group, the KT group also showed a greater improvement in the KT group at seven days, when testing flexion, extension, left rotation and right rotation (p < 0.001 for all comparisons). At six months creatinine concentrations in the urine were increased in the CTR group but not in the treatment groups (p < 0.05). Cystatin C increased less in both treatment groups compared to the CTL group (p < 0.05). An increased urea was noted in the CTL group but not in the treatment groups (p < 0.05).

Conclusion: This study of patients with chronic kidney disease found that six months of resistance training both with and without blood flow restriction could improve the progression of kidney disease.

KINESIO TAPE AND CERVICAL PROPRIOCEPTION FOR NECK PAIN

Among athletes with neck pain, proprioception has been shown to be impaired. This study evaluated the efficacy of kinesiotape (KT) as an intervention for athletes with mechanical neck pain (MNP).

Subjects were 66 athletes with MNP, referred for physical therapy. MNP was defined as pain of the cervical and shoulder region, aggravated by neck movements, sustained posture or palpation of the neck musculature. Cervical range of motion was measured, with pain intensity recorded on a visual analog scale (VAS) and functional neck disability assessed using the Neck Disability Index (NDI). Proprioception was calculated as cervical joint position errors in degrees as the subject was asked to actively reposition the head to a target position. After baseline assessment, the patients were randomized to a group using KT with appropriate tension or the same tape without tension (control). Outcomes were recorded before intervention (baseline), after placement and at three and seven days.

Sixty-six participants completed this study. Compared with the control group, position errors were significantly better in the KT group at seven days, when testing flexion, extension, left rotation and right rotation (p < 0.001 for all comparisons). Compared to the control group, the KT group also showed a greater improvement in the KT group at seven days, when testing flexion, extension, left rotation and right rotation (p < 0.001 for all comparisons). At six months creatinine concentrations in the urine were increased in the CTR group but not in the treatment groups (p < 0.05). Cystatin C increased less in both treatment groups compared to the CTL group (p < 0.05). An increased urea was noted in the CTL group but not in the treatment groups (p < 0.05).

Conclusion: This study of patients with chronic kidney disease found that six months of resistance training both with and without blood flow restriction could improve the progression of kidney disease.

Fecal calprotectin and inflammation in axial spondyloarthritis

The most common articular manifestations of axial spondyloarthritis (axSpA) are axial symptoms such as chronic back pain and stiffness. Emerging evidence suggests that subclinical gut inflammation plays a role in the pathogenesis of this disease. As fecal calprotectin (FP) is a biomarker of gut inflammation, this study investigated factors associated with increased FP levels in patients with axSpA.

Consecutive patients seen with axSpA at one Korean hospital were recruited to the study. Stool samples were obtained to measure FP levels, with additional data including serum levels to determine erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) level. Measures of disease activity included the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) and the Ankylosing Spondylitis Disease Activity Score (ASDAS). Radiographs of the cervical spine, lumbar spine and pelvis were obtained at the time of FP measurement.

Among the 190 patients, 18% had increased FP levels. Compared to those without increased FP levels, those with increased FP levels had more peripheral symptoms and higher ASDAS-ESR, ESR and CRP. The levels of FP increased with disease activity (p = 0.002).

Conclusion: This study of patients with axial spondyloarthritis found that a measure of inflammation, fecal calprotectin, is significantly associated with disease activity.
Nerve Conduction Studies and Dexterity in Carpal Tunnel Syndrome

Individuals with carpal tunnel syndrome (CTS) frequently report reduced performance at work and in activities of daily living. As dexterity can be impaired by CTS, this study compared the results of the nerve conduction study (NCS) with those of a dexterity evaluation among patients presenting with symptoms of CTS.

Patients referred for a NCS were consecutively screened for eligibility for study participation. Those with suspected CTS, actively employed and 20 to 69 years of age were considered eligible. CTS severity was classified based on NCS results. The functional dexterity test (FDT), the Phalen test and the Tinel test were administered by a physical therapist held blind to the results of the electrodiagnostic study.

Subjects were 141 patients of whom 39 had bilateral symptoms, providing a sample of 180 hands. A significant relationship was found between FDT scores and NCS findings (p=0.001). The FDT successfully discriminated subjects with severe/extreme NCS findings, with two thresholds identified. With the FDT added to the provocative tests, diagnostic accuracy improved, with a specificity of 0.97.

Conclusion: This study of patients presenting with symptoms of carpal tunnel syndrome found a strong, positive relationship between nerve conduction study results and functional dexterity.


Ultra-High-Frequency Ultrasound

With the recent development of ultra-high-frequency ultrasound (UHF-US), a significantly better visualization of nerve anatomy is now possible. This study compared sural nerve UHF-US evaluation to histopathologic findings in patients with polyneuropathies.

Subjects were patients with severe, progressive neuropathies, presenting to the Peripheral Nervous System Muscle Center of the Nice University Hospital, Nice, Italy. All subjects underwent electrodiagnostic evaluation of motor and sensory nerves bilaterally. UHF-US evaluation was performed on the sural nerve, which was then biopsied for histological analysis. Results of those two evaluations were compared.

Ten patients with severe, progressive neuropathies were enrolled in the study. Sural nerves were easily identified by UHF-US. An inflammatory infiltrate was found in five patients. All nerves with an inflammatory infiltrate on biopsy had a hyperreflective appearance on UHF-US (p<0.03). Nerve fascicles were easily identified by UHF-US.

Conclusion: This study of patients with severe progressive neuropathies found that ultra-high frequency ultrasound findings of hyper-echogenicity were significantly related to nerve inflammation.


Transcutaneous Vagus Nerve Stimulation for Rheumatoid Arthritis

Previous studies have suggested that the vagus nerve, through the cholinergic anti-inflammatory pathway, can suppress the production of pro-inflammatory cytokines, including tumor necrosis factor-alpha (TNF-α). As TNF-α is a central pathophysiologic mediator of rheumatoid arthritis (RA), this study investigated the effects of short-term, noninvasive vagus nerve stimulation (nVNS) on disease activity and pro-inflammatory cytokines in patients with RA.

This proof of concept study included patients with RA who underwent noninvasive evaluation of autonomic measures, including cardiac vagal tone (CVT) and venous blood sampling for cytokines. A nVNS device was a set to deliver 120 seconds of n-VNS, with stimulation three times per day. The main outcome measures were change in resting CVT, Disease Activity Scores, based on 28-joint count-C-reactive protein (DAS28-CRP) and cytokines, at baseline and after four days of treatment.

Subjects were sixteen participants with active RA (DAS28>3.2) and 20 with RA but low disease activity (DAS28<2.6). Among those with active RA, nVNS resulted in small, but significant, reductions in DAS28-CRP (p=0.02) CRP (p=0.001) and cytokine IFN-γ (p = 0.02). Such effects were not seen in those with low disease activity. The n-VNS was not associated with any change in CVT, HR or diastolic BP across the study period, although there was a 12-mmHg reduction in systolic BP (p = 0.003).

Conclusion: This study of patients with rheumatoid arthritis found that noninvasive vagus nerve stimulation can result in anti-inflammatory effects and reduce symptoms.


Corticotropin and Rheumatoid Arthritis

Melanocortin Receptor (MCR) agonists have anti-inflammatory and immune modulating properties mediated by receptors expressed on cells relevant to arthritis. This animal study evaluated the efficacy of an MCR agonist, repository corticotropin injection (RCI), for reducing the effects of a laboratory induced arthritis. Using a rat collagen-induced arthritis (CIA) model, disease induction was performed. On day 13, the animals were randomized to receive subcutaneous RCI (40 U/kg, 160 U/kg or 400 U/kg, twice daily) alone or in combination with etanercept (ENT), 10 mg/kg three times daily, ENT alone or vehicle alone (placebo). The treatments were initiated on day 13 and continued through day 19. Arthritis disease was represented as an increase in ankle diameter. On day 20, the animals were sacrificed for histopathologic assessment.

Compared to the placebo group, all intervention groups demonstrated significantly greater decreases in ankle diameter (p<0.05). Compared with ENT alone, RCI 160 or 400 U/Kg further reduced ankle diameter. Microscopic examination of the diseased paws revealed destructive polyarthritis, characterized by synovial and periarticular edema, mixed inflammatory cell infiltration, cartilage damage and bone resorption. As compared with controls, measures of inflammation were reduced in the ENT group, including RCI 160 U/kg, RCI 400 U/kg, ENT+RCI 160 U/kg and ENT+RCI 400 U/kg by nine percent, 19%, 26%, 29% and 55%, respectively. Also as compared with controls, cartilage damage was reduced by 22% in the ENT group (p<0.05) and by 51% in the ENT+RCI 400 U/kg group (p=0.0001).

Conclusion: This animal study found that corticotropin, as an adjunct therapy with etanercept, reduced...
structural damage in an experimental model of rheumatoid arthritis.


**FRESH FROZEN MENISCAL ALLOGRAFT TRANSPLANT OUTCOMES**

Meniscal allograft transplant (MAT) is designed to reduce pain in patients with post-meniscectomy syndrome. As most previous studies have been limited to short-term outcomes, this study evaluated the ten-year clinical outcomes of patients treated with this procedure.

Data were reviewed for 175, consecutive MAT procedures, performed between June of 2006 and March of 2013. Indications for the procedure were pain due to a previous total or subtotal meniscectomy, with osteoarthritis grade I through III according to the Kellgren-Lawrence scale. Those with anterior-posterior knee laxity underwent anterior cruciate ligament (ACL) reconstruction, and those with chondral lesions smaller than 2 cm² underwent microfracture procedures. Preoperatively, patients were evaluated with Lysholm scores, the Tegner Activity Scale, and a zero to 100 visual analog scale (VAS) for pain. At 10-year follow-up, these measures were repeated, with the addition of the Knee Injury and Osteoarthritis Outcome Score (KOOS) subscale.

A complete 10-year follow-up was available for 38 patients. Rates of survival, free from surgery, were 91% at five years and 86% at 10 years. Excluding those who experienced surgical failure with graft removal, and using the Lysholm scores for outcomes, 36% were rated as excellent, 21% as good, 31% as fair and 12% as poor. At final follow-up, 75% of the patients reported involvement in sports activity, mostly low-impact.

**Conclusion:** This 10-year follow-up of patients undergoing meniscal allograft transplant surgery found that, at 10 years, 70% demonstrated satisfactory clinical outcomes.


**IMPROVEMENT OF ROTATOR CUFF TEARS: SURGICAL VERSUS NONSURGICAL**

The prevalence of rotator cuff tears increases with age and will likely continue with the aging of the U.S. population. However, sparse evidence is available to guide clinical decision making when providing treatment options for these patients. This study compared the time to achieve clinically meaningful improvement in patients with rotator cuff tears treated surgically versus those treated conservatively.

The Rotator Cuff Outcomes Work Group (ROW) is a multicenter, longitudinal, cohort study including patients diagnosed with symptomatic partial or full rotator cuff tears. The treatment decision was established between the patient and the physician, with shared decision-making. Shoulder pain and function outcomes were measured using the Shoulder Pain and Disability Index (SPADI) and the American Shoulder and Elbow Surgeons (ASES) Standardized Shoulder form. Patients were followed for up to 60 months in order to determine the time to achieve the minimally clinically important difference (MCID) in improvement in the SPADI and the ASES scores.

The time to achieve at least a 30% reduction in SPADI scores favored the non-operative group, reaching the maximum difference at 3.25 months. The time to achieve at least a 50% reduction in SPADI scores favored the surgical group, with the maximum difference at 15.5 months. A similar pattern was seen for the ASES scores.

**Conclusion:** This study of patients with rotator cuff tears found that those treated non-surgically improved more quickly than did the surgical group, with the surgical group achieving better long-term results.


**OPEN VERSUS MINIMALLY INVASIVE DECOMPRESSION FOR SPONDYLOLISTHESIS**

Degenerative lumbar spondylolisthesis is one of the most common causes of low back pain. For those who fail conservative treatment, open laminectomy is a common intervention, although complicated by well-recognized drawbacks. Minimally invasive surgery (MIS) has been introduced to reduce the trauma of surgical intervention. This study compared the outcome of conventional open techniques with that of MIS techniques for patients with grade I spondylolisthesis.

The Quality Outcomes Database was queried for patients undergoing surgery for grade I degenerative lumbar spondylolisthesis between July 1, 2014, and June 30, 2016. This database was established to evaluate risk adjusted expected morbidity, 30-day clinical outcomes of interest and 12-month patient-reported outcomes (PROs).

Data were included for 608 patients undergoing surgery across 12 sites, of whom 140 underwent decompression alone. Of these, 71 underwent an MIS decompression and 69 underwent open decompression. Patients undergoing MIS decompression had a length of stay of 0.68 days, compared to 1.83 days for those undergoing open decompression (p=0.001). Complications occurred in 1.4% of the MIS group and 7.2% of the open group (p=0.11).

A multivariable analysis revealed that open surgery resulted in higher patient satisfaction at two years than did MIS (p=0.0005).

**Conclusion:** This study of patients with grade I spondylolisthesis found that both open and MIS procedures significantly improved back and leg pain and quality of life.


**PERSISTENT CONCUSSIVE SYMPTOMS AND EXERCISE**

The estimated rate of concussive injury in the pediatric population is 600 per 100,000, with 20%-30% experiencing persisting symptoms one month after injury. This study assessed the effectiveness of an exercise-based intervention in the pediatric
population with post-concussive symptoms at one-month post-injury. This multicenter, prospective study included patients eight to 17 years of age with a concussion and a symptom of post-concussion syndrome at least once per week. The subjects were randomized to an active rehabilitation group (n=36) or a control group (n=13) who received standard care. The active rehabilitation intervention involved aerobic activity, sport specific activity, mental imagery, education and a home program. Standard care comprised rest/light symptom-limited activities, academic adaptations and restriction from physical activities until symptom resolution. Outcomes were measured at three time periods over six weeks. The primary outcome measure was the Post-Concussion Symptom Inventory (PCSI).

The PCSI scores decreased over time for both the control and intervention groups (p=0.01), with no significant differences between the groups (p=0.33). Compared to the control group, the intervention group obtained higher scores in quality of life (p=0.04), reduced anger (p=0.02), improvements with tandem gait (p=0.07) and reduced fatigue (p=0.09).

**Conclusion:** This study of young patients with post-concussive symptoms found that an active intervention was as effective as standard care in reducing post-concussive symptoms but resulted in greater quality of life and reduced anger and fatigue.


**MORTALITY AND MUSCULOSKELETAL PAIN**

According to the World Health Organization's Global Burden of Disease study in 2017, low back pain is a leading cause of years lived with disability (YLD). This study explored the relationship between musculoskeletal pain and mortality.

Data were obtained from the National Institute of Public Health in Denmark, a nationally representative survey of the citizens 16 years of age or older. A randomly selected group was asked about musculoskeletal conditions. Variables included musculoskeletal pain within the prior 14 days, with further questions regarding pain location and severity. These data were compared to all-cause mortality and the cause of death.

Data were available for 4,817 persons, with a mean follow-up of 19.1 years. Of these, 41% had experienced musculoskeletal pain within the prior 14 days. All-cause mortality rates increased with increased musculoskeletal pain severity and increased spread of musculoskeletal pain. The risk was greatest for men with strong pain (Hazard Ratio (HR) 1.66) and women with widespread pain (HR 1.49).

**Conclusion:** This Danish study found a higher risk of mortality among those with musculoskeletal pain.


**TARGETING RULE AND NFL CONCUSSIONS**

Prior to the 2018 season, the National Football League (NFL) instituted a playing rule (Rule Eight), which forbids lowering the head to make contact with an opponent, termed “targeting”. This study assessed whether the initiation of this rule has affected the occurrence of head injuries in the NFL.

This retrospective study included all NFL players from the 2016 through 2020 regular seasons. Data were obtained from weekly injury reports, detailing the name of the injured player, and a brief description of each injury. The records were used to collect demographic information. Injury rates before and after the initiation of the new targeting rule were compared.

During the study period, 479 concussions were reported, of which 62.4% occurred during the two years prior and 37.6% during the two years after initiation of the rule. The relative risks of concussion per athletic encounter (AE) were 3.3/1000 AEs after and 5.5/1000 before (RR 0.60) the rule change. This finding represents a 40% decrease in sport related concussion.

**Conclusion:** This study of injuries in the National Football League points to a significant reduction in sports related concussions after a rule change which disallowed the lowering of a helmet to initiate contact during competition.


**LONGITUDINAL PATTERNS OF PAIN IN OLDER ADULTS**

Cross-sectional studies have found that pain and pain related functional limitations among older adults are common, though less is known concerning the longitudinal pattern of this pain. This study was designed to better understand the trajectories of pain in older adults.

This retrospective cohort study used longitudinal data from the population based National Health and Aging Trends Study (NHATS), prospective cohort of community based ambulatory Medicare beneficiaries age 65 years or older. Data were collected annually for six years, including demographics, health characteristics including smoking, body mass index, self-rated health, number of pain sites, comorbid health conditions, the Patient Health Questionnaire–2 for depression, and the Generalized Anxiety Disorder–2 for anxiety, self-reported falls, and usual gait speed physical capacity measured by the Short Physical Performance Battery. Summarized data for 6,783 adults found that in the prior month, 25% had used pain medications five to seven times per week. Pain trajectories were characterized as persisting, high bothersome pain (PH) in 35%, decreasing bothersome pain (DP) in 17%, increasing bothersome pain (IP) in 17%, and low bothersome pain (LP) in 32%. The same categories were produced for activity limiting pain. An adjusted logistic regression found that, compared to the LP group, a greater probability of PH was found in females, those with lower education, lower income, obesity, Medicaid coverage, fair or poor self-rated health, a greater number of comorbid health conditions, depression, anxiety and dementia.

**Conclusion:** This longitudinal study of elderly Medicare recipients found that 25% used pain medicine nearly every day and over half of older adults had either persistently high or increasingly bothersome pain.

BEDSIDE PORTABLE LOW FIELD MAGNETIC RESONANCE IMAGING

In patients admitted to an intensive care unit (ICU), transportation to imaging suites can be cumbersome and often dangerous, particularly in the era of COVID-19. This study assessed a novel bedside neuroimaging device using a low energy (0.064-T) MRI (LE-MRI) for patients with COVID in a neuroscience intensive care unit. The LE-MRI has a five-Gauss (0.0005-T) safety perimeter and a radius of 79 cm from the center of the magnet.

The subjects were fifty patients admitted to the ICU with a diagnosis of acute brain injury. Scans were performed for those who demonstrated any neurological alteration during clinical examination requiring imaging. LE-MRI examinations were performed at the bedside using an eight-channel head coil. Twenty-nine patients (97%) also underwent conventional imaging, and were used for comparison.

Diagnostic-grade T1W, T2W, T2 FLAIR and DWI sequences were obtained for 37, 48, 45 and 32 patients, respectively. The mean examination time was 35 minutes and 40 seconds. All but one of the LE-MRI findings were in agreement with available conventional radiology reports. The exception was a finding of a diffuse subarachnoid hemorrhage (p<0.001).

Conclusion: This study demonstrates the feasibility of a low yield, portable MRI for use in the intensive care unit.


ARTIFICIAL TURF AND CONCUSSION IN CONTACT SPORTS

Since the introduction of artificial turf (AF) in 1965, safety concerns have been raised regarding its use in competitive contact sports. This literature review and meta-analysis compared the incidence of head injuries when competitions were played on (AF) and those who played on natural grass (NG).

An electronic database review was completed for studies of head injuries occurring during competitive sports, separating injuries sustained while competing on AF from those on NG. From this review, 12 papers published between 2004 and 2018 were selected, including eight reporting on injuries sustained during soccer, two on injuries sustained during American football and two on injuries sustained during Rugby.

From the combined data, 260 head injuries and concussions occurred on AF during 91,337 hours of match play. In addition, 7,055 head injuries and concussions occurred on NG during 220,201 hours of match play. Compared with NG, a lower rate of head injury and concussion occurred during play on AF (relative risk (RR) 0.89). Reviewing by sport, the relative risk was lower with AF for Rugby (RR 0.56) and American football (RR 0.72), while no significant difference was found in studies of soccer (RR 1.06).

Conclusion: This systematic review and meta-analysis found that the rate of concussion or head injury during competitive contact sports is less frequent when competing on artificial turf than on natural grass.


RETURN TO PLAY FOLLOWING ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION IN THE NFL

The rates of return to football after anterior cruciate ligament (ACL) reconstruction have been estimated to be 63% for high school and 69% for college athletes. This study evaluated the return to play of national football league (NFL) players undergoing ACL repair.

In the author’s surgical practice, 55 NFL roster players underwent ACL repair surgeries. Data were available for 47 players who met inclusion and exclusion criteria. In all but one case, surgery involved an arthroscopic transstitial single bundle ACL repair, performed with a bone-patellar tendon-bone autograft.

Of the 47 repair procedures, 43 met the inclusion criteria, with 41 primary ACL repairs and six revisions performed. Return to game play (RTGP) was defined as returning to play in a regular-season game. Successful return to previous participation (RTPP) was defined as return to a level of participation equal to the level that the player had reached before injury. For this cohort, RTGP after primary ACL repair was 73% and RTPP 87.8%. A multivariate analysis revealed that an independent predictor of RTPP was age 25 years or less.

Conclusion: This study of 47 NFL active players found that successful return to play after primary anterior cruciate ligament repair was higher than previously reported, with an age of 25 years or less found to be an independent predictor of successful return.


FACET ARTHROPATHY FOLLOWING DISC REPLACEMENT

For patients with chronic low back pain (LBP) and lumbar disc degeneration, total disc replacement (TDR) is a surgical alternative for the spinal region. However, after TDR, facet arthropathy (FA) can appear, although the incidence and consequences of FA are unclear. This prospective, multicenter study assessed the long-term development of FA after TDR.

This study included 110 patients, 25 to 55 years of age, each with LBP of at least one year’s duration and a history of at least six months of physiotherapy or chiropractic treatment without sufficient recovery. The subjects were randomly assigned to undergo lumbar TDR or multidisciplinary rehabilitation (MDR) with a cognitive approach and supervised physical exercise over three to five weeks. The participants were followed for ten years. The primary outcome measure was FA, as assessed with MRI at spine levels L4/L5 or L5/S1.

At eight-year follow-up, FA had appeared or increased more often in patients treated by TDR than those treated with MDR (p<0.001). Index level FA developed in 36% of the TDR group and in two percent of the MDR group. In the TDR group, no significant association was found between FA changes and scores on the Oswestry Disability Index. This analysis could not be performed for...
the MRD group, given that only one patient in that group developed FA.

Conclusion: This randomized, prospective study of patients with chronic low back pain found that facet arthropathy progresses more frequently among those treated by total disc replacement, as compared to those treated with rehabilitation.


**HIGHLY BIOAVAILABLE CURCUMIN FOR KNEE OSTEOARTHRITIS**

Curcumin has been used as an anti-inflammatory treatment in traditional eastern medicine. Curcumin regulates biochemical and molecular pathways by modulating several molecular targets. This study assessed the clinical efficacy and safety of orally administered Theracurmin in patients with knee osteoarthritis (OA) over six months of treatment.

Subjects were 40 years of age or older with OA of the knee, Kelgren levels II, III or IV. Theracurmin was administered orally twice a day for six months, corresponding to daily doses of 180 mg of curcumin. Blood draws were performed to assess high-sensitivity C-reactive protein (hsCRP) at baseline and at six months. Symptoms were evaluated monthly, for six months, using the Japanese Knee Osteoarthritis Measure (JKOM), the knee pain visual analog scale (VAS), and the knee scoring system of the Japanese Orthopedic Association (JOA). Thirteen patients were treated with only Theracurmin without combined therapy. Data were completed for 45 patients with a mean age of 67.2 years. Scores on the VAS, JKOM and JOA all improved significantly (p<0.001, p=0.003 and p<0.001, respectively). Of the 45 patients, 34 were rated as effective cases (75.6%) and 11 as not effective. Of the 13 patients treated with Theracurmin without concurrent therapy, JOA scores were significantly improved (p=0.02).

Conclusion: This prospective, uncontrolled open label trial suggests that curcumin at 180 mg per day may reduce pain and disability caused by osteoarthritis of the knee.


**RECOMMENDED PHYSICAL ACTIVITY AND MORTALITY**

In 2018, Physical Activity Guidelines for Americans recommended that adults engage in at least 150 minutes of moderate, or 75 minutes of vigorous intensity activity per week. This study compared level of exercise to risk of mortality.

Data were obtained from the National Health Interview Survey, an annual, cross-sectional, household interview conducted since 1957 by the United States Centers for Disease Control and Prevention. From 1997 to 2014, subjects reported the frequency and duration of leisure time aerobic and resistance training activity, categorized by intensity. From these data were obtained a sample of 479,856 adults, followed for mortality. Covariates included personal variables, education, marital status, lifestyle variables and chronic health conditions.

During a median follow-up of 8.75 years, 59,819 members of the cohort died. In a fully adjusted model, compared to participants not meeting the physical activity guidelines, the risks of all-cause mortality were found to be 11% lower in those who engaged in the recommended strengthening activity and 29% lower in those engaged in the recommended aerobic activity. The risk was 40% lower among those who engaged in both. Similar patterns were reported for cause-specific mortality from cardiovascular disease, cancer and chronic lower respiratory tract infections.

Conclusion: This study demonstrates that adults engaged in leisure time aerobic and strengthening activities at levels recommended by the 2018 guidelines are at reduced risk of all-cause and cause specific mortality.


**PLATELET RICH PLASMA AND FRACTURE HEALING**

The incidence of delayed healing, or pseudoarthrosis ranges from one to six percent in long bone fractures. As platelets play an important role in the promotion of angiogenesis, mesenchymal cells and growth factors, this study investigated the effects of platelet rich plasma (PRP) for the treatment of pseudoarthrosis.

Subjects were 24 patients undergoing surgery for pseudoarthrosis between 2011 and 2014. Non-union was defined as the lack of union formation of the fracture line for at least nine months and no signs of fracture healing for three consecutive months. The patients’ surgeries were categorized as those that used, and those that did not use, PRP during surgery. All were followed until fracture union.

The mean periods of pseudoarthrosis were 34.3 months in the PRP group and 11.3 months in the control group. Fracture union times were 5.3 months in the PRP group and 11.3 months in the control group (p=0.000).

Conclusion: This unblinded, retrospective study of patients undergoing pseudoarthrosis surgery found that the time to fracture union is significantly shorter among those treated with platelet rich plasma during surgery.


**UPADACITINIB OR ABATACEPT IN RHEUMATOID ARTHRITIS**

Upadacitinib is an oral, selective, Janus kinase inhibitor that is approved to treat rheumatoid arthritis (RA). Abatacept, which inhibits T-cell proliferation and B cell stimulation, has similarly been approved for the treatment of RA. This study compared the efficacy and safety these two medications.

Subjects were 18 years of age or older, diagnosed with RA for at least three months’ duration, all with moderate to severe, active disease. All had failed treatment with at least one biologic disease-modifying antirheumatic drug (DMARD). The participants were randomized to receive either extended release oral upadacitinib (15 mg once daily) or intravenous abatacept (at day one and weeks two, four, eight, 12, 16 and 20 [500 mg for those <60 kg, 750 mg for those 60 to 100 kg,
The primary endpoint was change from baseline to week 12 in the Disease Activity Scores for 28 joints (DAS28-CRP). The participants included 303 in the upadacitinib group and 309 in the abatacept group. At week 12, the mean changes in the DAS28-CRP from baseline were -2.52 in the upadacitinib group and -2.00 in the abatacept group (p<0.001). Clinical remission occurred in 30% of the upadacitinib group and 13.3% of the abatacept group (p<0.001).

**Conclusion:** This study of patients with rheumatoid arthritis found that upadacitinib, an oral selective Janus kinase inhibitor, was superior to abatacept for improvement of DAS28-CRP scores and increasing rates of remission.