

# REHAB IN REVIEW

TM

WWW.REHABINREVIEW.COM

Volume 31 Number 7

Published by Physicians  
In Physical Medicine and Rehabilitation

July 5, 2023

## ASSOCIATION OF LOW DOSE COLCHICINE WITH INCIDENCE OF KNEE AND HIP REPLACEMENTS

The pathophysiology of osteoarthritis is multifactorial, with low-grade inflammation occurring in response to traumatic weight-bearing injury. As colchicine has anti-inflammatory properties, this study assessed the association of low-dose colchicine and the risk of joint replacement.

The Low Dose Colchicine trial (LoDoCo2) is a randomized, controlled, double-blind trial, including patients with chronic coronary artery disease, assigned to receive colchicine, 0.5 milligrams once daily, or a matched placebo. The time from randomization to the first total knee replacement (TKR) or total hip replacement (THR) was chosen as the primary endpoint. All hospitalizations were defined as adverse events.

The data were analyzed for 5,478 subjects with a mean age of 66 years and a median follow-up of 28.6 months. During follow-up, TKR or THR was performed in 2.5% of the colchicine group and 3.5% of the placebo group respectively (hazard ratio 0.69). The effects of colchicine compared to placebo were consistent for men but not for women.

**Conclusion:** This study of patients with history of coronary artery disease found that low-dose colchicine is associated with a 31% lower risk of knee or hip replacement.

Heijman, M., et al. Association of Low-Dose Colchicine with Incidence of Knee and Hip Replacements: Exploratory Analyses from a Randomized, Controlled, Double-Blind Trial. *Ann Intern Med.* 2023, June; 176(6): 737-742.

## BEETROOT JUICE SUPPLEMENTATION IN 65 TO 79-YEAR-OLDS

One key factor contributing to muscular decline is the age-related uncoupling of nitric oxide synthase 3 (NOS3), which leads to a reduced

vasodilatory response to physiological stimuli. In order to assess potential interventions, this study evaluated the effects of beetroot juice (BRJ) on muscle speed and power.

Sixteen community-dwelling men and women, aged 65 to 79 years, underwent a baseline assessment and were randomized to receive either 140mL/day of BRJ containing 18.2 mmol of NO3 (BRJ+) or BRJ without NO3 (BRJ-) for two weeks. Muscle function was evaluated immediately after the initial ingestion and again at two weeks using an isokinetic dynamometer. Maximal knee extensor speed (Vmax) and power (Pmax) were measured.

After the first dose, the BRJ+ group showed a mean of five percent increase in Vmax and a seven percent increase in Pmax compared to the BRJ- group (p=0.0088). After two weeks, the BRJ+ group exhibited a mean seven percent increase in Vmax and a nine percent increase in Pmax compared to the BRJ- group (p=0.0038). No changes were observed in blood pressure or in plasma markers of oxidative stress with either acute or short-term NO3-supplementation.

**Conclusion:** This study of community dwelling adults, with a mean age of 71 years, found that daily intake of beetroot juice with nitric oxide synthase 3 supplementation resulted in significant acute and short-term improvements in muscle performance.

Zoughaib, W., et al. Short-Term Beetroot Juice Supplementation Improves Muscle Speed and Power but Does Not Reduce Blood Pressure or Oxidative Stress in 65-79-Year-Old Men and Women. *Nitric Oxide.* 2023, September; vol 138-139;34-41.

## BEMPEDOIC ACID FOR STATIN-INTOLERANT PATIENTS

The CLEAR Outcomes (Cholesterol Lowering via Bempedoic Acid, an ACL-Inhibiting Regimen) trial included patients unable or unwilling

to take guideline-recommended doses of statins. The current article reports on a prespecified subgroup analysis of the effects of bempedoic acid on major adverse cardiovascular outcomes.

Subjects were ages 18 to 85 years, statin intolerant, and with clinical features placing them at high risk for a first cardiovascular event. The participants were randomized to receive a 180 milligram/day oral dose of bempedoic acid or a matching placebo. Serum levels of LDL-C and high-sensitivity C-reactive protein (hsCRP) were monitored. The primary endpoint was the time to first occurrence of a composite of death from cardiovascular causes, nonfatal myocardial infarction (MI), nonfatal stroke, or coronary revascularization.

Data were analyzed for 2,100 in the bempedoic acid group and 2,106 in the placebo group. After six months of treatment, compared with placebo, the bempedoic group had reduced levels of LDL-C by 30.2 mg/dL (21.3%) and hsCRP by 0.56 mg/L (21.5%). The primary composite endpoint occurred in 5.3% of the treatment group and 7.6% of the placebo group (p=0.002). There were no between group differences in serious adverse events.

**Conclusion:** This study of patients with elevated cardiovascular risk but without a prior clinical event who were intolerant of statin therapy found that treatment with bempedoic acid can significantly reduce the risk of myocardial infarctions, cardiovascular death, and all-cause mortality.

Nissen, S., et al. Bempedoic Acid for Primary Prevention of Cardiovascular Events in Statin-Intolerant Patients. *JAMA Open.* 2023, June 24; doi: 10.1001/jama.2023.9696.

## COGNITIVE FUNCTIONAL THERAPY AND BIOFEEDBACK FOR DISABLING LOW BACK PAIN

Globally, low back pain (LBP) is the greatest contributor to years lived with disability. Cognitive functional

**Editor-in-Chief**

David T. Burke, M.D., M.A.  
Emory University, Atlanta, GA

**Executive Editor**

Randolph L. Roig, M.D.  
Emory University, Atlanta, GA

**Copy Editor**

Roberta Alysoun Bell, Ph.D.  
Emory University, Atlanta, GA

**Assistant Copy Editor**

Tracie E. McCargo, Ph.D.  
Emory University, Atlanta, GA

**Director of Global Distribution**

Jocelyn M. Smith  
Emory University, Atlanta, GA

**Contributing Editors**

\*Alvin Chang, M.D.  
Casa Colina PM&R, Pomona, CA

\*Michael Stephanides, M.D.  
Lindsey Baer, M.D.  
Justin Dzierzawski, M.D.  
Caroline Pupke, D.O.  
Chiamaka Sonubi, M.D.  
Jasper Tseng, M.D.  
Emory Univ. SOM, Atlanta, GA

\*Irene Kalbin, M.D.  
Ciara Espinoza, M.D.  
Jillian Keegan, M.D.  
Caroline Lewis, M.D.  
Icahn SOM at Mt. Sinai, NY

\*Arieen Loo-Hernandez, D.O.  
\* Zachary Poche, M.D.  
Norris Akpan, M.D.  
Lauren Bagneris, MS  
Taylor Bosch, M.D.  
Brandon Savage, M.D.  
LSU Health, New Orleans, LA

\*Jack Leal, M.D.  
Matthew Cascio, D.O.  
Diane Moya, D.O.  
Aniroodh Reddy, M.D.  
Diane Moya, D.O.  
NUMC, East Meadow, NY

\*Sohyun Kang, M.D.  
Ahish Chitneni, D.O.  
Lorna Collins, M.D.  
Madhavan Elangovan, M.D.  
Jack Haberl, M.D.  
NY-Presbyterian, New York, NY

\*Elizabeth Callahan, D.O.  
\*Siulam Koo, D.O.  
NYU, New York, NY

\*Ali Jensen, D.O.  
\*Brock Mullenbach, D.O.  
Antonio Gonzalez, M.D.  
Lisa Laurenzana, M.D.  
NW Univ. Feinberg SOM, Chicago, IL

\*Leo Chaidarun, M.D.  
Sampson Abah, MS  
Owais Aftab, MS  
Danielle Lee, MS  
Rutgers, NJMS, Newark, NJ

\*Marc Ramos Emos, M.D.  
Brandon Badillo, MS4  
Shreya Jain, MS4  
Judy Lee, MS4  
Anam Purewal, M.D.  
Sunny Downstate, Brooklyn, NY

\* Clara Yuh, D.O.  
Michael Bazzi, D.O.

therapy (CFT) has been used to address LBP by targeting individual pain-related cognitions, emotions and behaviors which contribute to pain and disability. This study compared the efficacy of CFT with or without movement sensory biofeedback.

The RESTORE study enrolled patients ≥18 years of age with LBP lasting for more than three months. Random assignment placed patients into one of three groups: usual care, CFT alone, or CFT combined with biofeedback (CFT+). Interviews and physical examinations were used to identify factors contributing to ongoing pain and disability. Those in the biofeedback group used wearable movement sensors to assist in the identification of movement patterns that contribute to LBP. The CFT groups underwent seven, 30-minute treatment sessions over 12 weeks plus a booster session at 26 weeks. The primary clinical outcome was pain-related physical activity limitation at 13 weeks, using the Roland Morris Disability Questionnaire (RMDQ).

Data were analyzed for 141 participants of the usual care group, 141 of the CFT group, and 136 of the CFT+ group. At the 13-week mark, both CFT interventions were more effective for improving RMDQ scores (p<0.0001) as well as pain scores (p<0.0001) and disability scores (p<0.0001) than usual care, with no significant difference between the CFT and CFT+ groups.

**Conclusion:** This study of patients with chronic low back pain found that cognitive functional therapy is effective in improving activity limitations, with no added benefit for those who used wearable monitors.

Kent, P., et al. Cognitive Functional Therapy with or without Movement Sensor Biofeedback versus Usual Care for Chronic, Disabling Low Back Pain (RESTORE): A Randomized, Controlled Three-Arm, Parallel Group, Phase 3, Clinical Trial. *Lancet.* 2023, Jun 3; 401 (10391):1866-1877.

**CARDIOMETABOLIC MULTIMORBIDITY, BEHAVIOR, AND COGNITIVE FUNCTION**

Cognitive decline can result in decreased quality of life and functional capability, which usually precedes dementia. Given that pathological brain changes might be irreversible, identifying modifiable factors for diminishing cognitive decline is critical. This study

investigated the longitudinal association between multiple cardiometabolic diseases and cognitive decline and examined whether individual and combined lifestyle factors can affect cardiometabolic disease-related cognitive decline.

This pooled, multi-cohort study used data from the Health and Retirement Study, The English Longitudinal Study of Aging, The Survey of Health Aging and Retirement in Europe, and the China Health and Retirement Longitudinal Study. Data were included for adults 50 years of age or older with cardiometabolic multimorbidity, defined as a co-occurrence of two or three cardiometabolic diseases, including diabetes, heart disease, and stroke.

The primary outcome variable was performance and cognitive function in three domains; memory, numeracy, and orientation. Memory was measured with the Rey Auditory Verbal Learning Test, numeracy with the Serial Sevens test, and orientation with tasks involving naming the month, date, day of the week, and year, scored from zero to four. Unhealthy lifestyle factors included physical inactivity, current smoking, and excessive alcohol use.

Data were assessed from the records of 160,147 individuals with a mean age of 67.49 years. Compared to those who did not have cardiometabolic diseases, a faster decline in global cognitive scores occurred as the number of cardiometabolic diseases increased. Unhealthy lifestyle factors, including inactivity, smoking, and excess alcohol consumption, were found to accelerate cognitive decline related to cardiometabolic multimorbidity.

**Conclusion:** This cross-cultural, longitudinal study found that cognitive decline is associated with an increased number of cardiometabolic multimorbidities and unhealthy lifestyle factors.

Jin, Y., et al. Cardiometabolic Multimorbidity, Lifestyle Behaviors, and Cognitive Function: A Multicohort Study. *Lancet Healthy Long.* 2023, June; 4(6): e265-e273.

**GLOBAL BURDEN OF LOW BACK PAIN AND PROJECTIONS TO 2050**

The Global Burden of Diseases, Injuries, and Risk Factors study provides comprehensive assessments of health loss caused by diseases and injuries, considering

various factors such as age, gender, year, and geographical location. This study presents global, regional, and national level estimates of the prevalence of years lived with disability due to low back pain (LBP) in the general population.

Data for this study were obtained through a systematic review of electronic databases, opportunistic searches, government and international organization sources, websites, published reports, demographic and health surveys, and collaborative data sets. Bayesian meta-regression techniques were employed to generate prevalence estimates based on age, gender, location, and year. Projections were made to forecast global and regional LBP cases up to the year 2050.

In 2020, the number of LBP cases globally was estimated to be 619 million, with an age standardized rate of 7,460 per 100,000. The estimated years lost due to disability caused by low back pain in 2020 showed a slight decrease compared to 1990, totaling 69 million. In the same year, 38.8% of global disability due to LBP was attributed to three modifiable risk factors: occupational ergonomic factors, smoking, and elevated body mass index. Considering projected population changes, it is anticipated that by 2050, there will be 843 million individuals worldwide affected by LBP, representing a 36.4% increase in global cases.

**Conclusion:** This study provides estimates indicating that by 2050, approximately 843 million individuals worldwide will experience low back pain, with a significant proportion of years lost to back pain related disability attributed to modifiable risk factors.

GBD 2021 Low Back Pain Collaborators. Global, Regional and National Burden of Low Back Pain, 1990-2020, Its Attributable Risk Factors and Projections to 2050: A Systematic Analysis of the Global Burden of Disease Study 2021. *Lancet Rheum.* 2023, May 22; 5 (6):e316-e329.

### OUTCOMES FOR PATIENTS TREATED BY ALLOPATHIC VERSUS OSTEOPATHIC HOSPITALISTS

Currently, one in four U.S. medical students attends an osteopathic school. While the educational requirements are generally similar for both types of medical schools, there is limited

evidence on whether the quality and cost of care differ between patients treated by M.D.s and those treated by D.O.s. Therefore, this study compared the quality and cost of care provided by these two groups of physicians.

For this trial, a 20% sample of Medicare claims from 2016 to 2019 was used. The analysis focused on patients,  $\geq 65$  years of age, hospitalized and treated by hospitalists. The primary outcome measured was 30-day patient mortality, while secondary outcomes included 30-day readmission rates, length of hospital stay, and healthcare expenditures.

The data analysis encompassed 329,510 hospitalizations treated by 17,918 hospitalists across 3,438 hospitals. Among these hospitalists, 79.4% were M.D.s and 20.6% were D.O.s. The adjusted 30-day mortality rates were 9.4% for patients treated by M.D.s and 9.5% for those treated by D.O.s, with no statistically significant difference observed. Similarly, the 30-day readmission rates were 15.7% for patients treated by M.D.s and 15.6% for those treated by D.O.s, again with no statistical difference between the groups. The average length of stay was 4.5 days for both groups of patients.

**Conclusion:** This study including hospitalized Medicare patients treated by a hospitalist found no differences in quality of care or cost of care between those treated by D.O.s and those treated by M.D.s.

Miyawaki, A., et al. Comparison of Hospital Outcomes for Patients Treated by Allopathic versus Osteopathic Hospitalists. *Ann Intern Med.* 2023, June; 176(6): 798-807.

### VIGOROUS EXERCISE FOR PATIENTS WITH HYPERTROPHIC CARDIOMYOPATHY

Exercise is a well-established intervention for patients with cardiac disease. However, for individuals with hypertrophic cardiomyopathy (HCM), concerns have arisen regarding the potential increase in the risk of sudden cardiac death associated with physical activity. As a result, restrictions and disqualification from competitive sports have been implemented. This study investigated whether engaging in vigorous exercise, including competitive sports, is linked to a higher risk of life-threatening ventricular arrhythmias and/or mortality among individuals with HCM.

The study included subjects ages eight to 60 years who had been diagnosed with HCM. Their medical records were reviewed, and clinical and genetic data were extracted and recorded in the database. Participants completed questionnaires in which they reported the amount and intensity of their physical activity over the previous year. The intensity of activities was measured using metabolic equivalents (METs). Engagement in at least one activity with an MET intensity level of 6.0 or higher for a total of 60 hours or more per year was classified as vigorous exercise. The primary outcome variable was a predefined composite endpoint, encompassing death, resuscitated cardiac arrest, syncope attributed to arrhythmia, and implantable cardioverter defibrillation shocks, with or without syncope.

Data from 1,660 participants were analyzed. Among them, 252 (15%) were categorized as sedentary, 709 (43%) as engaging in moderate-intensity exercise, and 699 (42%) as participating in vigorous-intensity exercise. A multivariate Cox regression analysis found that individuals involved in vigorous exercise did not experience a higher incidence of the composite endpoint, as indicated by an adjusted hazard ratio of 1.01.

**Conclusion:** This study of patients with congestive heart failure found that individuals who engaged in vigorous exercise did not experience a higher rate of death or life-threatening arrhythmias than did those who were sedentary or who exercised moderately.

Lampert, R., et al. Vigorous Exercise in Patients with Hypertrophic Cardiomyopathy. *JAMA Cardiol.* 2023, June; 8: 595-605.

### HEALTHY LIFESTYLE BEHAVIORS AND QUALITY OF LIFE IN MULTIPLE SCLEROSIS

People living with multiple sclerosis (pwMS) report a reduced quality of life (QoL). As previous studies have demonstrated that healthy lifestyle behaviors can influence QoL, this study assessed the influence of a number of lifestyle behaviors on mental (mQoL) and physical (pQoL) QoL of patients with MS.

Data were extracted from the Health Outcomes and Lifestyle in a sample of pwMS (HOLISM) study. The participants were invited to

complete an online survey capturing demographics, clinical lifestyle, and outcome data at 2.5-year intervals. A healthy diet was defined as no meat/dairy plus omega-3 supplementation. Physical activity was determined by the International Physical Activity Questionnaire-Short Form (IPAQ-SF). Vitamin D exposure was defined as  $\geq 5000$  IU/day supplementation or intentional exposure to the sun. Quality of life was queried by a validated MSQOL-54.

Data were analyzed for 602 participants who completed baseline and up to 7.5-year follow-up surveys. Prospectively, healthy diet and physical activity were individually associated with QoL across all time points. At baseline, compared to pwMS who engaged in less than one behavior, adoption of three or more healthy lifestyle behaviors was associated with higher mQoL and pQoL. A dose-response association of behaviors was evident at all follow-up timepoints for pQoL, and at 2.5- and 7.5-year timepoints for mQoL. The greatest mean differences in pQoL from baseline were enjoyed by those following all five behaviors at 7.5-year (13.3 points), and by those following four behaviors at five years for mQoL (9.6 points).

**Conclusion:** This study of patients with multiple sclerosis found that healthy lifestyle behaviors, especially healthy diet and physical activity, can improve QoL over 7.5 years.

Fidao, A., et al. Engaging with Three or More Healthy Lifestyle Behaviors Is Associated with Improved Quality of Life Over 7.5 Years in People with Multiple Sclerosis. *Euro J Neurol*. 2023. In Press.

### BRAIN NEUROPLASTICITY AND ANKLE SPRAINS

Lateral ankle sprains (LASs) are the most common ankle injury in sports and have the highest rate of the recurrence. Approximately half of patients who experienced a LAS develop chronic ankle instability (CAI) over time. This literature review was designed to better understand the structural and functional brain adaptations in patients who experience an LAS and CAI.

After a literature review, the researchers selected 20 articles involving 356 patients with CAI. Methods of neuroplasticity testing were subdivided into functional and structural. The most common functional brain outcome was the

cortical motor excitability of several lower limb muscles. Several studies found a bilateral decrease in corticomotor excitability among patients with CAI. Corticospinal inhibition was assessed in five transcranial magnetic stimulation studies, which found a significantly longer cortical silent period among those with CAI.

Structural adaptations were found in the white matter microstructure of patients experiencing an LAS and in the grey matter of patients with CAI. Among those who were categorized as copers (those who recovered well from their ankle sprain), no difference in functional or structural adaptations was found in copers compared to healthy controls.

**Conclusion:** This study of patients with lateral ankle sprains found structural and functional brain adaptations related to these sprains which correlated with clinical outcomes.

Maricot, A., et al. Brain Neuroplasticity Related to Lateral Ankle Ligamentous Injuries: A Systematic Review. *Sports Med*. 2023; 53: 1423-1443.

### INTERSPINOUS SPACERS, DECOMPRESSION, OR FUSION FOR LUMBAR STENOSIS

Lumbar spinal stenosis (LSS) is a common condition that affects approximately one out of every ten individuals in the general population. When conservative treatment fails to provide relief, patients have options for symptom management, such as lumbar interspinous spacers or open surgery, which may involve decompression or fusion procedures. The purpose of this study was to evaluate the long-term outcomes of these procedures in patients with LSS.

For this retrospective study, a comprehensive analysis was conducted of patients aged 50 years or older who had been diagnosed with LSS. The study compared postoperative complications, rates of subsequent interventions, and costs among patients who received an interspinous spacer device (ISD) with those who underwent open decompression without fusion, open decompression with fusion, or fusion surgeries as their initial surgical intervention. During the follow-up period, the study assessed specific outcomes of subsequent spinal interventions related to LSS, including

additional surgeries such as fusion and lumbar spine surgeries.

Data were reviewed from the charts of 400,685 patients, with an average age of 71 years. Compared to individuals who received an ISD, those who underwent open surgery were more likely to require subsequent fusion or other lumbar spine surgeries. Additionally, the mean cost and one-year complication rate were lower among patients who opted for the ISD treatment approach.

**Conclusion:** This retrospective study of patients with lumbar spine stenosis found that the use of interspinous spacers was effective in relieving pain and increasing function, with lower cost and a decreased risk of further lumbar surgery.

Whang, P., et al. Longitudinal Comparative Analysis of Complications and Subsequent Interventions following Stand-Alone Interspinous Spacers, Open Decompression, or Fusion for Lumbar Stenosis. *Adv Ther*. 2023, Jun 8; doi: 10.1007/s12325-023-02562-6. Online ahead of print.

### OPIOID ANALGESIA FOR ACUTE BACK AND NECK PAIN

Low back pain and neck pain are prevalent musculoskeletal conditions, with guidelines recommending opioid analgesics for acute pain relief. This study investigated the efficacy and safety of a short course of opioid management for patients with acute, nonspecific low back pain and neck pain.

The Opioid Analgesia for Acute Low Back and Neck Pain (OPAL) study is an investigator led, multi-center, triple-blind, randomized, controlled trial involving 157 clinics and hospitals in Australia. The participants had presented to their general practitioners with complaints of low back pain or neck pain of less than 12 weeks' duration. The subjects were randomly assigned to care plus opioid, up to 20 milligrams of oxycodone per day orally, or guideline recommended care, with an additional identical placebo for up to six weeks. The primary outcome was pain severity at six weeks, as measured by the Brief Pain Inventory.

At six weeks, compared to the placebo group, the opioid group earned an average VAS pain score of 2.78, compared to an average score of 2.25 in the placebo group ( $p=0.051$ ). More people in the opioid group reported adverse events,

including six complaining of constipation.

**Conclusion:** This study of patients with acute low back or neck pain failed to demonstrate that opioids are more effective for pain relief than placebo.

Jones, C., et al. Opioid Analgesia for Acute Low Back Pain and Neck Pain (the OPAL Trial): A Randomised, Placebo-Controlled Trial. *Lancet*. 2023, Jun 27; S0140-6736(23)00404-X.

### RISDIPLAM FOR TYPES TWO AND THREE SPINAL MUSCULAR ATROPHY

Spinal muscular atrophy (SMA) is a genetic neuromuscular disorder characterized by reduced levels of motor neuron protein due to the loss of the SMN1 gene. Among the available treatments for SMA, risdiplam has gained approval for use across all age groups. This study aimed to evaluate the effectiveness of risdiplam in a diverse group of patients diagnosed with SMA-2 and SMA-3.

The SUNFISH study enrolled 51 patients, ranging from 2 to 25 years of age, who had genetically confirmed SMA diagnoses and exhibited clinical symptoms corresponding to type 2 or type 3 SMA. The patients received a daily dose targeting an area under the curve of 2,000 ng/hr/ml for a duration of 12 weeks. Blood samples were collected to measure SMN protein levels. Motor function was assessed using various efficacy measures, including the 32-item Motor Function Measure (MFM32), the Hammersmith Functional Motor Scale-Expanded (HFMSE), and the Revised Upper Limb Module (RULM). Respiratory function was evaluated based on forced vital capacity, forced expiratory volume in 1 second, peak cough flow, and sniff nasal inspiratory pressure.

The data demonstrated a dose-dependent increase in blood SMN protein levels, with an average increase of 100% achieved within four weeks of treatment, which was sustained over 24 months. Clinical data demonstrated either improved or stabilized scores on the HFMSE, RULM, and forced vital capacity (FVC) assessments.

**Conclusion:** This prospective study of 51 patients with spinal muscle atrophy found a dose dependent increase in blood survival of motor neuron protein, with a

median twofold increase within four weeks of treatment initiation.

Mercuri, E., et al. Risdiplam in Types 2 and 3 Spinal Muscular Atrophy: A Randomized, Placebo-Controlled, Dose-Finding Trial followed by 24 Months of Treatment. *Eur J Neurol*. 2023, Jul; 30(7): 1945-1956.

### ALCOHOL CONSUMPTION AND MORTALITY

Numerous studies have examined the potential positive and negative effects of alcohol consumption. This current study aimed to explore the relationship between alcohol consumption and both overall mortality and mortality linked to specific causes among a representative sample of adults in the United States.

The National Health Interview Survey (NHIS) is a comprehensive health survey conducted in the United States, encompassing the civilian, noninstitutionalized, household population. For this study, data collected between 1997 and 2014 were analyzed. The researchers categorized alcohol consumption into seven distinct groups: lifetime abstainers (individuals who consumed fewer than 12 drinks in their lifetime), former infrequent drinkers (less than 12 drinks in any previous year and none in the past year), former regular drinkers (at least 12 drinks in any previous year in their lifetime but none in the past year), current infrequent drinkers (1–11 drinks in the past year), current light drinkers (at least 12 drinks in the past year but no more than 3 drinks per week), current moderate drinkers (more than 3 drinks per week but no more than 7 drinks per week for women, and more than 3 drinks per week but no more than 14 drinks per week for men), and current heavy drinkers (more than 7 drinks per week for women and more than 14 drinks per week for men). The researchers then compared cause-specific mortality rates across these categories.

The analysis included data from 918,529 adults. After adjusting for various factors, the findings revealed that compared to lifetime abstainers, current infrequent, light, and moderate drinkers had a reduced risk of overall mortality, with hazard ratios of 0.87, 0.77, and 0.82, respectively. Conversely, heavy drinkers had a higher risk of mortality from all causes, with a hazard ratio of 1.07.

**Conclusion:** This study found that infrequent, light, and moderate alcohol consumption were inversely associated with mortality from all-causes.

Tian, Y., et al. Alcohol Consumption and All-Cause and Cause-Specific Mortality among U.S. Adults: Prospective Cohort Study. *BMC Med*. 2023; 21: 208.

### OVERNIGHT GLUCOSE AND NEXT DAY FUNCTION IN TYPE ONE DIABETICS

Blood sugar control and management play a crucial role in maintaining overall well-being and enhancing the quality of life. The objective of this study was to explore the relationship between nighttime glucose levels and functional capacity the following day.

This study focused on adults diagnosed with type I diabetes who were adhering to stable treatment regimens. All participants were equipped with continuous blood sugar monitoring devices, and their sleep/wake patterns were assessed using patient-worn accelerometers. Overnight glucose measurements were represented as follows: coefficient of variation (CV), percentage of time spent below 70 mg/dL, and percentage of time spent above 250 mg/dL. The study also evaluated next-day functional outcomes, including mobile cognitive tasks, physical activity measured by accelerometry, and self-reported activity participation.

A total of 166 participants, with an average age of 40.99 years, were included in the data analysis. The results demonstrated a significant association between next-day function and both the CV ( $p=0.017$ ) and the duration spent above 250 mg/dL ( $p=0.028$ ). However, no correlation was found with the time spent below 70 mg/dL. Prolonged durations below 70 mg/dL were linked to reduced sustained attention (adjusted  $p=0.007$ ), while increased durations above 250 mg/dL were associated with more sedentary time (adjusted  $p=0.024$ ).

**Conclusion:** This study found that overnight glucose can impact dimensions of functioning the following day, with a significant relationship between hyperglycemia and physical, cognitive, and self-reported function the following day.

Pyatak, E., et al. Impact of Overnight Glucose on Next-Day Functioning in

Adults with Type 1 Diabetes: An Exploratory, Intensive, Longitudinal Study. *Diabetes Care*. 2023, Jul 1; 46(7):1345-1353.

### PATIENT PORTAL USE IN OLDER ADULTS WITH DEMENTIA

Patient portals have gained widespread adoption in healthcare systems in recent years. However, there is limited knowledge about the utilization of patient portals among elderly individuals with dementia. This study was designed to investigate the usage of patient portals in individuals with and without dementia.

The study focused on individuals aged 65 years or older who had at least two healthcare visits within a 24-month period. To evaluate portal activity, the researchers introduced a portal activity metric, which measured the ratio of the number of portal sessions to the number of clinical encounters. The portal activity metric was then analyzed in relation to dementia diagnosis, both for portal users themselves and for their proxies who had shared-access credentials.

Data was collected from a total of 49,382 patients, with an average age of 76 years. The findings revealed that individuals with dementia were equally likely to be registered on the patient portal compared to those without dementia. However, individuals with dementia were more likely to have a registered care partner with shared access to their portal account (10.4%) compared to those without a dementia diagnosis (3.3%;  $p < 0.001$ ). Moreover, portal activity significantly increased in the 12 months following the diagnosis of dementia, in contrast to the 12 months prior to the diagnosis.

**Conclusion:** This study of patients diagnosed with dementia found that portal activity was significantly higher in the 12 months after the dementia diagnosis.

Gleason, K., et al. Patient Portal Use among Older Adults with Dementia Diagnosis. *JAMA Intern Med*. 2023, June: E1-E3.

### SUPERVISED WALKING FOR INPATIENTS

Inactivity during hospitalization is linked to delirium, falls, and longer lengths of stay. This study evaluated the efficacy of a supervised walking program, STRIDE (AssiSTed EaRly Mobility for Hospitalized VETERANS) on the length of the hospital stay and destination after discharge.

Participants were 17,237 patients in eight VA hospitals. The hospitals were randomly assigned to a three-month window in which to launch the STRIDE program. The program began within 24 hours of admission, involved patients over 60 years of age, and included a one-time gait and balance assessment, followed by daily supervised walks for the duration of the hospital stay. The outcome measures were the change in the incidence of discharge to a skilled nursing facility (SNF) and hospital length of stay after the STRIDE program was initiated.

The proportion of patients with any documented walking increased from 0.6% before the introduction of STRIDE to 22.7% after. Discharges to a SNF occurred in 13% of the patients before and eight percent after the implementation of STRIDE ( $p < 0.001$ ). An adjusted analysis verified that discharges to SNFs were significantly reduced after the initiation of the STRIDE program, although the length of stay was not. No difference was noted in the incidence of falls.

**Conclusion:** This study of patients hospitalized in acute care facilities found that a program of walking, beginning within 24 hours of admission, significantly reduced the incidence of discharge to skilled nursing, without an increased number of falls.

Hastings, S., et al. Effects of Implementation of a Supervised Walking Program in Veterans Affairs Hospitals: A Stepped-Wedge, Cluster Randomized Trial. *Ann Intern Med*. 2023, June; 176(6): 743-750.

### SUN EXPOSURE AND THE ASSOCIATION BETWEEN SEDENTARY BEHAVIOR AND SLEEP QUALITY

Several studies have demonstrated that sedentary behavior (SB) was associated with poor sleep quality during the Covid-19 pandemic. However, there is a lack of population-based data evaluating the mediating role of sun-exposure on the relationship between SB and sleep quality during the pandemic. This population-based study assessed the mediating effect between reduced sun exposure during the Covid-19 pandemic and sleep.

Data were obtained from a population-based study in Brazil. Sedentary behavior was defined as nine or more hours of total sitting time, with poor sleep quality defined as a Pittsburgh Sleep Quality Index

(PSQI) of greater than five. Insufficient sun exposure was defined as less than 30 minutes per day.

Data were analyzed for 1,629 subjects, of whom 52.5% reported poor sleep quality. A multivariate analysis, adjusted by gender, age, education, income, body mass index, and comorbidities, revealed that SB was associated with poor sleep quality. The data suggested that 16.7% of the association was mediated by insufficient sunlight exposure.

**Conclusion:** Sedentary behavior is associated with poor sleep quality, with 16.7% of this effect mediated by a decrease in sunlight exposure.

deMenezes-Junior, L., et al. The Mediating Role of Sun Exposure on the Association between Sedentary Behavior and Sleep Quality: A Population Based, Cross-Sectional Study. *Sleep Med*. 2023, Aug; 108: 98-99.

### SPORTS SPECIALIZATION AND MUSCULOSKELETAL INJURIES IN HIGH SCHOOL STUDENTS

Youth sport has increasingly involved sports specialization, defined as intentional, focused participation in a single sport for the majority of the year. This study was designed to clarify the association between sports specialization and musculoskeletal injury or concussion.

The subjects were 14 to 19 years of age, recruited from 30 schools in Alberta, Canada. The data were obtained through a secondary analysis of a cross-sectional study examining sport and recreation participation and injury rates in Canadian high school students. The students were categorized as low/moderate or highly specialized in their sport, as self-identified in a response to a series of yes/no questions. Injuries were defined as any musculoskeletal trauma or concussion sustained in a sports related activity in the previous year.

Data were evaluated for 1,492 students, of whom 37% were highly specialized (HS), and 32% were low specialized (LS). The HS group reported more yearly training than did the LS group ( $p < 0.01$ ). In an adjusted analysis, HS students reported higher rates of musculoskeletal injury, with a relative risk of 1.36, but not of lower extremity injury or concussion. Increasing training hours significantly increased the risk of musculoskeletal injury and concussion.

**Conclusion:** This study of Canadian high school students found that athletes who reported a high

sport specialization had a higher injury rate than did those who did not.

Whatman, C., et al. High Sport Specialization Is Associated with More Musculoskeletal Injuries in Canadian High School Students. *Clin J Sport Med.* 2023, May 1; 33(3): 233-238.

### **SIMUFILAM AND ALZHEIMER'S DISEASE**

Involved in the synaptic signaling damage evident in patients with Alzheimer's disease (AD), the mammalian target of rapamycin (mTOR) plays a central role in cellular survival. In addition to promoting aging, overactivation of mTORC1 appears to contribute specifically to the neuropathology of AD. This study evaluated the effect of simufilam, on the activity of mTOR in the lymphocytes of individuals diagnosed with AD.

The subjects were patients with AD and matched controls. Blood samples were obtained, with lymphocytes isolated. Lymphocyte mTORC1 was measured before and after simufilam was provided, and compared between the two groups. These measures demonstrated increased basal activity in the lymphocytes of patients with AD. After treatment with simufilam this heightened basal activity was reduced by day 28 ( $p < 0.01$ ), resulting in a significant improvement in insulin sensitivity. This allowed for a reduction in an upstream pathway of hyperphosphorylation of tau prior to the aggregation and deposition of tau or amyloid.

**Conclusion:** This study found that simufilam can restore insulin sensitivity and a disruption of a process that results in amyloid deposition in AD.

Wang, H., et al. Simufilam Suppresses Overactive mTOR and Restores its Sensitivity to Insulin in Alzheimer's Disease Patients Lymphocytes. *Front Aging.* 2023, June 29; 4.

### **RECOVERY OF ULNAR CONDUCTION BLOCK AT THE ELBOW**

Following peripheral nerve compression, motor and sensory deficits can be due to either axonal dysfunction, conduction block or both. This study describes the clinical and electrodiagnostic characteristics of conduction block recovery in a cohort

of patients with ulnar neuropathy at the elbow (UNE).

Between November 2018 and January 2021, eligible subjects were recruited from the authors' electrodiagnostic laboratory. These subjects had previously undergone electrodiagnostic assessment, which confirmed UNE with conduction block. A comprehensive physical examination, including sensory and motor function assessments, was conducted on the subjects.

Of the 396 patients diagnosed with UNE through electrodiagnostic testing, ten were selected, with an average age of 63 years, all with conduction blocks exceeding 50%. After one year of conservative management, the median index finger abduction strength, relative to the contralateral side, increased from 49% to 100%. Additionally, mean compound muscle action potentials (CMAPs) amplitude recorded during ulnar nerve stimulation proximal to the elbow showed a significant increase from 26% to 94% of the mean amplitude obtained on distal stimulation. The median ulnar nerve conduction block decreased from 74% to 6%. Most of the observed improvement occurred within the initial eight months following the onset of symptoms.

**Conclusion:** This study of patients with a conduction block of the ulnar nerve at the elbow found that, within one year, strength improved from 50% to 100% with most of the progress occurred within six months of the start of conservative therapy.

Podnar, S., et al. Clinical and Neurophysiological Recovery of Ulnar Nerve Conduction Block at The Elbow. *Muscle Nerve.* 2023, July 8. doi: 10.1002/mus.27928.

### **KYPHOPLASTY FOR VERTEBRAL COMPRESSION OSTEOPOROTIC AND PATHOLOGIC FRACTURES**

Symptomatic vertebral compression fractures (VCF) can be associated with a decreased quality of life and a significantly increased risk of mortality. Minimally invasive treatments which inject cement into the vertebral body include vertebroplasty (injection of cement with no attempt to restore the height or angle of the bone) and kyphoplasty (injection with an attempt to restore height). This study reviews the outcomes of patients treated with kyphoplasty for VCF.

This retrospective study included 112 patients treated for a VCF, of whom 85 had an osteoporotic fracture

and 27 had pathological fractures from metastases. All underwent fluoroscopically guided kyphoplasty. The patients responded to questionnaires about pain using the visual analog scale (VAS), disability using the Oswestry Disability Index (ODI) and function using the SF Form -36. Changes in these scores were assessed at 12 months.

Compared to baseline scores, at 12 months, the mean VAS pain scores improved from eight to four, the median ODI score improved from 66 to 28 and the physical component scores of the SF-36 improved from 33 to 37.4 ( $p < 0.001$  for all comparisons).

**Conclusion:** This retrospective study of patients with painful vertebral compression fractures treated with kyphoplasty, found that, after 12 months, significant improvements were noted in pain, disability and quality of life.

Khan, S., et al. Percutaneous Balloon Kyphoplasty for Vertebral Compression Osteoporotic and Pathological Fracture: One-Year Retrospective Study of 112 Patients. *Br J Neurosurg.* 2023,37(3):284-291.

### **HYPERBARIC OXYGEN FOR NONHEALING WOUNDS**

Wounds that do not undergo sufficient restoration of anatomical or functional integrity in the skin and underlying tissues within a reasonable timeframe are designated as chronic or nonhealing wounds. Hyperbaric oxygen therapy (HBOT) has been shown to improve tissue oxygenation by increasing the solution of oxygen in the blood plasma. This retrospective study evaluated the healing effect of HBOT in patients with nonhealing wounds.

The subjects were patients with a nonhealing wound who were referred from specialized wound centers for treatment with HBOT between January 2017 and December 2020. Of those, over 50% of the wounds had persisted for more than three months. Appointments at the wound clinic were scheduled once a week for all patients. The patients were treated in a multiplace (20-person) hyperbaric chamber (IHC Hytech). Each session lasted 110 minutes in total, of which 75 minutes consisted of breathing 100% oxygen. The primary outcome parameter was the degree of wound healing at discharge. Secondary outcome measures were the change in quality of life (QoL), the number of sessions performed, cost of therapy, and adverse effects. Wounds were rated

(Continued from page 2)

Michael Bazzi, D.O.  
Jake Gooing PGY-2  
Alexander Mounts, PGY-2  
Eden Peykar, OMS II  
Eric T. Nguyen, OMS-IV  
Jessica Nguyen, OMS I  
Bianca Urness, OMS II  
Preethika Venugopal, D.O.  
Cameron Widhalm OMS-IV  
UC Irvine, Irvine, CA

\* Gurtej Bajaj, M.D.  
Andrew Kahn, M.D.  
Peter Spurrell, M.D.  
Dvid Weinberg, M.D.  
UPenn, Philadelphia, PA

\*Martin Laguerre, M.D.  
Ellen Sloan, M.D.  
Jake Stephan, D.O.  
Chiamaka Ukooha, M.D.  
UT Southwestern Med Ctr. Dallas, TX

\*Joshua Wilson, PGY2  
Garrett Wahl, M.D.  
Uni. Of Washington, Seattle, WA

**Executive Editor Emeritus**  
Donald F. Langenbeck, Jr., M.D.

**Subscription Manager**  
Michael P. Burke, M.S.

**\*Regional Managing Editors have attested that they have no financial conflict of interest when choosing articles that appear in Rehab in Review.**

by degree of improvement, deteriorating, or resulting in minor or major amputation. The QoL was measured by the EQ5D-3L questionnaire.

Data were assessed from the records of 681 patients, who received a median of 39 treatments. At discharge 307 wounds (39.7%) were rated as completely healed, 165 wounds (21.3%) as substantially healed, 177 wounds (22.9%) as partially improved, and 41 wounds (5.3%) as deteriorated. Failure to achieve a successful outcome was associated with severe peripheral arterial occlusive disease ( $p=0.018$ ) and having fewer than 30 sessions ( $p<0.01$ ). The median cost for HBOT treatment was 6,275 Euros and for wound care was 2,276 Euros.

**Conclusion:** This study of patients with nonhealing wounds referred for hyperbaric oxygen treatment found that the majority of patients achieved a successful result.

Lalieu, R., et al. Hyperbaric Oxygen Therapy for Nonhealing Wounds – A Long-term Retrospective Study. **Adv Skin Wound Care.** 2023, Jun 1; 36 (6):304-310.

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

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

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

Private subscriptions are available by email at [rehabinreview@aol.com](mailto:rehabinreview@aol.com) or by fax or phone at (417) 779-9101.  
ISSN # 1081-1303



**REHAB IN REVIEW**



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



**EMORY**  
UNIVERSITY  
SCHOOL OF  
MEDICINE

EXPANDING THE FRONTIER OF REHABILITATION SCIENCE IN RESEARCH, TEACHING, AND PATIENT CARE