Muscle Activity

1- Physical activity and muscle-brain crosstalk

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Abstract

Neurological and mental illnesses account for a considerable proportion of the global burden of disease. Exercise has many beneficial effects on brain health, contributing to decreased risks of dementia, depression and stress, and it has a role in restoring and maintaining cognitive function and metabolic control. The fact that exercise is sensed by the brain suggests that muscle-induced peripheral factors enable direct crosstalk between muscle and brain function. Muscle secretes myokines that contribute to the regulation of hippocampal function. Evidence is accumulating that the myokine cathepsin B passes through the blood-brain barrier to enhance brain-derived neurotrophic factor production and hence neurogenesis, memory and learning. Exercise increases neuronal gene expression of FNDC5 (which encodes the PGC1 alpha-dependent myokine FNDC5), which can likewise contribute to increased brain-derived neurotrophic factor levels. Serum levels of the prototype myokine, IL-6, increase with exercise and might contribute to the suppression of central mechanisms of feeding. Exercise also increases the PGC1 alpha-dependent muscular expression of kynurenine aminotransferase enzymes, which induces a beneficial shift in the balance between the neurotoxic kynurenine and the neuroprotective kynurenic acid, thereby reducing depression-like symptoms. Myokine signalling, other muscular factors and exercise-induced hepatokines and adipokines are implicated in mediating the exercise-induced beneficial impact on neurogenesis, cognitive function, appetite and metabolism, thus supporting the existence of a muscle-brain endocrine loop.

Keywords
Keywords Plus

Muscle Activity

NECROSIS-FACTOR-ALPHAHUMAN SKELETAL-MUSCLESYNAPTIC PLASTICITYNEUROTROPHIC FACTORADIPOSE-TISSUEHIPPOCAMPAL NEUROGENESISDIFFERENTIAL REGULATIONGLUCOSE-HOMEOSTASISCHRONIC DISEASESENDOCRINE ORGAN

Muscle Activity

2- The epidemiology of aerobic physical activity and muscle-strengthening activity guideline adherence among 383,928US adults

By:
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Abstract

BackgroundThe World Health Organization's Global Recommendations on Physical Activity for Health' state that adults should engage in regular moderate-to-vigorous intensity aerobic physical activity (MVPA; e.g. walking, running, cycling) and muscle-strengthening activity (MSA; e.g. strength/resistance training). However, assessment of both MVPA and MSA is rare in physical activity surveillance. The aim of this study is to describe the prevalence, correlates and chronic health conditions associated with meeting the combined MVPA-MSA guidelines among a population representative sample of U.S. adults.MethodsIn this cross-sectional study, data were drawn from the U.S. 2015 Behavioral Risk Factor Surveillance System. During telephone interviews, MVPA and MSA were assessed using validated questionnaires. We calculated the proportions meeting both the global MVPA and MSA physical activity guidelines (MVPA 150min/week and MSA 2 sessions/week). Poisson regressions with a robust error variance were used to assess: (i) prevalence ratios (PR) for meeting both guidelines across sociodemographic factors (e.g. age, sex, education, income, race/ethnicity); and (ii) PRs of 12 common chronic health conditions (e.g. diabetes, coronary heart disease, hypertension, depression) across different categories of physical activity guideline adherence (met neither [reference]; MSA only; MVPA only; met both).ResultsAmong 383,928 adults (aged 18-80years), 23.5% (95% CI: 20.1, 20.6%) met the combined MVPA-MSA guidelines. Those with poorer self-rated health, older adults, women, lower education/income and current smokers were less likely to meet the combined guidelines. After adjustment for covariates (e.g. age, self-rated health, income, smoking) compared with meeting neither guidelines, MSA only and MVPA only, meeting the

combined MVPA-MSA guidelines was associated with the lowest PRs for all health conditions (APR range: 0.44-0.76), and the clustering of 6 chronic health conditions (APR=0.33; 95% CI: 0.31-0.35).ConclusionsEight out of ten U.S. adults do not meet the global physical activity guidelines. This study supports the need for comprehensive health promotion strategies to increase the uptake and adherence of MVPA-MSA among U.S. adults. Large-scale interventions should target specific population sub-groups including older adults, women, those with poorer health and lower education/income.

Keywords
Author Keywords
Public healthPhysical activityResistance trainingConcurrent trainingAerobic exercise
Keywords Plus
DOSE-RESPONSE RELATIONSHIPALL-CAUSE MORTALITYRISKASSOCIATIONSEXERCISERELIABILITYDEPRESSIONCANCERWORKTIME

3- EVALUATION OF THE CORRELATION BETWEEN FACIAL MUSCLE AND BRAIN ACTIVITIES IN AUDITORY STIMULATION

By:
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Abstract

Evaluation of the correlation of the activities of various organs is an important area of research in physiology. In this paper, we evaluated the correlation among the brain and facial muscles' reactions to various auditory stimuli. We played three different music (relaxing, pop, and rock music) to 13 subjects and accordingly analyzed the changes in complexities of EEG and EMG signals by calculating their fractal exponent and sample entropy. Based on the results, EEG and EMG signals experienced more significant changes by presenting relaxing, pop, and rock music, respectively. A strong correlation was observed among the alterations of the complexities of EMG and EEG signals, which indicates the coupling of the activities of facial muscles and brain. This method could be further applied to investigate the coupling of the activities of the brain and other organs of the human body.

Keywords
Author Keywords
Facial MuscleEMG SignalsBrainEEG SignalsFractal DimensionSample EntropyComplexity
Keywords Plus: RESPONSES

Muscle Activity

4- High-frequency brain activity and muscle artifacts in MEG/EEG: a review and recommendations

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Abstract

In recent years high-frequency brain activity in the gamma-frequency band (30-80 Hz) and above has become the focus of a growing body of work in MEG/EEG research. Unfortunately, high-frequency neural activity overlaps entirely with the spectral bandwidth of muscle activity (similar to 20-300 Hz). It is becoming appreciated that artifacts of muscle activity may contaminate a number of non-invasive reports of high-frequency activity. In this review, the spectral, spatial, and temporal characteristics of muscle artifacts are compared with those described (so far) for high-frequency neural activity. In addition, several of the techniques that are being developed to help suppress muscle artifacts in MEG/EEG are reviewed. Suggestions are made for the collection, analysis, and presentation of experimental data with the aim of reducing the number of publications in the future that may contain muscle artifacts.

Keywords
Author Keywords
high-frequency activitymuscle artifactsgamma-band activitymagnetoencephalographyelectroencephalography
Keywords Plus
RAPID ANTIDEPRESSANT RESPONSEGAMMA-BAND SYNCHRONIZATIONVISUAL-CORTEXSCALP EEGSOMATOSENSORY CORTEXELECTROMYOGENIC ARTIFACTSFUNCTIONAL CONNECTIVITYEMG CONTAMINATIONFAST OSCILLATIONSSPECTRAL-ANALYSIS

5- Muscle mass, strength, and physical performance predicting activities of daily living: a meta-analysis

By:
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Abstract

Background Activities of daily living (ADLs) and instrumental activities of daily living (IADLs) are essential for independent living and are predictors of morbidity and mortality in older populations. Older adults who are dependent in ADLs and IADLs are also more likely to have poor muscle measures defined as low muscle mass, muscle strength, and physical performance, which further limit their ability to perform activities. The aim of this systematic review and meta-analysis was to determine if muscle measures are predictive of ADL and IADL in older populations. Methods A systematic search was conducted using four databases (MEDLINE, EMBASE, Cochrane, and CINAHL) from date of inception to 7 June 2018. Longitudinal cohorts were included that reported baseline muscle measures defined by muscle mass, muscle strength, and physical performance in conjunction with prospective ADL or IADL in participants aged 65 years and older at follow-up. Meta-analyses were conducted using a random effect model. Results Of the 7760 articles screened, 83 articles were included for the systematic review and involved a total of 108 428 (54.8% female) participants with a follow-up duration ranging from 11 days to 25 years. Low muscle mass was positively associated with ADL dependency in 5/9 articles and 5/5 for IADL dependency. Low muscle

strength was associated with ADL dependency in 22/34 articles and IADL dependency in 8/9 articles. Low physical performance was associated with ADL dependency in 37/49 articles and with IADL dependency in 9/11 articles. Forty-five articles were pooled into the meta-analyses, 36 reported ADL, 11 reported IADL, and 2 reported ADL and IADL as a composite outcome. Low muscle mass was associated with worsening ADL (pooled odds ratio (95% confidence interval) 3.19 (1.29-7.92)) and worsening IADL (1.28 (1.02-1.61)). Low handgrip strength was associated with both worsening ADL and IADL (1.51 (1.34-1.70); 1.59 (1.04-2.31) respectively). Low scores on the short physical performance battery and gait speed were associated with worsening ADL (3.49 (2.47-4.92); 2.33 (1.58-3.44) respectively) and IADL (3.09 (1.06-8.98); 1.93 (1.69-2.21) respectively). Low one leg balance (2.74 (1.31-5.72)), timed up and go (3.41 (1.86-6.28)), and chair stand test time (1.90 (1.63-2.21)) were associated with worsening ADL. Conclusions Muscle measures at baseline are predictors of future ADL and IADL dependence in the older adult population.

Keywords
Author Keywords
Muscle massMuscle strengthHandgrip strengthPhysical performanceActivities of daily livingAged
Keywords Plus
LOWER-EXTREMITY FUNCTIONDWELLING OLDER MENHAND GRIP STRENGTHUSUAL GAIT SPEEDFUNCTIONAL DECLINEINCIDENT DISABILITYRISK-FACTORSINSTRUMENTAL ACTIVITIESSKELETAL-MUSCLESUBSEQUENT DISABILITY

Muscle Activity

6- A peptide encoded by a transcript annotated as long noncoding RNA enhances SERCA activity in muscle

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Abstract

Muscle contraction depends on release of Ca2+ from the sarcoplasmic reticulum (SR) and reuptake by the Ca2+ adenosine triphosphatase SERCA. We discovered a putative muscle-specific long noncoding RNA that encodes a peptide of 34 amino acids and that we named dwarf open reading frame (DWORF). DWORF localizes to the SR membrane, where it enhances SERCA activity by displacing the SERCA inhibitors, phospholamban, sarcolipin, and myoregulin. In mice, overexpression of DWORF in cardiomyocytes increases peak Ca2+ transient amplitude and SR Ca2+ load while reducing the time constant of cytosolic Ca2+ decay during each cycle of contraction-relaxation. Conversely, slow skeletal muscle lacking DWORF exhibits delayed Ca2+ clearance and relaxation and reduced SERCA activity. DWORF is the only endogenous peptide known to activate the SERCA pump by physical interaction and provides a means for enhancing muscle contractility.

Keywords

Muscle Activity

Keywords Plus

OPEN READING FRAMESCARDIAC CONTRACTILITYSKELETAL-MUSCLESARCOLIPINMICEPHOSPHOLAMBANTRANSPORT

Muscle Activity

7- LincRNA-p21 Regulates Neointima Formation, Vascular Smooth Muscle Cell Proliferation, Apoptosis, and Atherosclerosis by Enhancing p53 Activity

By:
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Abstract

Background-Long noncoding RNAs (lncRNAs) have recently been implicated in many biological processes and diseases. Atherosclerosis is a major risk factor for cardiovascular disease. However, the functional role of lncRNAs in atherosclerosis is largely unknown.

Methods and Results-We identified lincRNA-p21 as a key regulator of cell proliferation and apoptosis during atherosclerosis. The expression of lincRNA-p21 was dramatically downregulated in atherosclerotic plaques of ApoE(-/-) mice, an animal model for atherosclerosis. Through loss-and gain-of-function approaches, we showed that lincRNA-p21 represses cell proliferation and induces apoptosis in vascular smooth muscle cells and mouse mononuclear macrophage cells in vitro. Moreover, we found that inhibition of lincRNA-p21 results in neointimal hyperplasia in vivo in a carotid artery injury model. Genome-wide analysis revealed that lincRNA-p21 inhibition dysregulated many p53 targets. Furthermore, lincRNA-p21, a transcriptional target of p53, feeds back to enhance p53 transcriptional activity, at least in part, via binding to mouse double minute 2 (MDM2), an E3 ubiquitin-protein ligase. The association of lincRNA-p21 and MDM2 releases MDM2 repression of p53, enabling p53 to interact with p300 and to bind to the promoters/enhancers of its target genes. Finally, we show that lincRNA-p21 expression is decreased in patients with coronary artery disease.

Muscle Activity

Conclusions-Our studies identify lincRNA-p21 as a novel regulator of cell proliferation and apoptosis and suggest that this lncRNA could serve as a therapeutic target to treat atherosclerosis and related cardiovascular disorders.

Keywords

Author Keywords

apoptosisatherosclerosiscell proliferationMDM2 proteinRNA, long noncodingtumor suppressor protein p53

Keywords Plus

LONG NONCODING RNASDNA-DAMAGEIN-VIVOMDM2GENEACETYLATIONDISEASEPROTEINTRANSCRIPTIONDEGRADATION

Muscle Activity

8- Effect of Supplementation With Selenium-Yeast on Muscle Antioxidant Activity, Meat Quality, Fatty Acids and Amino Acids in Goats

By: Tian, XZ (Tian, Xing-Zhou) [1] ; Li, JX (Li, Jia-Xuan) [1] ; Luo, QY (Luo, Qing-Yuan) [1] ; Wang, X (Wang, Xu) [1] ; Xiao, MM (Xiao, Mei-Mei) [1] ; Zhou, D (Zhou, Di) [2] ; Lu, Q (Lu, Qi) [1] ; Chen, X (Chen, Xiang) [1]

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Abstract

The objective of this study was to observe the effects of selenium-yeast (SY) on growth performance, muscle antioxidant activity, meat quality, fatty acid and amino acid profiles in growing goats. A total of 18 Qianbei-pockmarked goats were assigned to three groups (six duplicates per group) by body weight (25.75 +/- 1.75 kg; mean +/- standard deviation) according to a completely randomized design: (1) basal diet (CON); (2) CON with 2.4 mg/kg SY (LS); and (3) CON with 4.8 mg/kg SY (HS). The results indicated that goats receiving SY did not show any differences ($P > 0.05$) in terms of dry matter intake, growth performance, or muscle chemical composition. In addition, dietary treatment did not affect ($P > 0.05$) the pH values (pH(45min) and pH(24h)), percentage of water loss, drip loss, or cooking loss. The HS group showed a significant increase ($P < 0.05$) in the dressing percentage, eye muscle area and meat color, as well as muscle total antioxidant capacity, glutathione peroxidase and 2,2-diphenyl-1-picrylhydrazyl scavenging activity levels, whereas it showed a significant drop ($P < 0.05$) in shear force and muscle malondialdehyde levels relative to the control. Feeding 4.8 mg/kg SY led to a significant ($P < 0.05$) decrease in the levels of C8:0, C14:0, C15:0, C16:0, C17:0, C18:0, C20:0 and total saturated fatty acids, whereas it led to a significant ($P < 0.05$) increase in C15:1 in comparison with that of the control group. Goats receiving 2.4 mg/kg SY had significantly ($P < 0.05$) increased C16:1, C17:1, C18:1n7, C18:2n6, C18:3n3, C20:4n6, C22:1n9, and PUFA relative to the control group. Compared with the control group, the treatment groups had higher ($P < 0.05$) levels of C18:1n9, C22:4, and monounsaturated fatty acids. The inclusion of 2.4 mg/kg SY induced significant ($P < 0.05$) increases in 4-aminobutyric acid, glutamic acid and umami amino acid concentrations compared to the control. In addition, the feeding of 4.8 mg/kg SY had significantly higher ($P < 0.05$) muscle serine, valine, isoleucine, leucine, ornithine hydrochloride, methionine, and tyrosine levels than the control group. Collectively, Se supplementation in the diet did not affect growth performance, muscle chemical composition, whereas it could improve meat quality,

muscle antioxidant activity, fatty acid and amino acid profiles in Qianbei-pockmarked goats. This showed that the optimal accession SY level was 4.8 mg/kg under the experimental conditions of this study.

Keywords
Author Keywords
selenium-yeastantioxidant activitymeat qualityfatty acidamino acid
Keywords Plus
RUMEN FERMENTATIONOXIDATIVE STRESSORGANIC SELENIUMLIPID-METABOLISMENRICHED YEASTLINSEED OILPERFORMANCEBLOODLIVERDIGESTIBILITY

Muscle Activity

9- Updated Results of PURE-01 with Preliminary Activity of Neoadjuvant Pembrolizumab in Patients with Muscle-invasive Bladder Carcinoma with Variant Histologies

By:
Necchi, A (Necchi, Andrea) [1] ; Raggi, D (Raggi, Daniele) [1] ; Gallina, A (Gallina, Andrea) [2] ; Madison, R (Madison, Russell) [3] ; Colecchia, M (Colecchia, Maurizio) [1] ; Luciano, R (Luciano, Roberta) [2] ; Montironi, R (Montironi, Rodolfo) [4] ; Giannatempo, P (Giannatempo, Patrizia) [1] ; Fare, E (Fare, Elena) [1] ; Pederzoli, F (Pederzoli, Filippo) [2] ; ...More
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Abstract

Background: Patients with predominant variant histology (VH) of bladder tumors, defined as involving >50 % of the tumor specimens, are typically excluded from clinical trials, and for these patients, the efficacy of standard chemotherapy is limited.
Objective: To evaluate the activity of preoperative pembrolizumab in patients with muscleinvasive bladder carcinoma (MIBC) and VH, enrolled in PURE-01 study (NCT02736266).
Design, setting, and participants: In the open-label, single-arm, phase 2 PURE-01 study, three courses of 200 mg pembrolizumab preceding radical cystectomy (RC) were administered in T2-4aN0M0 MIBC patients. The amended study design included patients with predominant VH.
Intervention: Neoadjuvant pembrolizumab and RC.
Outcome measurements and statistical analysis: Pathological complete response (pT0) in intention-to-treat population was the primary endpoint. Biomarker analyses included programmed cell-death ligand-1 (PD-L1) expression using the combined positive score (CPS; Dako 22C3 antibody) and comprehensive genomic profiling (FoundationOne assay). Multivariable logistic regression analyses (MVAs) evaluated the

histological category (predominant VH vs nonpredominant VH vs pure urothelial carcinoma), tumor mutational burden (TMB) and CPS in association with the pathological response.
Results and limitations: From February 2017 to June 2019, 114 patients were enrolled; 34 (30%) of them presented with VH, including 19 (17%) with predominant VH. In total, the pTO rate was 37% (95% confidence interval [CI]: 28-46) and the pT <= 1 rate was 55% (95% CI: 46-65). The majority of predominant VH patients presented with squamouscell carcinoma (SCC; N= 7), and six of seven (86%) had downstaging to pT <= 1, with one pTO; two of three lymphoepithelioma-like (LEL) variants had a pTO response. None of the remaining nine predominant VHs had a response. On MVA, TMB and CPS were associated with both the pTO and the pT <= 1 response, regardless of tumor histology.
Conclusions: The updated PURE-01 results confirm the activity of neoadjuvant pembrolizumab in MIBC. Patients with SCC and LEL features may be suitable for neoadjuvant immunotherapy trials. CPS and TMB are the key response predictors irrespective of the histological subtypes.
Patient summary: In the PURE-01 study, we have preliminarily evaluated the activity of neoadjuvant pembrolizumab in patients with predominant variant histology (VH). Of these patients, those harboring squamous-cell carcinoma or a lymphoepithelioma-like variant feature had major, although preliminary, pathological responses compared with those with other predominant VHs. Expression of programmed cell-death ligand-1 and tumor mutational burden may predict the pathological response to pembrolizumab, and provide a rationale for selecting patients according to these features instead of the histological bladder cancer subtypes.

Keywords
Author Keywords
PembrolizumabMuscle-invasive bladder cancerVariant histologiesNeoadjuvant immunotherapyBiomarkers
Keywords Plus
CANCERCHEMOTHERAPYCLASSIFICATIONMULTICENTERCISPLATINTHERAPY