which enables high-quality images with lower tracer activity in this translational animal model. Future research will apply the same methodology to other anatomical targets as well as to the use of different tracers. Preclinical nuclear medicine imaging using ultra-low tracer doses, demonstrated the potential to obtain reasonable quality images and diminishing radiation surveillance in accordance with as low as reasonably achievable tracer levels.

2366

Urinary tract infections in children with kidney allografts: Risk factors and clinical consequences

Annie Farrell[1], Larry Greenbaum[2] and Traci Leong[3]
[1] Emory University; [2] School of Medicine and Children's Hospital of Atlanta, Emory University; [3] Rollins School of Public Health, Emory University

OBJECTIVES/SPECIFIC AIMS: Background: Renal transplantation (tx) is the optimal treatment for end-stage renal disease (ESRD) in children, but post-tx urinary tract infections (UTIs) may cause morbidity and reduce allograft survival. Objectives: To quantify the number and risk factors for UTIs in pediatric kidney tx recipients in preparation for an analysis of the morbidity and impact of UTIs on allograft survival. METHODS/STUDY POPULATION: Methods: We identified all patients who underwent kidney tx between 2001 and 2016 (n = 390) at Children's Healthcare of Atlanta (CHOA). Patients were included if they had >1 year of follow-up at CHOA. We conducted an IRB-approved, retrospective review of patient demographics, medical history, and tx outcomes in the 5 years following tx. RESULTS/ANTICIPATED RESULTS: Results: Of the 205 records reviewed to date, we identified 176 eligible patients (61.9% male). Mean age at tx was 11.7 ± 5.5 years. In total, 58.5% had a deceased and 41.5% had a living kidney donor. Obstructive uropathy was the etiology of ESRD in 21.0%. Mean UTIs in all patients was 1.1/patient ± 2.7. On preliminary analysis, patients with a history of obstructive uropathy were more likely to develop a UTI than patients without (45.9% vs. 25.2%, $p = 0.014$). There is a trend to more UTIs in patients with a history of obstructive uropathy compared with patients without (2.1 ± 3.5 vs. 0.9 ± 2.4, $p = 0.055$). In males, there were more UTIs in patients with a history of obstructive uropathy compared to patients without (1.7 ± 2.9 vs. 0.5 ± 1.5, $p = 0.024$). In all, 23.2% of all patients were on UTI prophylaxis post-tx; trimethoprim-sulfamethoxazole was the prophylactic antibiotic in 54.5%. DISCUSSION/SIGNIFICANCE OF IMPACT: Conclusions: UTIs are common post kidney tx in children, especially in those with a history of obstructive uropathy. The associated morbidity and impact on graft survival are unknown.

2010

Use it but still lose it: Exploring age-related changes in skeletal stem cell location and activation in response to physical stimulation

Pamela C. Zuckerman[1], Chao Liu[2,3] and Alesha B. Castillo[2,3]
[1] H + H Clinical and Translational Science Institute, New York University, New York, NY, USA; [2] New York University, New York, NY, USA; [3] Veterans Affairs New York Harbor Healthcare System, New York, NY, USA

OBJECTIVES/SPECIFIC AIMS: Our goal is to assess age-related changes in osteogenic stem cell populations of bone tissue. We hypothesize that aging mice have reduced osteogenic capacity in response to physical stimulation due to aging-associated decline in osteoprogenitor cell number and their proliferative capacity. METHODS/STUDY POPULATION: Mechanical loading: The NYU School of Medicine Institutional Animal Care and Use Committee approved all procedures. The response of tibial periosteal cells to physical stimulation or mechanical loading was assessed in 16-week-old adult (n = 6) and aged 78-week-old female (n = 4) mice subjected to 4 consecutive days of strain-matched axial compressive loading (1400 μm, 120 cycles, 2 Hz). Whole Mount Staining: Baseline periosteal cell numbers and nuclear morphology were assessed by whole bone DAPI staining of the antero-medial region of the tibiae in adult and aged mice (n = 6). Immunohistochemistry: Tibiae were fixed in 4% PFA, decalcified in 19% EDTA, OCT-embedded, and thickly sectioned (150 μm) at midshaft. Sca1 + , Prrx1 + , and Ki67 + cell numbers were quantified by simultaneous fluorescent immunohistochemical staining from loaded and nonloaded contralateral tibiae. Nonimmune species specific serum served as negative controls. Imaging: 3D image datasets of the periosteum at the antero-medial region of the tibial midshaft were acquired by multi-photon and confocal microscopy. Quantification of Sca1 + , Prrx1 + , and Ki67 + cells was carried out using Particle Analysis software (ImageJ) and Imaris 7.4.2 Surface Rendering Statistics functions. Cell number was normalized to periosteal area (~0.04 mm^2). A Student *t*-test determined significance at $p < 0.05$. RESULTS/ANTICIPATED RESULTS: At baseline, aged periosteal cell nuclei (DAPI +) area (14% decrease, $p < 0.0001$), nuclei number, and Prrx1 + cell number (22% decrease) was significantly lower compared with adult mice. In loaded adult mice, Prrx1 + but not Sca1 + cell number increased significantly (35%, $p = 0.0115$). Proliferating Sca1 + (top panel) and Prrx1 + (top panel) cells also increased with loading, 62%, $p = 0.0253$ and 115%, $p = 0.0004$, respectively, in adult but not aged mice. The percentage of Prrx1 + cells undergoing proliferation (co-expressing Ki67 +) in the total Prrx1 + cell population increased significantly with loading (bottom panel). Aged mice did not exhibit significant differences in loaded versus nonloaded controls for all other outcomes. Our data suggest fundamental changes in periosteal cell morphology, number and response to mechanical loading with aging. The significant increase in total Prrx1 + cell number and the number of Prrx1 + cells undergoing proliferation with loading in adult mice, suggest that the Prrx1 + cell population expands through proliferation. In fact, loading resulted in a 2-fold increase in the percentage of Prrx1 + preosteogenic cells undergoing proliferation. Accordingly, the significant age-related decrease in Prrx1 + cells may explain, in part, the attenuation of load-induced bone formation in aged mice. Loading resulted in greater numbers of proliferating Sca1 + cells (the more primitive cell) in adult mice, though this represented only a small percentage (<10%) of the total Sca1 + population. Mechanical loading expands the Prrx1 + pre-osteogenic cell population, but not the more primitive Sca1 + population. However, this load-induced osteogenic effect in the periosteum is not observed in aged mice, which may explain age-related diminishment of load-induced bone formation. DISCUSSION/SIGNIFICANCE OF IMPACT: Mechanical loading presents an inexpensive treatment for increasing bone mass and bone strength, but may be insufficient to prevent or reverse age-related bone loss due to reduced numbers of osteogenic progenitors in the periosteum. Therapeutic approaches targeting the osteogenic capacity of periosteal cells will be required to address declining mechanoresponsiveness with age.

2128

Using real-time functional magnetic resonance imaging (fMRI) neurofeedback as a tool for demonstrating therapeutic efficacy in cognitive behavioral therapy

Kathryn Dickerson, Katherine E. MacDuffie, Jeff MacInnes, Kari M. Eddington, Timothy J. Strauman and R. Alison Adcock
Duke University

OBJECTIVES/SPECIFIC AIMS: The purpose of this study was to provide individuals who have experience with cognitive behavioral therapy (CBT) with a demonstration of how using their therapeutic strategies affects their brain activity. Two challenges that face CBT and other cognitive therapies are (1) sustaining the gradual, incremental behavioral changes characteristic of the treatment and (2) measuring associated biological changes. These challenges may impede treatment efficacy and may negatively affect treatment outcomes, including patient discontinuation of CBT. Ideas for addressing these issues include providing patients with (1) a more immediate indicator of therapy effectiveness as well as (2) a biological index of behavioral change. In this study, we aimed to provide participants with an index of biological change based on therapeutic experiences via use of real-time functional magnetic resonance imaging (rtfMRI) neurofeedback. METHODS/STUDY POPULATION: We recruited participants who had already completed cognitive therapy as part of a clinical trial for depression at the University of North Carolina at Greensboro (n = 13). In the present experiment, participants were asked to provide a list of negative autobiographical memories or worries as well as cognitive strategies they use to cope with negative moods. The task consisted of COUNT, MEMORY, and STRATEGY trials (30 s each). During baseline COUNT trials, participants counted backwards (e.g., 300–4). During MEMORY trials, they viewed phrases previously developed describing their negative autobiographical memories/worries. During STRATEGY trials participants viewed a strategy they use to help them process the memory/worry. First, a localizer run was completed to determine a unique region of interest for each participant. We identified peak activation within the cingulate cortex to the contrast of MEMORY (STRATEGY + COUNT). Although the task was the same, no neurofeedback was displayed during the localizer run. During the feedback runs, participants were shown neurofeedback from the cingulate cortex following both the MEMORY and STRATEGY trials. This activation was

https://doi.org/10.1017/cts.2018.145 Published online by Cambridge University Press