WALKING IT OFF: MORE STRESSORS AND PERCEIVED STRESSOR CONTROL PREDICT MORE PHYSICAL ACTIVITY IN DAILY LIFE

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Research shows that, while the experience of stress relates to lower levels of physical activity (PA), people who perceive a greater sense of control engage in higher levels of PA. This study explores whether a sense of control specifically over stressful situations moderates the negative association between stressor exposure and PA in daily life. We used 8-day diary data from up to 1,236 participants (Age: Range = 43-91, M = 62.47, SD = 10.20) in the National Study of Daily Experiences. Somewhat contrary to hypotheses, people reported spending more time on light PA (but not moderate-to-vigorous PA) on days when they also experienced more stressors than usual. Perceived stressor control appears to magnify this effect, with people reporting even more light PA on days when they feel greater control. Initial findings suggest that a physically active lifestyle may help middle-aged and older adults cope with daily stressors.

ACCELEROMETRY-BASED PHYSICAL ACTIVITY AND AFFECTIVE RESPONSES TO DAILY STRESSORS: AN ANALYSIS OF THE AAPECS STUDY

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Evidence suggests that physical activity on a daily basis dampens the extent to which one experiences elevations in negative affect in response to daily stressors. Yet, these studies primarily relied solely on end-of-day recall of stressors and negative affect, and self-reported physical activity. More intensive assessments throughout the day and accelerometry-based physical activity measurements are required to answer whether any type of body movement (e.g. light, moderate, vigorous) reconfigures the end-of-day recall of the intensity of the affective experience of a stressor or, rather, mitigates the actual experience of a stressor in real-time. This presentation will summarize results addressing this question using data from the University of Pittsburgh’s Assessment of Personality, Ecological Context, and Stress (AAPECS) study. AAPECS includes 172 participants who wore accelerometers to assess movement-based activities and completed ecological momentary assessment 6 times daily for 14 days, with additional ‘bursts’ of affective assessments following reported stressors at any time.

PHYSICAL ACTIVITY IN DAILY LIFE

PERCEIVED STRESSOR CONTROL PREDICT MORE PHYSICAL ACTIVITY: A NATURAL EXPERIMENT

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We examined whether individuals experienced more stressors than usual and utilized a natural experiment to test the relationship of perceived stressor control and physical activity. We analyzed 8-day diary data from up to 1,236 participants (Age: Range = 43-91, M = 62.47, SD = 10.20) in the National Study of Daily Experiences. Somewhat contrary to hypotheses, people reported spending more time on light PA (but not moderate-to-vigorous PA) on days when they also experienced more stressors than usual. Perceived stressor control appeared to magnify this effect, with people reporting even more light PA on days when they feel greater control. Initial findings suggest that a physically active lifestyle may help middle-aged and older adults cope with daily stressors.

Session 1170 (Symposium)

A NEW TYPE OF COP: THE ROLE OF CIRCULATING OSTEOGENERIC PROGENITOR (COP) CELLS IN HEALTH AND DISEASE

Chair: Gustavo Duque

Circulating osteogenic progenitor (COP) cells are a population of cells in the peripheral blood with the capacity for bone formation and broader differentiation into mesoderm-like cells in vitro. While some of their biological characteristics are documented in vitro, their role in the aging process and the pathogenesis of musculoskeletal diseases remains to be thoroughly evaluated. This translational session will go from bench to bedside, reviewing the current evidence on COP cells. In this session, we will provide an overview of the role of COP cells in the aging process and a number of physiological and pathological conditions and identify areas for future research. In addition, we will suggest possible areas for clinical utilization in the management of musculoskeletal diseases, which include novel diagnostic and therapeutic uses.

COP CELLS AND TISSUE LOSS SYNDROMES: FRAILTY, SARCOPENIA, AND OSTEOPOROSIS

Gustavo Duque, The University of Melbourne, St Albans, Victoria, Australia

COP cells have been identified as having a potential role in the pathogenesis of tissue loss syndromes such as osteoporosis and frailty. This is based on the hypothesis that dysregulation may cause a decrease in bone and...
muscle formation, which also increase the risk of adverse outcomes such as frailty and disability. Whereas high numbers of COP cells have been associated with osteoporosis and fracture healing, a low percentage of COP (%COP) cells have been associated with frailty and disability. In addition, low expression of lamin A (a protein of the inner nuclear envelope) in COP cells has also been associated with frailty and disability in older persons. In this session, the evidence on quantification methods for COP cells in clinical settings and the potential clinical use of COP cells in tissue loss syndromes will be discussed. This discussion will include current evidence supporting the use of COP cells as a biomarker or as a novel therapeutic approach to these age-related conditions.

THE BIOLOGY OF COP CELLS: MESENCHYMAL OF HEMATOPOIETIC?
Meghan McGee-Lawrence, Medical College of Georgia, Augusta, Georgia, United States

Circulating osteogenic progenitor (COP) cells are a population of cells in the peripheral blood with the capacity for bone formation, as well as broader differentiation into mesoderm-like cells in vitro. There are several pathologies of accelerated bone formation and physiological responses to injury in which COP cells have been theorized to play a role. These include fracture, vascular calcification, and subtypes of heterotopic ossification (HO). Overall, the available studies suggest COP cells are likely to be mobilized in response to fracture, home to the site of injury, undergo a maturation process, and contribute to the osteogenesis and angiogenesis required for fracture healing. HO is the pathological process of bone formation in nonskeletal tissue and can be acquired or hereditary. COP cells may seed sites of injury and inflammation that precede the formation of endochondral bone identified in both genetic and nongenetic forms of HO. Vascular calcification is a common occurrence in older adults and is strongly associated with poorer cardiovascular health outcomes. It appears that COP cells, particularly those expressing hematopoietic and vascular markers such as CD45 and CD34, contribute to the calcification and ossification of atherosclerotic plaques and aortic valves, and that they correlate to the severity of the calcification. Whether COP cells are attracted to sites of injury and inflammation and so are highly associated with fracture, vascular calcification/ossification and HO, or whether they underlie these processes at a more mechanistic level, remains to be more clearly demonstrated.

THE KYNURENINE PATHWAY METABOLITES QA AND KYNA INDUCE SENESCENCE IN BONE MARROW STEM CELLS THROUGH THE AHR PATHWAY
Dmitry Kondrikov, Ahmed Elmansi, Xing-ming Shi, Meghan McGee-Lawrence, Sadanan Fulzele, Mark Hamrick, Carlos Isales, and William Hill

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Cell senescence is emerging as a critical factor in the pathophysiology of aging bone loss. We have shown that the essential amino acid tryptophan is metabolized by IDO-1 in the periphery to generate kynurenine (KYN), and that KYN can signal through the aryl hydrocarbon receptor (AhR) transcription factor pathway to inhibit osteogenesis in bone marrow MSCs via epigenetic regulation of osteogenic genes, while also upregulating osteoclastogenic transcription factors and genes driving osteoclast activity. Further, we recently showed that KYN acting via AhR inhibits MSC autophagy while inducing senescence. Here we demonstrate that KYN metabolites downstream from KYN act via the AhR signaling pathway to inhibit autophagy and induce SASP expression and drive senescence in murine and human bone marrow MSCs. We focused on two of these metabolites, quinolinic acid (QA) and kynurenic acid (KYNA) and investigated their effects on BMSC cellular function. We demonstrated that both kynurenine pathway metabolites QA and KYNA increase biomarkers for senescence including beta-galactosidase, p21/Cdkn1 and other SASPs such as PAI-1 and TIMP-2, as well as nuclear DNA damage leading to senescent markers like H2A Ser139 phosphorylation, and the accumulation of senescence-associated heterochromatin foci (SAHF) with H3K9-me3 labeling. Then upon treatment with the AhR inhibitor 3’4’-DMF the disruption of autophagy and induction of senescent biomarkers was blocked. Like KYN, the effects of QA and KYNA were mediated through the AhR receptor. Therefore, this presents novel therapeutic targets linked to KYN metabolite signaling via AhR to prevent senescence and bone loss.

Session 1175 (Symposium)

A TRANSITIONAL CARE MODEL FOR VETERANS WITH COMPLEX NEEDS DURING COVID: THE BEHAVIORAL RECOVERY OUTREACH (BRO) TEAM
Chair: Kathleen Matthews
Discussant: Latrice Vinson

The Veterans Health Administration’s Care for Patients with Complex Problems (CP)2 Program developed a national