UNIVERSITY of MARYLAND
SCHOOL OF MEDICINE
CENTER FOR RESEARCH ON AGING

3rd Annual Aging Research Symposium

Poster Session:

Featuring aging-related research by faculty, trainees and students

MAY 16, 2022

Keynote Address:

The Implications of Longevity for Public Health and Epidemiology

Linda Fried, MD, MPH

Dean of the Mailman School of Public Health and DeLamar, Professor of Public Health Practice, Professor of Epidemiology and Medicine Senior Vice President, Columbia University Medical Center

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Forward

The University of Maryland School of Medicine Center for Research on Aging is proud to present poster abstracts from the 3rd Annual Aging Research Symposium on May 16, 2022. Dr. Linda Fried, Dean of the Mailman School of Public Health of Columbia University Medical Center, will present "The Implications of Longevity for Public Health and Epidemiology" as the guest speaker, as well as the poster session featuring aging related research by faculty, fellows and graduate students. This compilation of abstracts from faculty, fellows and graduate students from UMB, UMBC, and the University of Maryland College Park presents some of the exciting research in aging on our campuses.

The mission of the Center for Research on Aging is to facilitate, amplify, and enrich research in gerontology and geriatrics; provide outstanding research training and educational opportunities in gerontology for graduate students and health professionals; and enhance delivery of excellent multidisciplinary geriatric care that prevents functional and mental disability in the elderly, and promotes a healthy lifestyle. We currently have more than 150 affiliates that focus on aging research, education, and clinical care. We are hoping that these abstracts will inspire others and promote collaborations amongst students, fellows, and faculty at our campuses and beyond. Through these collaborations, faculty continue to secure aging-related grants, establish new research collaborations, and strengthen already established areas of research.

The Center for Research on Aging would like to thank Dean Reece for his ongoing support of aging research as well as the many Centers and Programs across campus that focus on the aging population and improving their health and quality of life.

We hope you enjoy our Aging Symposium 2022 and that you will join our Aging Research Seminars scheduled throughout the year. If you would like more information about the Center for Research on Aging, please contact Anne Sullens (asullens@som.umaryland.edu) or visit https://www.medschool.umaryland.edu/research-centers/Center-for-Research-on-Aging/.

Sincerely,

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1. Dietary Intakes Of Green Vegetables, Phylloquinone, And Beta-Carotene Are Associated With Cognitive Functioning In A National Sample Of US Older Adults

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Background
Inflammation and oxidative stress are associated with low cognitive function that can be mitigated by high intake of vegetables and other nutrients. The study aim is to assess the association between green vegetable and cognitive functioning in US older adults and whether it can be explained by phylloquinone (vitamin K1) and beta-carotene, biologically active nutrients in green vegetables.

Methods
Cross-sectional data of older adults (≥60 years; n=2,341; females 53.3%, males 46.7%) from the 2011–2014 the National Health and Nutrition Examination Survey (NHANES) were analyzed. Dietary intakes were estimated using two 24-hour dietary recalls. Green vegetable intake was categorized as none, 0<cup/day<1, and ≥1 cup/day. Phylloquinone and beta-carotene were separately divided into quartiles. The cognitive functioning assessment included four tests:(1) Word learning (CERAD); (2) Delayed Word Recall (DWR); (3) Animal Fluency (AFT); (4) Digit Symbol Substitution (DSST); and an (5) Overall Score (calculated as the average of standardized scores of all four tests). Multivariable weighted linear regressions examined the association of green vegetable, phylloquinone, and beta-carotene intake with each outcome, controlling for study covariates including age, gender, education, race/ethnicity, poverty income ratio, smoking status, alcohol use, physical activity, energy intake, diet quality, diabetes, medication use (including anticoagulants and antithrombotic drugs), elevated cholesterol, hypertension, and history of cardiovascular diseases.

Results
The sample Mean ± SD age was 68.9±6.6 years where more than half (55.0%) did not consume green vegetables across all age groups (p-value=0.747), and females vs. males consumed more of ≥1cup/day of green vegetables (58.3 vs. 41.7%, p-value=0.006). Participants who consumed ≥1cup/day of green vegetables vs. none had higher scores by 0.4-0.9 points on the CERAD, DWR, and AFT tests and higher overall standardized score (Mean ±SE) (-0.57± 0.06 vs. -0.71±0.05, p<0.012). Participants with high (Q4) vs. low (Q1) beta-carotene intake had higher scores on the CERAD, DWR, and AFT tests (all p<0.028) and overall standardized score (-0.56±0.07 vs. -0.81±0.06, p=0.001) after adjusting for study covariates. Participants with high (Q4) vs. low (Q1) phylloquinone intake had higher scores on the CERAD, DWR, AFT, and DSST tests (all p<0.005) and overall standardized score (-0.63±0.05 vs. -0.84±0.06, p<0.001) after adjusting for study covariates.

Conclusions
Consumption of more than one cup a day of green vegetables might benefit cognitive functioning in older adults due to their high contents of phylloquinone and beta-carotene.

Work in Progress
Biology/Basic Science
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3. Association Between Grip Strength and Cognitive Function in Individuals Aging with Cerebral Palsy from the Cerebral Palsy Adult Aging Study

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Objectives: To investigate the association between Hand Grip Strength (HGS) and cognitive function in adults with Cerebral Palsy (CP) as potential functional markers of premature aging.

Design: Prospective cross-sectional study

Participants: Data from the Cerebral Palsy Adult Aging Study were used for this analysis (Research Team (cuanschutz.edu). A total of 66 adults with CP (age range: 18.5-48.7; mean [STD] age: 24.9 [5.4]; hemiplegic 37.5%, diplegic 52.7%, triplegic 5.6%, quadriplegic 4.2%; Male: 45.5%, Female: 54.5) who have been previously seen at our motion capture gait lab were recruited.

Main Outcomes: HGS (JAMAR® hydraulic dynamometer) and cognitive function using the Wechsler Memory Scale IV (WMS-IV), the Wechsler Adult Intelligence Scale IV (WAIS-IV), and the Short Test of Mental Status (STMS) (Kokmen et al 1987) were collected. Limb dominance was determined from diagnosis and interview.

Results: Linear regression was used to compare outcomes. For WMS-IV, visual Paired Association I - Immediate Recall ($r=0.36$), Visual Paired Association II – Delayed Recall ($r=0.38$), Visual Paired Association II – Recognition ($r=0.34$), Logical Memory I – Immediate Recall ($r=0.30$), Total Logical Memory II – Delayed Recall ($r=0.32$), were all statistically significant with average HGS obtained from the dominant hand ($p<0.05$). From the WAS-IV, Digit Span ($r=0.37$), as well as the STMS score ($r=0.45$) were also statistically significant ($p<0.05$) with average HGS obtained from the dominant hand.

Conclusions/Significance: This analysis reveals that there is a positive correlation between HGS and cognitive function in this cohort. It supports using HGS as a marker of cognitive health in adults with CP who are at higher risk for multiple chronic diseases development and premature aging. HGS is an effective health measure that can be integrated into health and wellness visits. HGS should be used in conjunction with other clinical assessments to identify markers of premature aging and help identify efficacious and timely interventions for individuals with complex health conditions and disabilities (vulnerable populations).

Author Disclosures: No disclosures or conflict of interest.

Work in Progress
Clinical Science
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5. Characteristics of Urban-Dwelling Older Adult Transit Users in the United States: Insights from the National Health and Aging Trends Study

Gimie, Afnan M.; Melgar Castillo, Andrea I.; C. Mullins, Daniel; Falvey, Jason R.

Abstract: Public buses, trains, and trams are a growing mode of transportation for older adults in the United States, yet many environmental and health related barriers to use have been reported. Characterizing the population of older adult transit users is essential for developing age-friendly communities. We used data from 5696 urban, community dwelling older adults in round 5 of the National Aging and Trends Study (NHATS), an annual nationally representative survey of late-life disability. Using SAS (version 9.4), weighted frequencies were calculated and compared between transit and non-transit users, accounting for the complex design of the NHATS survey. Compared to non-transit users, those who reported using transit in the last month (n=555, 9.8%; weighted n=3,122,583) were significantly more likely to identify their race/ethnicity as Black or Hispanic (50% vs 28%), report difficulty meeting financial needs for housing, utility, and food (12% vs 7%), and to speak a language other than English (32% vs 18%). Nearly 15% of older transit users lived in Section 8 housing—almost a fourfold difference as compared to non-transit users (14.2% vs 3.9%, p<.001). Transit users were significantly less likely to use a walker (9% vs 14%) or wheelchair/scooter (4% vs 9%). Additionally, 15% of transit users did not have a working cell phone and 42% did not have a working computer. Over 20% of transit users (weighted n=658,850) rely on these public transportation services to get to their regular doctor. These findings highlight the clinical, social, and socioeconomic barriers that disproportionately affect over 3 million older adult transit users in the United States, informing improvements oriented towards improving community access for older adults.

Work in Progress
Policy Science
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7. Using Voice and Touchscreen Technology to Protect Vulnerable Clients in Residential Care Facilities

Jocelyn Brown

Abstract:

CMS restricted residential care facility visitation to only essential personnel during the COVID-19 pandemic. To better protect and enhance caseworker access to their institutionalized guardianship clients, Maryland's Department of Human Services distributed Amazon EchoShow devices to a sample of residential care clients. EchoShows are voice and touchscreen controlled smart speakers (VCTSS), that enable visual and audio contact, enhancing connection with caseworkers, family/friends, and various media resources. This study reports the results of the first phase of a comprehensive evaluation, pilot testing the devices via a group of "superuser" case managers to understand the potential challenges and benefits of using these devices.

We conducted two focus groups with the superuser caseworkers in phase 1 (N=16). Virtual focus groups with the superusers before and after the EchoShow installation asked caseworkers about their experiences with installing devices, accessing clients, and client engagement as well as their thoughts on benefits for clients, caseworkers, and residential care facilities. Focus groups were audio-recorded, transcribed verbatim, and two researchers independently identified themes using open and axial coding. Major themes identified included: device installation and use challenges (e.g., training caseworkers, facility barriers), ethical concerns (e.g. privacy and content controls), strategies to overcome challenges (e.g. developing detailed training protocol), and benefits to using Echo devices (e.g. enhanced stimulation of client, care monitoring during COVID).

These findings suggest that VTCSS can: assist caseworkers in protecting vulnerable clients when in-person access is restricted; enable isolated residents to engage the outside world through technology thus enhancing quality of life; and assist facility staff in providing residents with stimulating activities during facility lockdowns. Policy implications and replication strategies will be presented.

Published Work
Social/Behavioral Science
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9. Retinal and Episcleral Blood Flow and their Evolution with Aging

Sarah Kim, Victoria Chen, Shih-En Chen, Osamah Saeedi

Introduction: Dysfunction of the cerebral microcirculation may contribute to age-related functional decline including reduced cognition and mobility. There is a critical need for surrogate markers of microvascular dysfunction to enhance our understanding of age-related disease pathophysiology and to guide our approach to timely and effective therapeutic interventions. The retina and its microvasculature, as embryologic extensions of the central nervous system, offer a unique opportunity to directly study neurovascular blood flow and autoregulation of blood flow non-invasively in vivo. In addition, episcleral veins offer a uniquely visible window into aqueous humor outflow, a key target for intraocular pressure-reducing glaucoma therapies. We have recently developed erythrocyte mediated angiography, EMA, a technique in which autologous fluorescently labeled erythrocytes are reinjected into a human subject permitting the observation and precise quantification of flow rates in vivo.

Purpose: The purpose of this study was to use EMA to observe and quantify changes in retinal and episcleral blood flow with respect to age.

Methods: Healthy controls, glaucoma suspect patients and patients with glaucoma were recruited from the Department of Ophthalmology and Visual Sciences at the University of Maryland, Baltimore. All subjects underwent anterior segment EMA and conventional indocyanine green angiography. A MATLAB program we developed was used to track erythrocytes on EMA angiograms. Vessel diameter was measured using the Automated Retinal Image Analyzer program. Changes in erythrocyte velocity, vessel diameter, and estimated blood flow were assessed using generalized estimating equations.

Results: In the retina, average arteriole velocity of 4 patients overall was 5.53±0.20 mm/s, average capillary velocity was 1.56±0.04 mm/s, and average venule velocity was 4.70±0.18 mm/s. We found that age did not have a significant effect on retinal arteriole velocity ($p=0.22$), capillary velocity ($p=0.64$), or venule velocity ($p=0.82$) in this small sample. 15 episcleral vessels of 13 eyes of 10 patients were analyzed, with an average velocity of 2.19±0.99 mm/s. We found that age did not have a significant effect on episcleral venule velocity ($p=0.86$) in this small sample.

Conclusions: We found that in our small sample, age did not have a significant effect on retinal and episcleral blood flow. However, we expect that with a larger sample size and broader recruitment criteria, this technique will provide valuable information about the relationship between retinal blood flow, episcleral blood flow, and functional decline. This will lay the foundation for improved disease monitoring, early intervention, and potentially further study of the effect of exercise on microvascular function in age-related diseases.

References:

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2. Asanad S, et al. Erythrocyte-mediated angiography: quantifying absolute episcleral blood flow in humans. *Ophthalmology*. 2021 May;128(5):799-801. doi: 10.1016/j.ophtha.2020.09.010.

Work in Progress
Clinical Science
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11. The Role of Educational Attainment and Literacy Skills in Volunteer Participation among White, Black, and Hispanic Middle-aged and Older Adults in the U.S.

Donnette Narine, Takashi Yamashita, Wonmai Punksungka, Abigail Helsinger, Jenna Kramer, Rita Karam, and Phyllis A. Cummins

Abstract

Volunteer participation is a form of civic engagement that benefits the individual over the life course and society overall. Although education, literacy skills, and race/ethnicity are associated with volunteering, detailed interrelations are yet to be explored. Guided by the integrated theory of volunteer work and the notion of productive aging, we examined the roles of education and adult literacy in the context of volunteering in later life across racial and ethnic groups (i.e., Whites, Blacks, Hispanics) in the U.S. Using the nationally representative sample of middle-aged and older adults (age 45+; N = 3,770) from the 2012/2014/2017 Program for International Assessment of Adult Competencies (PIAAC), structural equation modeling was constructed to evaluate mediation relationships among education, literacy, and volunteering. The mediation model was further tested for moderation by racial and ethnic groups. Results show no statistically significant mediation (a.k.a., indirect) effect of education on volunteering through literacy, nor was there a statistically significant difference in the mediation effect across racial and ethnic groups. However, there was a statistically significant difference in the direct effect of education on volunteering between Black and Hispanic adults [b(Black) = 0.44 versus b(Hispanic) = 0.08, $p < 0.05$]. This finding indicates that higher education was more strongly associated with volunteering among older Black adults, compared to Hispanic counterparts. Suggested policy implications include support for the promotion of volunteer participation through culturally (e.g., U.S.-born and immigrant) and socioeconomically sensitive approaches.

Work in Progress
Social/Behavioral Science
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13. The Effect of Aging on Vasomotion and Microvascular Autoregulation

Catherine Sun, Dongyi Wang, Victoria Chen, Osamah Saeedi

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Introduction: Vasomotion is the spontaneous rhythmic variations in vessel lumen resulting from smooth muscle dilatation and constriction, and impaired vasomotion has been implicated in the pathogenesis of numerous diseases related to aging including Alzheimer's disease (AD) and glaucoma. Since the retina is an extension of cerebral tissue, the retinal vasculature presents an opportunity to directly observe microvascular flow and microvascular flow autoregulation *in vivo*. By using erythrocyte mediated angiography (EMA) coupled with a machine learning algorithm, paused erythrocytes, a manifestation of vasomotion and microvascular autoregulation, can be directly visualized and automatically quantified.

Methods: We recruited 5 healthy controls (mean age = 45.2 years old) and obtained 320 retinal angiograms of 10 eyes. Subjects were divided into two age groups of 20-45 years old and 46-70 years old. Paused erythrocytes in the optic nerve head and macular region were assessed using a previously validated machine learning algorithm.

Results: For the optic nerve head region, average number of paused erythrocytes was 71.86 ± 38.24 (n=3) and 30.24 (n=1) for age groups 20-45 years old and 46-70 years, respectively. For the macula region, average number of paused erythrocytes was 110.33 ± 58.77 (n=4) and 33.88 ± 27.57 (n=3) for age groups 20-45 years old and 46-70 years, respectively. The disc to macula paused erythrocyte ratios was 0.81 ± 0.03 (n=3) and 0.53 (n=1) for age groups 20-45 years old and 46-70 years, respectively. There was a significant difference in the average number of paused erythrocytes between the two age groups for the macula region (p=0.04).

Conclusions: The average number of paused erythrocytes was significantly greater in the 20-45 years old age group compared to the 46-70 years old age group. The preliminary results support our hypothesis that older subjects may exhibit diminished vasomotion relative to younger subjects as represented through direct measures of erythrocyte pausing in capillary beds. The results from this project may set a foundation for the development of new, sensitive, and quantifiable biomarkers for diseases associated with aging. Further work assessing the relationship between retina vascular measures and functional outcomes is needed and ongoing.

Work in Progress
Clinical Science
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15. Impact of Economic Disadvantage and Dementia on Aging in Place After Hip Fracture

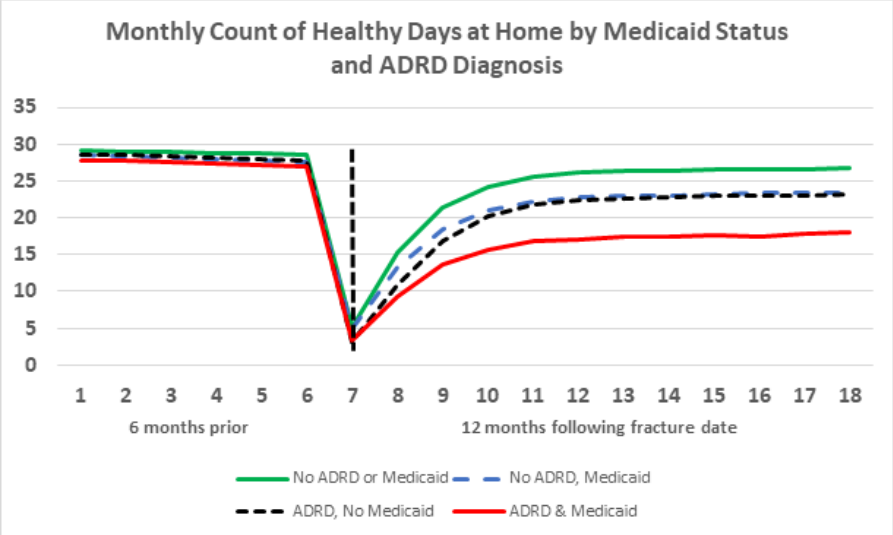
J. Falvey, C. Chen, J. Magaziner, J. Yang

Background: Older adults with Alzheimer's disease and related dementias (ADRD) have poorer outcomes after hip fracture than those without ADRD. It is unclear whether those living with ADRD and concurrent economic disadvantage may be even more vulnerable.

Methods: Data were drawn from 2010-2018 Medicare claims. ADRD was identified in the Chronic Conditions file; Medicaid eligibility (proxy for economic disadvantage) was drawn from enrollment files. The primary outcome was a monthly count of days at home (DAH) for 1 year after hip fracture—days at home not utilizing emergency care or under hospital observation. Patients were eligible if covered by Medicare for the study period. Repeated measures Poisson regression and generalized estimating equations were used to model HQ-DAH. A Medicaid-eligibility by ADRD interaction variable was included in the final models, adjusted for demographics, injury severity, comorbidity burden, community factors, and DAH over the prior 6 months.

Results: 70,477 patients contributed 714,707 person-months of follow-up. ADRD and Medicaid eligibility were associated with poorer outcomes after fracture; those with both spent nearly 7 fewer DAH each month (Figure). In adjusted models, patients living with concurrent dementia and Medicaid eligibility spent 9% fewer HQ-DAH each month as compared to those living with ADRD and no Medicaid eligibility (interaction rate ratio=0.91, 95% CI 0.89-0.94).

Conclusions: The impact of dementia on high-quality aging in place after hip fracture is magnified for older adults living in poverty. This suggests unmet needs that need to be addressed in future care pathways.



Work in Progress
Clinical Science
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17. Feasibility of Large-Scale Falls Prevention Programs Implementation Based on Academic-Community Partnerships

Sara Pappa, PhD, Cathy Elrod, PT, PhD, Uma Kelekar, PhD, Patricia C. Heyn, PhD, FGSA, FACRM, Rita Wong, PT, PhD, FAPTA

Background: The Northern Virginia (NoVa) region is broadly diverse in age, race, ethnicity, economic status, health status, culture, and language.[1] Based on Virginia State data,[2] it is estimated that 28.7% of the 75,000 older adults who live in NoVa will experience at least one fall during the year.[3] Since 2014, the Administration for Community Living (ACL) has sponsored the implementation of evidence-based fall prevention programs (EBFPPs) across the United States to decrease the health and economic burden of falls.

Aim: The overall aims of this study are to 1) describe the characteristics of participants in EBFPPs implemented using an academic-community partnership model and 2) report initial exploration of effectiveness using data inputted into the Administration for Community Living National Falls database.

Methods: Marymount University (MU) received two cooperative agreement grants (2016, 2018) from the ACL to implement EBFPPs in NoVa. The three EBFPPs included: 1) Stay Active and Independent for Life (SAIL) targeting prevention of falls in active older adults, 2) A Matter of Balance (AMOB) targeting less active older adults with higher fear of falling, and 3) Otago Exercise Program (OEP) targeting more frail and high risk older adults. By engaging with local senior service agencies, health care organizations, and residential facilities, a Northern Virginia Falls Prevention Alliance was formed, and a MU Regional Training Office was built to provide training for community leaders and assist with program delivery. The data source is the data collected and submitted to the ACL national database for the workshops implemented through the MU academic-community partnership as well as participants characteristics before and after participation in an EBFPP. The study was approved by MU IRB (#415).

Results: From 2016-2021, we reached over 5,000 older adults, trained over 400 EBFPP leaders, and implemented EBFPPs at 60 program delivery sites from different types of sites and a diverse range of adults with the majority over 70 years of age and ≥ two chronic conditions. Preliminary exploration of the data from those completing pre and post surveys indicates that, overall, the number of people reporting a fall decreased from 20% at pre-test to 15% at post-test. Those participating in AMOB showed the greatest decline in falls (from 34% to 14%). Fall injuries declined from 11% to 7% and emergency department visits were reduced from 3% to 1%.

Conclusion: Preliminary analysis indicates that EBFPPs had an overall beneficial impact on falls outcomes and shows promise in decreasing the injuries related to falls in EBFPP participants. This academic-community partnership, built on a shared purpose, has reached a large and diverse group of older adults at low risk of falling (SAIL program) who express interest in maintaining low risk; and an impactful decline in falls for individuals at moderate to high risk (those participating in AMOB). We have struggled to reach the truly high risk (more frail) population with Otago with low reach into this community. Future research will investigate program outcomes differences based on zip code or county, facilities type, education level, SES, race, gender, and age and delivery models.

Work in Progress
Social/Behavioral Science
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19. Debriefing Sessions: An Intervention to Support Wellness in Trainees While Caring for Patients with Advanced Illness

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2. *Geriatric Research Education & Clinical Center, VA, Baltimore, MD.*

Background:
Health care professionals experience grief when caring for persons with serious and advanced illness. The opportunity to process personal and professional responses to a patient's suffering seems to be important yet lacking. We created an action plan to support health care professionals. The intervention – debriefing session – was specifically aimed at providing emotional support and increasing one's ability to engage. The purpose of debriefs are to promote wellness and provide support during an elective that can be emotionally taxing, especially to those who have not yet entered clinical practice.

Methods/ Results:
A semi structured format for conducting debriefing sessions was developed, Interdisciplinary debriefs are done bi-weekly for trainees during their 2- or 4-week palliative care elective rotations and led by palliative care attendings and chaplain. Trainees included students, residents, and fellows within medicine and pharmacy. Various questions are asked to stimulate discussion and assess coping; Several open-ended questions are then posed to invite the participants to express their personal and professional responses "What was it like taking care of this patient?" elicited responses about the experience of providing physical care or coping with emotional and spiritual stress. Inquiring about the most distressing and the most satisfying aspect of the case enabled participants to review both positive and negative experiences in caring for the patient/family. At the conclusion of the debrief sessions, an image titled "Emotions" done by Douna Montazeralghaem, MD is shared with trainees. This image of an oil painting serves to demonstrate a physician's emotional experience in today's culture of medicine.

Conclusions:
Self-report evaluations revealed that health care professionals found the sessions helpful. Responses to the most satisfying aspects of the case included elements related to team collaboration, end of life care, and the relationship with the family. Responses to the most satisfying aspects of the case included elements related to team collaboration, end-of life, and the relationship with the family.

Work in Progress
Social/Behavioral Science
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21. Admission of Critically Ill Patients with Cancer to the ICU: Calling for Better Mortality Predictors

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Geriatric Research Education & Clinical Center, VA, Baltimore, MD.

Background:
Overall mortality of cancer patients has decreased over the past decades, due to improvement in early detection and innovative cancer treatments. At the same time, the probability of life-threatening events requiring Intensive Care Unit (ICU) treatment related to these novel therapies has increased. We examined characteristics and short-term outcomes for older adults with cancer in a large tertiary medical center.

Methods:
Case review of patients admitted to MICU with primary diagnosis of cancer between 10/1/21 – 10/31/21.

Results:
Review of data showed 12 of 35 (34%) had a cancer diagnosis. Male: 10 of 12 (83%), Female: 2 of 12 (17%), White: 7 (58%) Black: 4 (33%) Asian: 1 (9%). Age Range: 44-79 with a mean age of 64. Hematologic Malignancy: 7/12 (58%) AML (5) ALL (1) Multiple Myeloma (1). Solid Tumor Malignancy: 5/12 (42%) Prostate Cancer (2) Lung Cancer (2) Melanoma (1). Patient had an average length of an ICU stay of 5.7 days. Noted 6 of the 7 (85%) with hematologic malignancies either died in ICU or were discharged to hospice and died shortly thereafter.

Conclusion:
A significant proportion of patients with hematologic malignancies are admitted to ICU. While ensuring that patients with a reasonable prospect of recovery are not deprived of an ICU admission, there is a need to refine our mortality predictors so that patients along with their families will not undergo any unnecessary suffering should there be a low chance of recovery.

Work in Progress
Clinical Science
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2. Geriatric Palliative Care in Skilled Nursing Facilities Increases Goals-of-Care Conversations and Hospice Referrals

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Background: Geriatric palliative care (GPC) is an emerging field to deliver comprehensive, whole-person care to aging patients with serious illnesses. A growing number of institutions provide combined fellowship training for Geriatrics and Palliative Care. It is not yet known how different the care would be by the addition of palliative care training to the geriatric training.

Methods: A retrospective chart review was conducted for a total of 308 older adults who were admitted to a skilled nursing facility (SNF) for post-acute care between July 2018 and December 2019. The care was provided by seven physicians: one was trained by a GPC combined program and six trained by geriatrics-only programs. Patient assignment occured on a non-selective basis. We compared the frequency of documented goals-of-care (GOC) conversations, the patients' dispositions, and post SNF courses up to 6 months between the patients cared by the GPC physician (GPC group: N=53) and by the geriatricians (control group: N=255).

Results: Baseline characteristics did not differ between the groups. 17 (32%) in the GPC group and 50 (20%) in the control died within 6 months (p=0.065). Dispositions among those alive after 6 months did not differ between the groups. However, among those who died within 6 months, discharge to hospice was significantly more frequent in the GPC group (11/17 vs 3/50, p<0.001). GOC conversation had been held during the index SNF stay among 12 of 17 decedents (71%) in the GPC group while only four of 50 (8%) in the control (p<0.001). 11 of 12 conversations (91%) by the GPC physician led to hospice admission. Number of rehospitalizations among the decedents was significantly fewer in the GPC group (mean 0.4 vs 1.1 per patient, p=0.007).

Conclusions: Although a considerable portion of patients died within 6 months after their SNF admission, GOC conversations rarely occurred in SNF with geriatricians without palliative care training. Additional training in palliative care seems to substantially increase GOC conversations and hospice referrals among SNF patients with high mortality risk, which helps to prevent the cycle of rehospitalizations until death.

Work in Progress
Clinical Science
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4. Differences in Postural Sway Accelerometry Measures Between Stages of Parkinson Disease

Ruth Akinlosotu

Background: Postural instability is one of the cardinal signs of Parkinson disease (PD). It is also a major determinant of PD-related disability reflected in the modified Hoehn and Yahr (H&Y) scale. Postural sway as an objective measure of postural control can be quantified by accelerometry using wearable sensors. It is unknown which (if any) accelerometry-based postural sway measures differ between age-matched controls and PD stages H&Y 1-2, 2.5-3 and 4.

Aim: To identify postural sway measures that differ between patients with mild, moderate, and severe PD and healthy controls, respectively.

Methods: 145 PD patients (H&Y stages 1-4, medication ON state) and 50 age-matched control subjects stood quietly on a firm surface for 20s first with their eyes open (EO), then (for another 20s) with their eyes closed (EC). A wearable triaxial accelerometer (Dynaport MT, McRoberts, The Netherlands) worn on the lower back was used to quantify postural sway (sampling rate 100Hz). Postural sway measures included high frequency power (HF power, 4-7 Hz) anterior posterior (AP) and mediolateral (ML) (tremor measures), mean velocity of the center of mass (CoM) AP and ML, and jerk AP and ML (postural instability measures). Subjects were stratified by PD severity according to their H&Y stages: controls (H&Y 0), mild (H&Y 1-2), moderate (H&Y 2.5-3) or severe PD (H&Y 4). A Kruskal Wallis test was used to determine differences in postural sway measures between groups of PD severity for EO and EC, respectively. Significance was established at an alpha level of 0.05, corrected for multiple comparisons.

Results: For the tremor measures (HF power), group differences were only identified between age-matched controls and H&Y 1-2 for HF power AP (p=0.001) with EO. With EC, we identified group differences between controls and all H&Y stages (p< 0.01). The HF power ML also revealed differences between controls and patients in all H&Y stages for EO and EC (p=<0.02). For postural instability measures (CoM velocity and jerk), the mean CoM velocity and jerk AP EO showed differences between controls and all H&Y stages (p<0.04). Jerk AP EO further revealed differences between H&Y 1-2 and H&Y 2.5-3 (p=0.02), and between H&Y 1-2 and H&Y 4 (p=0.01). With EC, mean velocity AP and jerk AP also demonstrated differences between controls and H&Y 2.5-3 (p<0.001) as well as between H&Y 1-2 and H&Y 2.5-3 (p<0.04). In the ML direction, mean CoM velocity and jerk demonstrated differences between controls and H&Y 2.5-3, and 4 (p<0.01) under EC (Figure 2). In addition, a difference was also noted between H&Y 1-2 and 2.5-3 and between H&Y 1-2 and 4 (p≤ 0.05). Mean Jerk ML with EC further revealed differences between controls and H&Y 1-2 (p<0.01).

Conclusions and implication: Postural sway measures from a wearable triaxial accelerometer differ between different stages of PD and may provide an objective measure of postural (in)stability. Despite medication, static postural control is worse in patients with more advanced PD regardless of whether they have their eyes open or closed. Accelerometry-based tremor measures also reveal differences between controls and patients with mild PD (H&Y 1-2). Further analysis is warranted to determine the clinical utility of accelerometry-based postural sway measures.

Work in Progress
Clinical Science
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6. Shifts in the Mitochondrial Fuel Preferences of Human Platelets Following Weight Loss and Exercise in Obese Older Adults

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Objective:
Obesity increases the risk of type 2 diabetes and cardiovascular diseases. Weight loss and exercise have many benefits that include improving quality of life, improving insulin sensitivity, and reducing the risk of cardiovascular diseases. We hypothesize that diet and exercise will increase fatty acid oxidation-dependent mitochondrial respiration with no effect on TCA-dependent mitochondrial respiration.

Methods:
Participants are provided with dietary counseling, daily low-calorie heart-healthy meals, and twice-weekly supervised exercise training sessions for 12 weeks. Blood is collected from fasted participants within 2 weeks of the beginning and end of the program. Platelets were isolated from blood and assayed for mitochondrial function. Measurement of platelet metabolism may represent the metabolic function of other cell types. The Seahorse XFe96 was used to measure mitochondrial oxygen consumption and glycolytic rate. Each assay included simultaneous mitochondrial and fatty acid oxidation stress tests. The mitochondrial stress test utilizes glucose, pyruvate, and glutamine as fuel sources to determine basal, ATP-dependent, maximal, and non-mitochondrial oxygen consumption. The fatty acid oxidation stress test utilizes glucose, carnitine, and palmitate in the presence or absence of the fatty acid oxidation inhibitor etomoxir.

Results/Conclusion:
Participants were 71% male and 57% African American. The average age was 58.5 ± 6.4 yrs (X±SD) and BMI was 36.0 ±2.4 kg/m^2. The average weight loss was approximately 8%. Preliminary results trend towards a decrease in capacity for utilizing the citric acid cycle associated substrates and an increase in the capacity for utilizing fatty acid oxidation associated substrates. To our knowledge, this study is the first to utilize simultaneous oxygen consumption assays to demonstrate a shift in metabolic function before and after exercise and weight loss.

Work in Progress
Clinical Science
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8. Lower Extremity Strength of Paretic Limbs is Associated with Endurance and Balance Measures in Hemiparetic Stroke

Adam J. Amorese, PhD, Frederick M. Ivey, PhD, Alice S. Ryan PhD

Background: Following stroke, about 50% of individuals suffer from hemiparesis, which can be accompanied by a loss in muscle mass and strength. This loss of muscle mass can have profound consequences, hindering functional performance of the lower extremities, especially in older adults.

Aim: The aim of this study was to determine the relationship between muscle strength of the lower extremities and functional measures of endurance and balance in chronic stroke survivors.

Methods: 55 older adults (mean age = 60.2, 47 males and 10 females) who previously had a hemiparetic stroke (mean latency since stroke = 72 months) were included in the study. Strength testing included one-repetition maximum (1RM) and peak isometric torque capacity of the knee extensors and flexors of non-paretic and paretic limbs. Functional measures performed include 6-minute walk distance (6MWD), a measure of ambulatory function and gait endurance, and both the Berg Balance Scale (BBS) and Dynamic Gait Index (DGI), which are measures of static and dynamic balance. Linear regression analyses using Pearson correlation coefficients were used to determine relationships between variables.

Results: Paretic limb 1RM was 24% lower than that of non-paretic limb 1RM ($p<.001$). The difference between paretic and non-paretic limbs in 1RM negatively correlated with 6MWD ($r = -0.49$, $p<0.05$) and DGI scores ($r = -0.49$, $p<0.05$). In paretic limbs, 1RM was positively correlated with both 6MWD ($r = 0.29$, $p<0.05$) and DGI scores ($r = 0.37$, $p<.05$), whereas no correlations were significant in non-paretic limbs between 1RM and functional measures. For Peak isometric torque of paretic knee extensors was 29% lower than that of non-paretic knee extensors ($p<.001$) while peak isometric torque of paretic flexors was 41% lower than that of non-paretic knee flexors ($p<.001$). Negative correlations were found between the difference in peak torque of the knee extensors between paretic and non-paretic limbs and 6MWD ($r = -0.47$, $p<0.05$), BBS scores ($r = -0.31$, $p<0.05$), and DGI scores ($r = -0.50$, $p<0.05$). Similar negative correlations were found between the difference in peak isometric torque of the knee flexors between paretic and non-paretic limbs and 6MWD ($r = -0.60$, $p<0.05$), BBS scores ($r = -0.49$, $p<0.05$), and DGI scores ($r = -0.63$, $p<0.05$). In paretic limbs, peak isometric torque of the knee extensors was positively correlated with 6MWD ($r = 0.48$, $p<0.05$), BBS scores ($r = 0.42$, $p<0.05$), and DGI scores ($r = 0.51$, $p<0.05$). Likewise, positive correlations were found in paretic limbs between peak isometric torque of the knee flexors and 6MWD ($r = 0.56$, $p<0.05$), BBS scores ($r = 0.56$, $p<0.05$), and DGI scores ($r = 0.61$, $p<0.05$). No correlations were found between peak isometric torque of non-paretic limbs and functional measures.

Conclusion: Overall, both strength of paretic limbs as well as the difference in strength between non-paretic and paretic limbs were correlated with measures of endurance and static and dynamic balance. This suggests that the loss of strength in paretic limbs following stroke is the predominant factor in the reduction of functional status and balance impairment in this patient population. Thus, rehabilitative approaches should focus more heavily on paretic limbs for improving function and balance.

Work in Progress
Clinical Science
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10. Research Experience During COVID-19: Implementing Remote Procedures to Explore Daytime Symptoms and Cognitive Function Among Older Adults with Insomnia

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Introduction: The global COVID-19 pandemic has resulted in significant challenges to healthcare delivery and biomedical research. Due to federal safety guidelines and supply chain barriers, conducting clinical research has been difficult, particularly in recruitment and other key areas. The purpose of this study is to describe the successful adaptation of an in-person cohort study (of insomnia among community-dwelling older adults) to an entirely remote approach.

Methods: Prior to the onset of COVID-19, study protocols were developed and approved by the Institutional Review Board (IRB) at University of Maryland, Baltimore. Approved research methods included in-person recruitment, enrollment, and data capture including questionnaire completion, clinical interviews, neurocognitive testing, and home sleep apnea testing and actigraphy setup. The onset of COVID-19 occurred prior to enrollment of any participants. As the global pandemic progressed, the research team adapted to this new circumstance. Modifications were developed and approved by the IRB, including an expansion of recruitment pathways and replacing all in-person activities with telephonic (e.g., Brief Test of Adult Cognition by Telephone) and computer-based procedures. Additionally, home sleep apnea tests, actigraphy set-up, and training on using a mobile app were conducted by phone, with supplies delivered by FedEx. Participants completed a post-satisfaction survey via an online survey platform.

Results: Participants included 31 older adults who met DSM-V diagnostic criteria for insomnia disorder (67.5 [sd 6.6] years) and 35 older adults without sleep disorders (70.4 [sd 5.6] years). Complete remote data capture was successful for self-report questionnaires (98%), home sleep apnea testing (84%), actigraphy (98%), as well as cognitive assessment via telephone (100%) and participant home desktop computer (72%). In addition, participants completed 98% of 56 surveys administered via smartphone during the two-week study period (i.e., ecological momentary assessment). To date, satisfaction survey results have indicated that 87.8% of participants would “probably” or “definitely” participate in this remote study again, and 87.8% of participants would “recommend” or “strongly recommend” this approach to others. Following completion of data capture, the research team debriefed and identified 11 recommendations for remote study execution in four domains: research team, remote procedures, recruitment, and data preparation.

Conclusions: COVID-19 has presented substantial challenges to clinical research. However, present findings demonstrate that researchers are still able to conduct high-quality clinical research by adopting a fully remote approach.

Work in Progress
Clinical Science
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12. Differences in Staff-Resident Interactions by Facility Racial Composition

Rachel McPherson, B.S., & Barbara Resnick, PhD, CRNP

Introduction: Communication and interactions are an integral component of care in nursing home settings. Staff-resident care interactions include verbal or nonverbal exchanges and the quality of these care interactions can be positive, neutral, or negative. Among nursing home residents with dementia, the quality of care (QoC) interactions can significantly affect quality of life, well-being, and behavioral symptoms. There have been inconsistency in findings of racial differences in the quality of care interactions. Some studies found that Black nursing home residents with dementia experience more positive care interactions, while other studies have found that White nursing home residents with dementia experienced more positive care interactions. These discrepancies may be due to characteristics of the nursing home (e.g., percentage of low-income residents, staff longevity, percentage of direct care workers of color). The purpose of the present study was to determine if there were differences in the QoC interactions between nursing home facilities with Black residents and nursing home facilities without any Black residents. It was hypothesized that residents in nursing homes with Black residents would have more positive care interactions.

Methods: This was a secondary data analysis using data from the EIT-4-BPSD study: Evidence Integration Triangle for Behavioral and Psychological Symptoms of Dementia. This study included a total sample of 553 residents with dementia from 55 settings. Of the parent study, 532 residents had complete data on the QoC interactions variable.
The QoC interactions were measured using the quantified version of the Quality of Interactions Schedule (QuIS), which is an observational measure. Facility racial composition was derived from the number of recruited Black residents in each facility and was dichotomously recorded as: facility had Black nursing home residents involved in the study; or facility did not have any Black nursing home residents involved in the study. Covariates for the present study included age (obtained from facility charts), cognition (measured using Brief Interview of Mental status), comorbidities (measured using Cumulative Illness Rating Scale), and function (measured using Barthel Index). Descriptive statistics were conducted to describe resident demographics. A multiple linear regression using hierarchal entry was conducted to determine whether there were differences in the QoC interactions between facilities with and without Black residents while controlling for age, cognition, comorbidities, and function.

Results: For step one of the regression analysis, age, cognition, function, and comorbidities were entered. These predictors explained about 13.2% of the variance in the quality of care interactions (R^2 = .13, $F(4, 527)$ =20.06, p <.001). For step two of the regression analysis, facility racial composition was entered, and racial composition was a significant predictor of QoC interactions ($p < .001$) and added 3% to the variance explained in the QoC interactions. This set of predictors explains about 16.4% of variance in the quality of care interactions (ΔR^2 = .03, $F(2, 525) = 24.57$, R^2 = .16, $p < .001$). Compared to facilities without Black residents, facilities with Black residents have a 0.68 increase in the QoC interaction score ($b = 0.68$, $p < .001$).

Discussion: The hypothesis that nursing home facilities with Black residents would have more positive care interactions compared to facilities without Black residents was supported. This finding has been supported in previous research considering that Black nursing home residents with dementia have been found to have more positive care interactions than White nursing home residents with dementia. A limitation of the study was that we did know capture the race of the staff during the interaction. This would be critical for future research and would help guide the need for interventions to improve care for all residents. Specifically, the goal is to increase positive interactions and reduce and ideally eliminate negative care interactions. The findings from this study will be used to inform future interventions to aid in reducing quality of care disparities in nursing home facilities with and without Black nursing home residents.

Work in Progress
Social/Behavioral Science
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14. Dog Walking and the Social Impact of the COVID-19 Pandemic on Loneliness in Older Adults

Lincy Koodaly, PhD Student (UMSON) and Erika Friedmann, PhD

Background: The US elderly population is growing rapidly, and loneliness is becoming more prevalent among the elderly. Loneliness is associated with many adverse physical and mental effects, especially in the elderly, including mortality. The social restrictions imposed by the COVID-19 pandemic, particularly on vulnerable groups such as the elderly, predicted an increase in loneliness and other health consequences. Dogs are known to provide companionship and social connections, and dog walking reduces loneliness in their owners during stressful times in life. This longitudinal study examined the effect of COVID restrictions on loneliness and if dog walking buffered loneliness in a sample of community-based older adults in Florida.

Methods: A Qualtrics survey was used to collect data from the eligible, voluntary participants at baseline in November 2018, and then later in June and October 2020. Measured variables were loneliness using the UCLA Loneliness Scale, the social impact of COVID-19, and frequency of dog walking. OLS regression models were used to evaluate the change in loneliness. The social impact of COVID-19 on loneliness while controlling for dog walking and having pets and the buffering effect of dog walking on the Social Impact of COVID-19, were examined.

Results: The high social consequences were related to an increase in loneliness and walking a dog daily buffered this relationship.

Conclusions: The benefits of dog walking in the elderly during COVID-19 call for more similar studies to reinforce promoting pets for the well-being of the ever-growing population of older adults.

Published Work
Social/Behavioral Science
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16. Honoring Elders and Continuing Life Patterns of Chinese Elders through Cultural Design of the Built Environment

Meldrena Chapin Ph.D., SEED, WELL AP

Abstract:
Respect for diversity and cultural identity are key concerns in contemporary society. This poster examines two aspects of cultural diversity present in the contemporary older adult population – the physical environment and common behaviors related to a specific cultural group – Chinese American. The importance of embodying the six stages of cultural competency is suggested as a means to support the provision of meaningful care to a diverse population of elder adults. The role of cultural inclusion in the design of the built environment will be discussed. Major elements of culture that can be integrated within the built environment are presented - including symbols, artifacts, language, and accommodations for behavioral norms and societal values common to the Chinese culture.

Work in Progress
Social/Behavioral Science
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18. Cardiovascular Disease in Movies: Missed Opportunities to Drive Social Change and Improve Shared Decision Making

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Background:
Cardiovascular diseases (CVD) are the leading cause of death and disability. Their prevalence in the United States is expected to rise 10% between 2010 and 2030. Interventions that improve self-care behavior, or cardiovascular outcomes in most vulnerable population are generally lacking. Films have been the interactive medium to create awareness in the society on different social issues. Shaping perception of illness through films may enhance patient care and stimulate conversations about shared decision-making patient self-management and patient reported outcomes. We examine films representation of women, black, and racial minorities with cardiovascular disease.

Methods:
Cardiovascular diseases including Myocardial Infarction (MI), Stroke, Hypertension (HTN), Heart Failure represented in films were identified through various search engines including Internet Movie Database (IMDb), the NIH PubMed system: The representations of the different illnesses were reviewed separately. The Commonsense Model used as theoretical framework to outline illness perceptions and trajectory in films reviewed.

Results:
Most films represented middle aged white men from middle to high socioeconomics class. Myocardial infarction followed by stroke were most depicted. Qualitative analysis identified three main themes: (a) Social construct of who is at risk for cardiovascular disease; (b) Portrayal of certain risk reducing strategies, and (c) Disempowerment and delegation of responsibility for women with cardiovascular illness.

Conclusions:
Film portrayal of who is at risk of cardiovascular illness may limit awareness among marginalized demographics including women, black and minority racial backgrounds and those from lower socio-economic status. Filmmakers as advocate for social change should bridge the awareness gap between films and real-world persons at risk of illness.

Work in Progress
Social/Behavioral Science
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20. PBMCs as a Biomarker for Osteo-Sarcopenia

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The biology of frailty is most understood in the context “inflammaging”; the systemic low-grade inflammation in the absence of illness that underscores the impaired cellular function in aging. Recent work by our group extends the deleterious impact of inflammaging to altered microtubule structure and properties in muscle (muscle fiber) and bone (osteocyte) that impact their mechanics (i.e., stiffness) and disrupt their ability to sense and respond to mechanical load. Informed by our evidence that *in vivo* microtubule-targeted therapeutics improve microtubule properties and musculoskeletal function in aged mice, we propose microtubule alterations as a contributor to musculoskeletal frailty. The factors that contribute to the impact on muscle and bone are proposed to be systemic, as changes in microtubules occur in disparate tissues including brain and intestine. We have also investigated a genetic model of chronic innate immune cell activation that exhibits a dramatic increase in musculoskeletal frailty. Here, in young mice (3 months), we identified microtubule changes in PBMCs that exceed those we identified in healthy aging (~22 months). In this young inflammatory model, we also identify diminished muscle function and significant microtubule alterations as seen in aged mice. Together, these results suggest *microtubule alterations as a nexus for the impact of inflammaging.*

Work in Progress
Biology/Basic Science
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