Duke University Medical Center
Claude D. Pepper Older Americans Independence Center

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SECTION I. DESCRIPTION OF CENTER

The overall theme of our center is "***to understand and modify multiple pathways of functional decline."*** The Duke Claude D. Pepper Older Americans Independence Center (Pepper Center) is based in the Duke Center for the Study of Aging and Human Development, an all-university program with strong multidisciplinary affiliated programs such as the Durham VA GRECC, the RAND/Hartford Interdisciplinary Geriatric Research Center, the Duke Institute for Genomic Sciences and Policy, the Duke Clinical Research Institute, the Duke Center for Living, Trajectories of Aging and Care Center, and the Stedman Nutrition and Metabolism Center. This rich milieu includes 126 faculty as Senior Fellows of the Aging Center and over 21 million dollars of research germane to our center goals.

Over the past twenty-one years, the Duke Pepper Center has been at the forefront of geriatric research and training focused on the development of interventions to improve the functional status of older adults and the support of research that identifies risk factors predictive of functional decline. The Duke Pepper Center originally began its funding as a Geriatric Research and Training Center (GRTC) in 1991. The GRTC was originally funded with three research cores and support for junior faculty and pilot projects, which reflects the organization of the current OAIC structure. One year later, Duke was awarded a Pepper Center and, at the direction of the National Institute on Aging, the two programs were combined into one. Initial Pepper Center support focused on the development of promising interventions to promote the independence of older Americans and faculty development. Since then, the Duke OAIC has produced an impressive portfolio of relevant research and innovations in faculty development.

The specific goals of the Duke Pepper Center are:

1) Support and enhance research related to our Center theme of exploring modifiable pathways to functional decline;
2) Train investigators in the methodologies needed for competence in mechanistic, translational, and outcomes research aimed at exploring modifiable pathways to functional decline;
3) Identify and nurture promising new and transitioning investigators who have an interest in research aimed at modifying functional decline in later life.

SECTION II. RESEARCH, RESOURCES, AND ACTIVITIES

A. CORES

Analysis Core (Resource Core 1)

Carl F. Pieper, D.P.H., Core Leader
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The Analysis Core provides analytic and technical support to the funded grants, pilots, projects and junior faculty in the Pepper. The Core provides mentoring, consultation and advice to approved projects and people and pursue two general goals: to collaborate with the projects and researchers of the Pepper Center with appropriate and innovative analytic and data management technologies, and to advance statistical science in the study of function and functional decline. The Analysis Core work closely with the Biochemical Pathways and Metabolomics Cores to direct and perform the requisite analyses from the data derived from that Core. Members of this core sit on the Internal Operating Committee and are involved in selecting and assisting in the design of future projects, pilots, and junior faculty. To accomplish these goals, the Analysis Core has the following specific aims:

Aim 1: Provide R01s, pilot projects, and junior faculty investigators with design, analytic, data management, and technical support by which to conduct research and to address hypotheses related to functional and aging;

Aim 2: Further statistical/analytic science in the study of elderly.

Biochemical Pathways Core (Resource Core 2)

Virginia B. Kraus, M.D., Ph.D., Core Leader
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The overall goal of the Biochemical Pathways Core is to increase scientific knowledge that will lead to more effective strategies to maintain or restore independence in older persons. To this end we perform biomarker and systems pathway analyses to ealuate etiologies of functional decline associated with aging. Our long term goals are to develop tools to predict at-risk groups, and to provide information to monitor efficacy of intervention(s). Our primary focus is on biochemical and inflammatory markers. This core provides a centralized resource for these analyses across the spectrum of Pepper projects: pilot studies, Research Career Development awardees, external projects. The overall approach we utilize combines analyses of multiple excellent studies to advance the understanding of pathways of functional decline.

To accomplish these goals the Biochemical Pathways Core has three specific aims:

Aim 1. Perform biomarker analyses for several independent but inter-related Pepper-designated projects.

Aim 2. Perform systems pathway analyses to identify biological pathways implicated in functional decline and with potential for modifiability via interventions.

Aim 3. Serve as a resource for research-oriented advice and training on principles and methods of biomarker analyses.

The services of this core enhance our center's ability to conduct novel age relevant analyses:

a. To identify biochemical and inflammatory markers indicative of functional status and predictive of functional decline in aging;
b. To generate data for the Analysis Core to evaluate the generalizability of markers of functional decline in aging;
c. To generate data to evaluate specific disease associations with markers of functional decline;
d. To gain insights into biological pathways implicated in functional decline;
e. To aid identification of targets for interventions to slow, halt or reverse functional decline;
f. To generate data to monitor the efficacy of interventions designed to combat functional decline in aging**.**

Metabolomics Core (Resource Core 3)

James Bain, Ph.D., Core Leader
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Comprehensive metabolite profiling, or "metabolomics", can define chemical phenotypes and has unique potential for discovering biomarkers that predict disease incidence, severity, and progression and for casting new light on underlying biochemical and metabolic abnormalities associated with such conditions. While genomic and transcriptomic technologies have matured to the point that core laboratories providing these services are commonplace, the complexity inherent in metabolomics still requires a specialized resource to measure large numbers of intermediary metabolites with diverse chemical properties in a quantitatively rigorous and reproducible fashion. Underlying issues include a) the wide-ranging concentrations of metabolites in tissues and bodily fluids (ranging from sub-nanomolar to millimolar), b) the variety of biological matrices that are surveyed, and c) the chemical diversity of the analytes. Given these variables, it is not surprising that no single technology exists for measurement of all of the metabolites in the "metabolome".

Our focus is on metabolic signatures associated with functional decline in aging. The goal of the Metabolomics Research Core (RC3) is to apply a diverse set of ***complementary*** metabolomics technologies that provide a ***rare combination*** of ***broad coverage*** and ***analytical precision*** to the study of aging and its associated morbidities in support of the overall theme *to understand and modify the multiple pathways of functional decline*. Using a suite of seven research-dedicated mass spectrometers, our team analyzes small-molecule metabolites in samples from aging studies in humans, laboratory animals, and cultured cells, with an emphasis on understanding how changes in metabolism relate to functional decline. We take a two-pronged approach, performing both targeted and non-targeted ("shotgun" or exploratory) metabolomics. We currently offer fifteen targeted assays, which make quantitative measurements of more than 400 individual metabolites in such diverse chemical classes as amino acids, ceramides, and acyl coenzyme As. Our non-targeted work employs both gas chromatography/mass spectrometry (GC/MS) and liquid chromatography/MS. Duke's Pepper Center has supported development of several of our assays. We are always open to forming new collaborations with intra- and extramural Pepper investigators.

Aim 1) To provide both targeted and non-targeted MS-based metabolomic measurements that might help explain functional decline in samples from studies funded by the Duke Pepper OAIC and its collaborators.

Aim 2) To develop new targeted metabolomics methods for measurement of a broader array of acylcarnitine and acylglycine species.

Aim 3) To support young investigators in the Duke Pepper OAIC in planning, execution, and interpretation of metabolomics measurements in the context of their clinical and/or basic studies, and to integrate the resultant findings with other biochemical and clinical data to enhance our understanding of metabolic changes associated with functional outcomes.

Aim 4) To serve as a vehicle for connection of the Duke Pepper OAIC to other Pepper Centers and the aging research community at large.

Research Career Development Core

Cathleen Colon-Emeric, MD, MHS, and Kenneth W. Lyles, M.D., Core Leaders
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The goal of the Research Career Development Core (RCD Core) is to recruit, train, mentor, and develop future research leaders with skills in translational research and clinical investigation directed at exploring approaches to understand and modify multiple pathways of functional decline. Promising scientists are recruited to develop and/or expand their investigative skills with an emphasis on translating basic research findings into clinical studies or, taking clinical research findings and posing new basic research questions. RCD Core awardees take courses tailored to their specific career needs, receive mentoring from senior faculty members, and receive leadership training to prepare them for key positions in geriatrics and gerontology. Our mentoring plan is designed to motivate clinical investigators to explore basic research principles and basic scientists to interface with clinical researchers. The RCD Core ensures its awardees to take advantage of other Pepper Center research cores and other experienced investigators at Duke University Medical Center. RCD Core awardees participate in seminars and conferences where interdisciplinary investigators discuss their work. In these settings, ideas for translational collaborations are raised and discussed, resulting in new projects and studies. Close collaborative links with other programs and centers at Duke University are available to RCD Core awardees, e.g., Duke Clinical Research Institute; Health Services Research Program, VAMC; Geriatric Research Education and Clinical Center VAMC; the Duke Clinical Translational Science Award Center; the Institute for Genome Sciences and Policy, and the Duke University Medical Center Mentored Clinical Research Scholar Program (MSRSP). The RCD Core helps awardees develop interdisciplinary projects and use these programs, Center and Institutes to foster translational research studies. A listing of past and current awardees is listed in section III.

Pilot/ Exploratory Studies Core

Kenneth E. Schmader, M.D., and William Kraus, M.D., Core Leaders
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The overall objective of the Pilot/Exploratory Studies Core (P/E Studies Core) is to conduct pilot studies to acquire information needed to select or design future crucial studies in the Duke Pepper's area of research focus. The P/E Studies Core orchestrates several key activities to generate productive pilot studies. These activities include formal methods to solicit and select pilot studies via the Duke Pepper Pilot Grants Program and Pilot Studies Workshop Series and a multifaceted plan for monitoring study progress and larger proposal development. There are six specific aims associated with this core:
1) Generate ideas and enhance the intellectual environment for the development of pilot/exploratory studies of approaches to understand and modify multiple pathways of functional decline;
2) Solicit, select and provide research funding for the highest quality pilot studies and investigators;
3) Facilitate successful completion of the pilot studies and their development into externally funded, larger grants;
4) Attract, support, and further develop promising junior investigators to aging research in coordination with activities of the Research Career Development Core;
5) Grow areas of research foci for future Duke Pepper OAIC applications;
6) Educate developing investigators about the logistics and science of pilot studies via pilot studies workshops.

Leadership/ Administrative Core

Harvey J. Cohen, M.D., Core Leader and Principle Investigator
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Miriam C. Morey, Ph.D., Co-Director and Principle Investigator
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Jamazina Smith, Staff Assistant
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The Leadership/Administrative Core (L/AC) has responsibility for the overall direction and operation of the Duke Pepper Center. The L/AC will provide the leadership necessary to harness and direct the creative energy of this complex research activity. The Core will have input from, and interaction with, key members of other units of the Medical Center, the University, and the Durham VA and relies on two panels, Independent Review Panel and External Advisory Committee for expertise and direction in selection of future projects, pilots and junior faculty awardees. The Pepper Center Operating Committee is the primary mechanism for problem solving and planning. Monthly meetings composed of core leaders, key program advisors and administrative staff which are Co-chaired by Drs. Cohen and Morey to review the status of all center related activities and strategies to move forward with the proposed work. The specific goals of the L/AC are:

(1) Assure overall coordination, integration, and administration of the Duke Pepper Center;
(2) Assure integration with other affiliated programs;
(3) Assure efficient and appropriate use of core facilities by investigators and programs;

(4) Plan and develop funding strategies for cores and support of projects related to cores;
(5) Plan and coordinate future core activities and integrate Pepper Center activities with new programs established at Duke Medical Center.

B. RESEARCH:
The Duke Pepper Center supports three resource cores which have evolved from prior support: (1) Analysis, (2) Biochemical Pathways, and (3) Metabolomics. Externally funded NIH/VA grants, with study aims and study populations that integrate into our thematic focus, receive support from these cores. New specific research aims relevant to our Center are developed for each externally funded grant which we support. The Research Career Development Core and the Pilot/Exploratory Studies Core facilitates career development with established post-doctoral Research and Geriatric Training and Pilot Programs. Support for career development and pilot projects are selected on a competitive basis using criteria clearly defined in the Pepper Center guidelines. The Leadership/ Administrative Core direct and coordinates activities to ensure continued integration of center activities. Collectively, the resources and activities surrounded these resources contribute towards the advancement of our center theme of "***to understand and modify multiple pathways of functional decline."*** Our resource cores provide comprehensive profiling capabilities that allow us to explore an integrated and multi-system approach to understanding multiple pathways of functional decline.

A **Data Integration Working Group** serves as a mechanism thorugh which center-wide research questions are developed and addressed, and the work of emerging Pepper Scholars is mentored and developed. Over the past few years, we have identified and begun to address crucial problems in statistical methodology to reduce, analyze, and synthesize large volumes of biologic and genetic data (RC1). An example of this work can be found in the Peterson et al publication (in press for 2015 and published in 2016) in which we describe a "A Novel Analytic Technique to Measure Associations Between Circulating Biomarkers and Physical Performance Across the Adult Life Span" – JG:MS). We also have identified novel biochemical and metabolic factors underlying organ and tissue impairment that are associated with dysfunction at the level of the whole person (RC2), and we have identified and developed new technologies in metabolomics (RC3) (see Hirschey . Mol. Cell. Proteomics). Also new for this year we examined the impact of metabolites on body mass index and age (See Kraus WE, et al). This strengthened metabolomics influence within the OAIC has resulted from key investigations that provide innovative linkages between metabolic signatures, premature disease, heritability of premature disease, and functional decline (Hirschey MD. SIRT3 regulates progression and development of diseases of aging in Trends Endocrinol Metab). Our metabolic profiling capability is unique among Pepper Centers and is a valued collaborative resource to the overarching Pepper OAIC program nationally. Our biomarker work is not limited to metabolic investigations as our resource cores have wide ranging capabilities. One of our young scholars published work examining the impact of early life biomarkers as a marker of premature aging in young adults (See Belskey et. Al.; Proc Natl Acad Sci) which received substantial publicity and another scholar continues to provide evidence of the role of progenitor cell depletion in poor late life physical function (see Povsic etal JG:MS). Other scholars continued to build on our work in biomarkers of osteoarthritis (see pubs with Kraus V as senior author). A review of our publications below highlights the breadth of our supported investigations.

PEPPER CENTER SCHOLARS
Since its inception, the Duke Pepper Center has produced an impressive portfolio of relevant research and innovations in faculty development. One of its many accomplishments is support

and mentoring of numerous promising investigators whose careers focus on relevant aging related research at Duke. In 2009 in recognition of the contributions of these young investigators, career development and pilot project awardees, and the Duke Pepper Center established a *Duke Pepper Scholars Program.*

Ongoing Pepper Center Scholars are:

Mehri McKellar, M.D. Assistant Professor, Department of Medicine, Division of Infectious Diseases
Work in Progress: To examine whether the degree of immunosuppression and underlying inflammation in HIV-infected patients affects physical performance and whether physical decline is mediated through metabolic dysregulation.

Richard Lee, MD., MPH Medical Instructor, Department of Medicine, Division of Endocrinology and Metabolism
Work in Progress: Two investigations to explore his hypothesis that increased functional impairment contributes significantly to the increased fracture risk in older patients with diabetes.

Rasheeda Hall, MD, Department of Medicine, Division of Endocrinology and Metabolism
Work in Progress: To determine if chronic kidney disease is an independent predictor of recurrent falls and injurious falls in nursing home residents with a history of falls and to examine potential mediators of recurrent falls.

C. PILOT PROJECTS

Ongoing Pilot Projects led by Pepper Scholars are:

A Pilot Study to Identify Physiological Vulnerabilities to Accelerated Functional Decline
Dan Belsky, PH.D., Assistant Professor, Medicine, Geriatrics
(Funded 2014-ongoing)

Epigenetic Modification of Stem Cells with Aging and Obesity
Farshid Guilak, Ph.D., Professor, Orthopedic Surgery and Cell Biology
(Funded 2014-ongoing)

Skeletal Muscle Mass and Strength Trajectories in Older Patients Hospitalized with Medical Illness
Susan Nichole Hastings, M.D., Associate Professor, Medicine, Geriatrics
(Funded 2014-ongoing)

Determining the Role of Protein Quality Control in Mitochondrial Dysfunction and Disease in Aging
Matthew Hirschey, Ph.D., Assistant Professor, Chemistry and Biochemistry
(Funded 2014-ongoing)

Racial Differences in Outcomes of Older Adults Receiving Inpatient Palliative Care Consultation
Kimberly Johnson, M.D. Associate Professor, Medicine, Geriatrics

(Funded 2014-ongoing)

Accelerometry Data for Physical Activity and Sedentary Behavior in Older Adults: Data Processing and Analysis
Katherine Hall. PhD, Assistant Professor, Medicne, Geriatrics
(Core Resource Utilization 2013-ongoing)

Improving Venous Thromboembolism Prophylaxis in Hospitalized Elders
Juliessa Pavon, MD, Assistant Professor, Medicine, Geriatrics
(Core Resource Utilization 2013-ongoing)

SECTION III. CAREER DEVELOPMENT (RECENT) AND SUBSEQUENT FUNDING

Mehri McKellar, MD,
Medicine – Geriatrics/ Endocrinology
Duke University Medical Center
Durham, NC
RCD Supported (2013-2015)
Work in Progress: To examine whether the degree of immunosuppression and underlying inflammation in HIV-infected patients affects physical performance and whether physical decline is mediated through metabolic dysregulation.
Subsequent funding
1.5P30-AI064518-08, Duke Center for AIDS Research (CFAR) Small Award, Physical Function and the Role of Metabolomics in HIV and Aging Study, awarded 2013. Role: PI.
2.5P30-AI064518, Duke Center for AIDS Research, renewal for 5 years, awarded 2015. To establish and support an academic environment that promotes and encourages the intramural collaboration and coordination of all AIDS-related research activities at Duke, thus serving the requirements of all AIDS investigators and their research programs**.** Role: Executive Committee member and leader of the HIV and Aging Scientific Working Group.
3.1R24AG044325-01, HIV/Aging Pilot Program, Rapid Cycle award, awarded 2014. To study racial differences in change in physical function in older male veterans with HIV, using the national Veterans Aging Cohort Study database.
4. R13, conference funding, sponsored by Emory University. HIV & Aging: From Mitochondrial to the Metropolis, October 2104. Role: Executive Committee member.

Richard Lee, MD,
Medicine – Geriatrics/ Endocrinology
Duke University Medical Center
Durham, NC
RCD Supported (2013-2015)
Applied for GEMSSTAR 2013
Work in Progress: Two investigations to explore his hypothesis that increased functional impairment contributes significantly to the increased fracture risk in older patients with diabetes.
Subsequent funding
GEMSSTAR award 10/1/14-9/30/16: Aim: To identify potential novel biomarkers or pathways using metabolomics, associated with increased fracture risk, independent of bone mineral density, among older adults with diabetes.
American Diabetes Association 7/1/14-6/30/16
NIH Loan Repayment Program 7/1/14-6/30/16

Rasheeda Hall, M.D., Pepper Center Diversity Supplement Awardee (2012-2013)
Medicine – Nephrology
Duke University Medical Center
Durham, NC

Subsequent funding

Research Award of Excellence: VA Institute of Medical Research
NIA GEMSSTAR award, 2015-2017.
Work in Progress: To determine if chronic kidney disease is an independent predictor of recurrent falls and injurious falls in nursing home residents with a history of falls and to examine potential mediators of recurrent falls.

SECTION IV. DUKE PEPPER CENTER PUBLICATIONS –2015-2016

PUBLICATIONS 2015

Band PA, Heeter J, Wisniewski HG, Liublinska V, Pattanayak CW, Karia RJ, Stabler T, Balazs EA, Kraus VB. Hyaluronan molecular weight distribution is associated with the risk of knee osteoarthritis progression. Osteoarthritis Cartilage. 2015 Jan;23(1):70-6. doi: 10.1016/j.joca.2014.09.017. Epub 2014 Oct 7. PMCID: PMC4375131.

Huffman KM, Pieper CF, Hall KS, St Clair EW, Kraus WE. Self-efficacy for exercise, more than disease-related factors, is associated with objectively assessed exercise time and sedentary behaviour in rheumatoid arthritis. Scand J Rheumatol. 2015;44(2):106-110. PMID: 25222824; PMCID: PMC4356639.

Lv YB, Yin ZX, Chei CL, Qian HZ, Kraus VB, Zhang J, Brasher MS, Shi XM, Matchar DB, Zeng Y. Low-density lipoprotein cholesterol was inversely associated with 3-year all-cause mortality among Chinese oldest old: data from the Chinese Longitudinal Healthy Longevity Survey. Atherosclerosis. 2015 Mar;239(1):137-42. doi: 10.1016/j.atherosclerosis.2015.01.002. Epub 2015 Jan 14. PMCID: PMC4441211

Hybels CF, Pieper CF, Payne ME & Steffens DC. Late-life depression modifies the association between cerebral white matter hyperintensities and functional decline among older adults. American Journal of Geriatric Psychiatry 2016;24:42-49. DOI: 10.1016/j.jagp.2015.03.001. First published online 12 March 2015. PMCID: PMC4567962

Pearce MJ, Koenig HG, Robins CJ, Nelson B, Shaw SF, Cohen HJ, King MB. Religiously integrated cognitive behavioral therapy: a new method of treatment for major depression in patients with chronic medical illness. Psychotherapy (Chic). 2015 Mar;52(1):56-66. doi: 10.1037/a0036448. Epub 2014 Nov 3. PubMed PMID: 25365155; PubMed Central PMCID: PMC4457450.

Orlowsky EW, Kraus VB. The role of innate immunity in osteoarthritis: when our first line of defense goes on the offensive. J Rheumatol. 2015 Mar;42(3):363-71.doi:10.3899/jrheum.140382. Epub 2015 Jan 15. PMCID:PMC4465583

Chou CH, Lee MT, Song IW, Lu LS, Shen HC, Lee CH, Wu JY, Chen YT, Kraus VB, Wu CC. Insights into osteoarthritis progression revealed by analyses of both knee tibiofemoral compartments. Osteoarthritis Cartilage. 2015 Apr;23(4):571-80. doi: 10.1016/j.joca.2014.12.020. Epub 2015 Jan 7. PMID: 25575966

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Kraus VB, Blanco FJ, Englund M, Henrotin Y, Lohmander LS, Losina E, Önnerfjord P, Persiani S. OARSI Clinical Trials Recommendations: Soluble biomarker assessments in clinical trials in osteoarthritis. Osteoarthritis Cartilage. 2015 May;23(5):686-97. doi: 10.1016/j.joca.2015.03.002. Review. PMID:25952342

Fu Q, Cao J, Renner JB, Jordan JM, Caterson B, Duance V, Luo M, Kraus VB. Radiographic features of hand osteoarthritis in adult Kashin-Beck Disease (KBD): the Yongshou KBD study.Osteoarthritis Cartilage 2015 Jun;23(6):868-73. doi: 10.1016/j.joa.2015.01.009. Epub 2015 Jan 24 PMID:25623625

Porter Starr KN, McDonald SR, Bales CW. Nutritional Vulnerability in Older Adults: A Continuum of Concerns. Curr Nutr Rep. 2015 Jun;4(2):176-184. PMID:26042189

Povsic TJ, Sloane R, Pieper CF, Pearson MP, Peterson ED, Cohen HJ, Morey MC. Endothelial Progenitor Cell Levels Predict Future Physical Function: An Exploratory Analysis From the VA Enhanced Fitness Study. J Gerontol A Biol Sci Med Sci. 2016 Mar;71(3):362-9. doi: 10.1093/gerona/glv180. Epub 2015 Oct 28

Belsky DW, Caspi A, Israel S, Blumenthal JA, Poulton R, Moffitt TE. Cardiorespiratory fitness and cognitive function in midlife: neuroprotection or neuroselection? Ann Neurol. 2015;77(4):607-617. PMID: 25601795; PMCID: PMC4376580.

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Belsky DW, Caspi A, Houts R, Cohen HJ, Corcoran DL, Danese A, Harrington H, Israel S, Levine ME, Schaefer JD, Sugden K, Williams B, Yashin AI, Poulton R, Moffitt TE. Quantification of biological aging in young adults. Proc Natl Acad Sci U S A. 2015 Jul 28;112(30):E4104-10. doi: 10.1073/pnas.1506264112. Epub 2015 Jul 6. PubMed PMID: 26150497; PubMed Central PMCID: PMC4522793.

Kannan S, Kurupati RK, Doyle SA, Freeman GJ, Schmader KE, Ertl HC. BTLA expression declines on B cells of the aged and is associated with low responsiveness to the trivalent influenza vaccine. Oncotarget. 2015 Aug 14;6(23):19445-55. PMID:26277622

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McDonnell E, Peterson BS, Bomze HM, Hirschey MD. SIRT3 regulates progression and development of diseases of aging.Trends Endocrinol Metab. 2015 Sep;26(9):486-92. doi: 10.1016/j.tem.2015.06.001. Epub 2015 Jun 29. Review. PMID:26138757

Berger M, Nadler JW, Browndyke J, Terrando N, Ponnusamy V, Cohen HJ, Whitson HE, Mathew JP. Postoperative Cognitive Dysfunction: Minding the Gaps in Our Knowledge of a Common Postoperative Complication in the Elderly. Anesthesiol Clin. 2015 Sep;33(3):517-50. doi: 10.1016/j.anclin.2015.05.008. Epub 2015 Jul 16. Review. PMID: 26315636

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Kenzik KM, Morey MC, Cohen HJ, Sloane R, Demark-Wahnefried W. Symptoms, weight loss, and physical function in a lifestyle intervention study of older cancer survivors. J Geriatr Oncol. 2015 Nov;6(6):424-32. doi: 10.1016/j.jgo.2015.08.004. Epub 2015 Sep 9. PubMed PMID: 26362355; PubMed Central PMCID: PMC4662250.

Marcum ZA, Gurwitz JH, Colón-Emeric C, Hanlon JT. Pills and ills: methodological problems in pharmacological research. J Am Geriatr Soc. 2015 Apr;63(4):829-30. doi: 10.1111/jgs.13371. No abstract available. PMID:25900504

Hirschey MD, Zhao Y. Metabolic regulation by lysine malonylation, succinylation, and glutarylation. Mol. Cell. Proteomics. 2015;14(9):2308-2315. PMID: 25717114; PMCID: PMC4563717

Daghestani HN, Kraus VB.Inflammatory biomarkers in osteoarthritis.Osteoarthritis Cartilage. 2015 Nov;23(11):1890-6. doi: 10.1016/j.joca.2015.02.009. Review. PMID:26521734

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SECTION V. EXTERNAL ADVISORY BOARD MEMBERS

Karen Bandeen-Roche, Ph.D. Johns Hopkins
Chair of Duke External Advisory Board,
Years of service: 6

Roger Fielding, Ph.D Boston University School of Public Health
Years of Service: 6

Mary Tinetti, M.D., Yale School of Medicine
Years of Service: 1

RECOGNITION AND AWARDS
DUKE UNIVERSITY PEPPER CENTER
(2015)

2015

Harvey Jay Cohen, M.D., Professor of Medicine, Division of Medicine, Duke University Medical Center

Honors:

Member, of a LLC, 2017 International Association of Geriatrics and Gerontology Congress 2013 – 2017

President, American Federation of Aging Research (AFAR)

Cathleen Colon-Emeric, M.D., Associate Professor of Medicine, Division of Geriatrics Duke University Medical Center

Honors:

Nominated for the Duke School of Medicine Clinical Mentoring Award.

Accepted to the Duke Academic Leadership Innovation and Collaborative Engagement (ALICE) Program

Dr Louis DeFrate, Sc.D., Assistant Professor in the School of Medicine, Division of Orthopaedic Duke University Medical Center

Honors:

ACL Study Group Traveling Scientist (2016-2018)

Kappa Delta Young Investigator Award (2016)

American Academy of Orthopaedic Surgeons and Orthopaedic Research Society

Katherine S. Hall, Ph.D., Assistant Professor of Medicine, Division of Geriatrics, Duke University and Durham VA Medical Centers

Honors:

Program Committee Member, International Association of Gerontology & Geriatrics (IAGG) World Congress

Elected Secretary-Treasurer, IAGG Council of Student Organizations

Elected Communications Chair, Society of Behavioral Medicine, Military and Veterans Health Special Interest Group

Member, American College of Sports Medicine Strategic Health Initiative for Older Adults

Virginia Kraus, M.D., Ph.D., Professor of Medicine, Division of Rheumatology and Immunology

Honors:

President of the Osteoarthritis Research Society International (OARSI)

Kappa Delta award from AAOS

Kappa Delta award from ORS

William Kraus M.D., Professor of Medicine, Division of Cardiology Duke University Medical Center

Honors:

Elected Vice President, American College of Sports Medicine.

Miriam C. Morey, Ph.D. Professor of Medicine, Division of Geriatrics Duke University and Durham VA Medical Center

Honors:

Member, American College of Sports Medicine Strategic Health Initiative for Older Adults, Exercise is Medicine Subcommittee for Older adults

Nominated, Paul B. Magnuson Award

Kenneth E. Schmader, M.D., Professor of Medicine, Duke University Medical Center VA Medical Center

Honors:

Respiratory Syncytial Working Group, Advisory Committee on Immunization Practices, Centers for Disease Control

Heather E Whitson, M.D., Assistant Professor of Medicine, Division of Geriatrics Duke University Medical Center

Honors:

Outstanding Committee Service Award, AGS Research Committee

Program Chair, American Geriatrics Society
approved by Board as Vice Chair, Research Committee, AGS

Served on the Institute of Medicine Committee on Public Health Approaches to Eye Health and Vision Impairment

Distinguished Nominee, Duke School of Medicine Research Mentoring Award

Minority Research

The Duke University Pepper Center
(2015)

General Brief Description of Minority Activities:
The Duke Pepper Center has a rich tradition of minority research that includes support of minority trainees and a broad depth of research yielding extensive publications of relevance.

Special Projects

Genetic Ascertainment of Large African American Family for Osteoarthritis and Early Onset Cardiovascular Disease.
Virginia Kraus, M.D., Ph.D., William Kraus, M.D., Project Leaders:
Years 2001-ongoing

Drs. Virginia Byers Kraus and William E. Kraus, in collaboration with the Duke Pepper Center and the Duke Center for Human Genetics, have genetically ascertained one of the largest intact extended families in the United States. Particular emphasis was placed on evaluating this family (Family C) for osteoarthritis and early onset heart disease. This family celebrated a reunion in Durham, NC, July 24-28, 2002. A total of 500 adults participated from 35 states. This family traces its origin back to 1773 and consists of a mixture of ethnicities: primarily American Indian mixed with Anglo-Saxon and African-American. This is believed to represent one of the oldest intact extended families in the United States. Large family reunions have been held every two years since 1978 and every four years in North Carolina. A family genealogy has been published encompassing the years 1773 to approximately 1950. Of note, the author, approximately aged 86, is still living in North Carolina. We ascertained 239 members of this family at a Health Fair. We obtained health information, family history information along with laboratory data for use as quantitative traits including glucose and lipids. In addition, a physical exam was obtained which included body mass index, weight, height, calcaneal bone mineral density, hand exam for OA, blood pressure, eye exam for glaucoma and retinopathy, and a physical function measure on the over 65 age group. A pedigree has been constructed consisting of four generations. In addition to phenotyping and genetic ascertainment, we provided educational medical workshops on osteoporosis, osteoarthritis and cardiovascular disease. We are working to connect the four generations in the pedigree back to the original founders utilizing information provided in the Family C geneology and information provided by the family geneologist who has kept current records for the family. We now have these in hand. We plan to proceed with interviews of older family members remaining in North Carolina to try to fill in any pedigree gaps. We will also proceed with evaluating the pedigree for medical conditions that appear to run in the family. We will then proceed to apply for funding to support genetics research on this family.

Gene-environment Interactions in Aging, Functional Decline and Disease
Svati Shah, M.D., Project Leader Years 2007-Ongoing

The overall goal of this work is to study the interactions between aging, genetics and environment on the risk and development of (or protection from) complex diseases that commonly cause disability and loss of independence in older adults. The study of risk factors and heritability of key diseases in older adults directly relates and leads to functional decline. Furthermore, multiple disease pathologies and risk factors likely interact to produce disability and functional decline in older adults. Moreover, these interactions are not localized to old age alone, but occur throughout the life span, making the study of complex diseases in younger individuals (e.g., mid-life) as important as older individuals for advancing the understanding of how these diseases produce functional decline in late life.

For this pilot study, we will study metabolic risk factors for the complex diseases of cardiovascular disease (CVD) and osteoarthritis (OA). We have chosen to study CVD and OA risk for several reasons. First, CVD and OA are the two of the most common disabling conditions affecting older adults in the US. Second, aging is identified as a major risk element contributing to the development of each of these conditions. Third, ascertainment of samples from a large family structure four generations will provide a unique opportunity to study the interactive effects of aging, genetics and environment on the development of arguably the two most influential conditions affecting functional decline in the aging US population.

We have the extraordinary opportunity to address these issues through access to medical information, biomarker and genetic sampling in a large complex ethnically-diverse (primarily African and Native American) family. The family under study (Family C) is one of the oldest existing extended families in the United States and has a prevalence of disease that mirrors the rates in the general population, making it valuable for generalizing findings to the US population. This large multi-generational family resource will provide an innovative means to study the effects of aging, trait heritability, genetic and environmental factors, and interactions among these elements for common inherited conditions. There are three specific aims related to this project:
1). Quantitative measurement of CVD and OA disease-related biomarkers in all sampled family members;
2). Quantitative assessment of the heritability of metabolic risk factors for CVD and OA biomarkers, and their interaction with aging in this family;
3). Perform a genome-wide linkage analysis in this Family to map metabolic risk factors for CVD and OA susceptibility genes.

Johnston County Osteoarthritis Project
Virginia Kraus, M.D., Ph.D., Investigator. Years 2001 - Ongoing

The Johnston County Osteoarthritis Project is an ongoing, community-based study of the occurrence of knee and hip OA in African American and Caucasian residents in a rural county in North Carolina. Details of this study have been reported previously 24. Briefly, this study involved civilian, non-institutionalized adults aged 45 years and older who resided in six townships in Johnston County. Participants were recruited by probability sampling, with over-

sampling of African Americans. A total of 3,187 individuals were recruited between May 1991 and December 1997. All participants completed a baseline clinical evaluation. Among the 3,187 participants with baseline data, 1,329 were not eligible or available for follow-up assessments. Reasons that participants were not eligible or available included emigration from study area (N=161), refusal (N=435), inability to participate due to physical or mental conditions (N=234), death (N=411), and inability to contact or find (N=88). Assessments at follow-up were completed from 1999-2003.

Dr. Kraus's research in musculoskeletal disease has identified important racial differences in several biomarkers and pain responses. These results impact the use and interpretation of biomarkers for personalized medicine applications. While Caucasians had higher serum Hyaluronan levels (an indicator of knee synovitis) than African Americans, African-Americans had higher levels of the systemic inflammatory biomarker high-sensitivity C-reactive protein (hsCRP) . In individuals with hip and knee OA, African Americans had higher pain scores. Racial differences in pain and function were related to psychological factors, including arthritis self-efficacy, affect, and use of emotion-focused coping. These symptom and biomarker data will be of increasing importance for early identification of individuals at risk for disease onset and progression in order to initiate treatment at very early times to avoid irreversible stages of disease and functional impairment.

HOSPICE and PALLIATIVE CARE
Kimberly Johnson, MD – Ongoing

1) What are hospices in the Carolinas doing to increase access to hospice care for older African Americans in their service area. (2011-ongoing)

Experts and national organizations recommend that hospices work to increase service to African Americans, a group historically underrepresented in hospice. The objective of this study was to describe strategies among hospices in North and South Carolina to increase service to African Americans and identify hospice characteristics associated with these efforts. We used a cross-sectional survey which examined the frequency of community education/outreach, directed marketing, efforts to recruit African American staff, cultural sensitivity training, and goals to increase service to African Americans.

Of 118 eligible hospices, 79 (67%) completed the survey. Over 80% were at least somewhat concerned about the low proportion of African Americans they served, and 78.5% had set goals to increase service to African Americans. Most were engaged in community education/outreach, with 92.4% reporting outreach to churches, 76.0% to social services organizations, 40.5% to businesses, 35.4% to civic groups, and over half to health care providers; 48.0% reported directed marketing via newspaper and 40.5% via radio. The vast majority reported efforts to recruit African American staff, most often registered nurses (63.75%). Nearly 90% offered cultural sensitivity training to staff. The frequency of strategies to increase service to African Americans did not vary by hospice characteristics, such as profit status, size, or vertical integration, but was greater among hospices that had set goals to increase service to African Americans. These findings suggest that many hospices are engaged in efforts to increase service to African Americans. Future research should determine which strategies are most effective.

Johnson KS, Payne R, Kuchibhatla MN. What are hospice providers in the Carolinas doing to reach African Americans in their service area? J Palliat Med 2016;19:183-89.

Johnson KS, Payne R, Kuchibhatla MN, Tulsky JA. Are restrictive admission practices associated with hospice enrollment for older African Americans and Whites? J Pain Symptom Manage 2016;51:697-705.

Johnson KS, Payne R, Kuchibhatla MN, Tulsky JA. Are restrictive admission practices associated with hospice enrollment for older African Americans and Whites? J Pain Symptom Manage 2016;51:697-705.

2) Increasing access to hospice care for older African Americas: a National study
***Kimberly Johnson, M.D.,* (2013-Ongoing)**

African Americans use hospice at lower rates than Whites. The overall goal of this work is to identify best practices among hospice providers in reaching African Americans. The study includes a national sample of hospice providers. Participants provide information about their community education and outreach practices, admission practices beyond those required in Medicare Hospice Benefit, cultural sensitive training, goals and strategies to increase service to African Americans, and identify barriers and facilitators of these efforts. The overall goal is to identify best practices among hospice providers in reaching older African Americans.

To-date, we have enrolled 204 hospices across the United States. The vast majority of hospices were not-for-profit (79.4%), freestanding (70.1%), and located in the South (52.9%). Nearly 70% offered cultural competency training and 52% participated in community education and outreach to increase service to African Americans, most commonly involving churches, social service agencies, and healthcare providers. Participating hospices reported that the most successful strategies included partnerships with churches and community physicians with large numbers of African Americans. The least successful strategies to reach African Americans included the use of printed material or other advertising. We are involved in ongoing analyses which will lead to specific recommendations for hospice providers to increase service to African Americans in their communities.

3) **Racial Differences in Outcomes of Older Adults Receiving Inpatient Palliative Care Consultation (Pepper Pilot 2014-2016)**
(ongoing)
Over the last decade, there has been tremendous growth in inpatient palliative care consultation programs. These programs reduce symptoms, improve doctor-patient communication, increase satisfaction with care, and decrease costs. Inpatient palliative care consultation programs are especially relevant to improving the care of older adults hospitalized with restricting symptoms and progressive functional decline because nearly 70% of Medicare beneficiaries spend some time in the hospital in the last year of life. Because older African Americans with advanced illness are more likely than Whites to be hospitalized in the last year of life and to die in the hospital, inpatient palliative care consultation may provide an opportunity for them to receive interventions which address major threats to independence and the quality of end-of-life care (ex: uncontrolled symptoms, spiritual, emotional, and social well-being). Using a combination of

chart review and interviews with patients and caregivers, the overall goal of this study is to examine differences in characteristics of African Americans and Whites receiving inpatient palliative care consultation, including reason for consultation, discharge disposition, and advance care planning.

We have identified 666 consults among older adults (≥ age 65) between January 1, 2011 and December 31, 2011; 29.6% were African American. African Americans were slightly older than Whites (mean age 79.5 vs. 77.8) and a greater proportion (40.1% vs. 29%) were on the General Medicine service and a lower proportion in the ICU (19.8% vs. 25.8%) at the time of the consultation. Among African Americans, the reasons for consultation more often included a request to assist with communication (80.2% vs. 69.3%) and symptom management (69.5% vs. 58.9%). More older whites than African Americans who received palliative care consultation died during the hospitalization (31.1% vs. 18.3%) and more African Americans than whites were discharged to skilled nursing facility or rehab (29.4% vs. 19.6%). Similar proportions of patients in both racial groups were discharged with hospice. These findings suggest that there are important racial differences in inpatient consultation. Some of these differences may reflect attempts by referring providers to improve the care of seriously ill African Americans across domains where African Americans are known to experience lower quality care than whites, such as communication and symptom management (both more common reasons for consultation among blacks than whites).

We also examined differences between the 2 racial groups in code status before and after inpatient palliative care consultation (IPCC). African Americans were more likely to be full code before (45.2% vs. 30.9%, p=0.01) and after (25.0% vs. 12.1%, p=0.002) IPCC. Among those who were full code before IPCC, 44.7% of African Americans and 60% of Whites changed their code status. After controlling for age, gender, diagnosis, and location, Blacks had a higher odds of being full code before (AOR 1.98 [1.21, 3.23]) and after (AOR 2.65 [1.45, 4.85] IPCC. These findings suggest that efforts to increase access to inpatient palliative care consultation for seriously ill African Americans may reduce use of some life-prolonging therapies and improve the quality of end-of-life care.

Johnson K, Kucibhatla M. Did you get the DNR? Black-White differences in code status among older adults before and after inpatient palliative care consultation. J Am Geriatr Soc 2016;64: S114

4) Understanding Caregivers' Views about Policies for Resolving Disagreements about the Use of Life-Sustaining Treatments

Lawmakers, hospitals, and professional societies have developed policies for resolving intractable conflicts when families request treatments for seriously-ill patients that clinicians believe are futile or otherwise inappropriate.[1,2] These “futility policies” attempt to balance patient autonomy in medical decision-making, as expressed by their families acting as surrogate decision-makers, with physicians’ rights to not prescribe treatments that they believe are nonbeneficial or harmful. Although the goal of these policies is to ensure that all patients are treated equitably, a number of factors suggest that African Americans are more likely than Whites to find themselves in conflicts which trigger the use of futility policies, the outcome of which most often upholds clinicians’ assessments of futile care. First, African Americans are

more likely than Whites to want life-sustaining therapies in cases that clinicians believe are unlikely to lead to recovery, increasing the risk for conflict over treatment decisions. Second, African Americans' views are more often guided by cultural values which emphasize the sanctity of life (in whatever form) and spiritual beliefs about the redemptive value of suffering. These beliefs often conflict with physicians' judgments about what is an acceptable quality of life and their strategies to relieve suffering. Third, most hospital committee members who render decisions in futility cases are culturally different from African Americans and unlikely to share their perspectives. Despite these concerns, to our knowledge, those charged with developing futility policies have not systematically considered the perspectives of African Americans who may be disproportionately affected by such policies.

Therefore, the overall goal of this research is to compare the perspectives of African Americans and Whites on current futility policies and potential changes to these policies that would ensure fair consideration of their perspectives. Using focus groups and semi-structured interviews, the specific aims of this work are:

Aim 1: Compare beliefs and attitudes among African American and White caregivers of seriously ill patients regarding conflict management when caregivers request treatments that clinicians believe are futile or inappropriate.

Aim 2: Compare views of African-American and White caregivers of seriously ill patients regarding provisions which should be included in a "fair" process for resolving disagreements between caregivers and clinicians about the use of life-sustaining therapies.

Aim 3: Develop recommendations for conflict management policies which address the concerns and perspectives African Americans of African Americans and Whites.

This work will lead to recommendations which consider the perspectives of racially diverse groups of older adults in resolving conflicts between caregivers of seriously ill patients and physicians over the use of life-sustaining therapies.

Duke Pepper Center Minority Supplement Awardee 2012-2014, Pepper REC Scholar 2016-2018
Rasheeda K. Hall, MD, MHS, MBA

Dr. Rasheeda Hall is an Instructor in Nephrology with an interest in exploring solutions to health system problems for vulnerable populations, such as low-income, elderly, and uninsured patients with chronic kidney disease (CKD) that rely on Medicare and Medicaid for healthcare coverage. Her career goal is to become an established independently funded investigator that conducts health services research to improve the efficiency, quality, and costs of healthcare delivery for this vulnerable subset of patients. To attain this goal, she has incorporated her prior educational and clinical training into research training under NRSA's Comparative Effectiveness Post-doctoral Fellowship Program while completing her clinical fellowship in Nephrology. Her diversity supplement will allow her to build on this training and allow protected time for immersion in aging research and geriatric nephrology. She will develop a deep understanding of

the health system problems that impact the vulnerable population of nursing home (NH) residents with CKD.

Her completed and proposed research is summarized below.

1. *Chronic kidney disease and recurrent falls in nursing home residents: a retrospective cohort study (completed).* This study examined whether chronic kidney disease (CKD) is associated with recurrent falls in older adults in nursing homes (NHs). We used data abstracted over a six month period from 510 NH residents with a history of falls. Thirty-five percent of the NH residents had CKD. In adjusted analyses, the incidence of recurrent falls was similar in those with and without CKD [fall rate ratio (FRR) 1.00, 95% confidence interval (CI) 0.97-1.02]. Orthostatic hypotension (FRR 1.52, 95% CI 1.12-2.05), history of falls during the prior six month period (FRR 1.25, 95% CI 1.05-1.49), cane or walker use (FRR 1.64, 95% CI 1.16-2.33), and ambulatory dysfunction (FRR 1.47, 95% CI 1.23-1.75) were independently associated with increased fall rate. CKD was not an important predictor of falls in this cohort of nursing home residents with prior falls. Instead, traditional fall risk factors were much more strongly associated with recurrent falls.

2. *Utilization of acute care among patients with ESRD discharged home from skilled nursing facilities (completed).* Older adults with ESRD often receive care in skilled nursing facilities (SNFs) after an acute hospitalization; however, little is known about acute care use after SNF discharge to home. This study used Medicare claims for North and South Carolina to identify patients with ESRD who were discharged home from a SNF between January 1, 2010 and August 31, 2011. Nursing Home Compare data were used to ascertain SNF characteristics. The primary outcome was time from SNF discharge to first acute care use (hospitalization or emergency department visit) within 30 days. Cox proportional hazards models were used to identify patient and facility characteristics associated with the outcome. Among 1223 patients with ESRD discharged home from a SNF after an acute hospitalization, 531 (43%) had at least one rehospitalization or emergency department visit within 30 days. The median time to first acute care use was 37 days. Characteristics associated with a shorter time to acute care use were black race (hazard ratio [HR], 1.25; 95% confidence interval [95% CI], 1.04 to 1.51), dual Medicare-Medicaid coverage (HR, 1.24; 95% CI, 1.03 to 1.50), higher Charlson comorbidity score (HR, 1.07; 95% CI, 1.01 to 1.12), number of hospitalizations during the 90 days before SNF admission (HR, 1.12; 95% CI, 1.03 to 1.22), and index hospital discharge diagnoses of cellulitis, abscess, and/or skin ulcer (HR, 2.59; 95% CI, 1.36 to 4.45). Home health use after SNF discharge was associated with a lower rate of acute care use (HR, 0.72; 95% CI, 0.59 to 0.87). There were no statistically significant associations between SNF characteristics and time to first acute care use. Almost one in every two older adults with ESRD discharged home after a post-acute SNF stay used acute care services within 30 days of discharge. Strategies to reduce acute care utilization in these patients are needed.

2. CANDIDATE'S PROPOSED RESEARCH PLAN for 2016-ongoing

Resilience in Older Dialysis Patients. Adults over age 65 are the most rapidly growing population initiating dialysis; however, 2/3 experience functional decline within six months.[16] Before interventions to promote resilience after dialysis initiation can be developed, we need a

better understanding of how to measure it. Resilience can be described as recovery after each dialysis session (day-to-day resilience), and as maintenance of functional status after development of end-stage renal disease (long-term resilience, figure). Long-term resilience is influenced by the chronic inflammatory state of end stage renal disease that is manifest by protein-energy wasting and frailty.[17,18] Day-to-day resilience is influenced by the acute intermittent stress of hemodialysis, when the cardiovascular system is exposed to rapid hemodynamic shifts, and the dialysis membrane's foreign material promoting inflammation. Interventions such as multifactorial geriatric assessment may improve both day-to-day and long-term measures of resilience.

Aim 1. Identify feasible, reliable, sensitive measures of day-to-day resilience for older dialysis patients.

1a. Determine the range and within-subject variability in physical activity (PA) using step activity monitors and a self-reported fatigue score over 14 days and in relation to timing of dialysis.

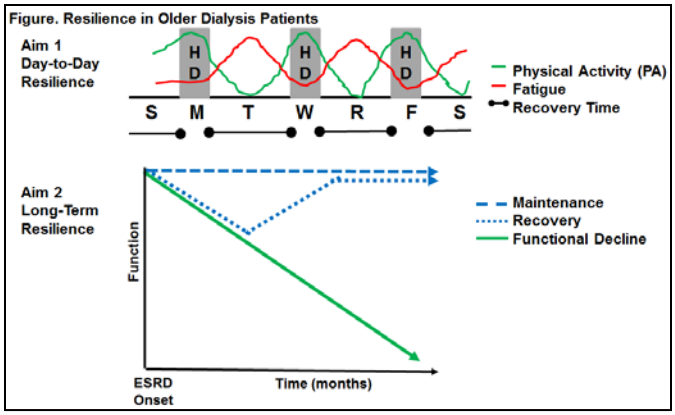
1b. Determine the correlation between within-subject trajectories of fatigue score and PA and between a self-reported, validated measure of recovery time and an objective measure of recovery time from PA data.

Aim 2. Identify feasible, reliable, sensitive measures of long-term resilience for older dialysis patients.

2a. Describe the change in function [short physical performance battery (SPPB), handgrip, and activities of daily living (ADLs)] over the first six months of dialysis (administered on a mid-week dialysis day at baseline, 3 months, and 6 months) and between dialysis and non-dialysis days (administered twice over a 48 hour period).

2b. Determine the correlation between within-subject performance in the Functional Independence Measure (FIM), physical performance measures (SPPB, handgrip) and ADLs.

Significance: Completion of these aims will identify optimal measures of resilience in an older dialysis population and provide Dr. Hall with feasibility and measurement pilot data supporting an intervention development grant application.



Approach. A sample of 30 subjects ≥65 years who initiated hemodialysis within the past 30 days will be recruited. Exclusions include non-ambulatory status, dependence in all ADLs, advanced dementia, non-English speaking, and hospice enrollees. Subject screening, recruitment and consent will occur at dialysis units within 15 miles of Duke; in this area, there are 250 prevalent hemodialysis patients aged ≥ 65 years and 15 new patients/month. Clinical characteristics (comorbidities, intradialytic weight gain, hemodialysis access, hemoglobin, dialysis adequacy, and albumin) will be obtained from medical records. Subjects will undergo home PA monitoring with accelerometers for 14 days. During this time, study personnel will call subjects each weekday to ask subjects to report their fatigue score at that moment on a numeric rating scale (0-10).[19] A validated measure of recovery time will be obtained at baseline.[20] Functional measures will be tested in the dialysis unit before dialysis on a mid-week dialysis at baseline, 3, and 6 months (SPPB, handgrip strength, Lawton

ADLs, and Katz ADLs). During the same week, these measures will be repeated on a non-dialysis day in each subject's home. Simultaneously, a physical therapist will conduct a home assessment involving the Functional Independence Measure (FIM).
Aim 1 analysis will calculate the proportion of subjects who complete the study protocol, the distribution of self-reported recovery time and within-subject changes in fatigue score and PA counts. Bivariate associations will test whether mean fatigue scores and PA counts are similar on dialysis and non-dialysis days. Associations of clinical characteristics with longitudinal changes in fatigue score and PA counts will be assessed using a mixed model with repeated measures logistic regression. Within-subject trajectories of fatigue score and PA counts will assess correlation between the two measures. Kaplan-Meier survival analysis will estimate time to recovery after dialysis using within-person changes in fatigue score and PA counts. The cut-points that will define time to recovery will be determined from the distribution of fatigue scores and PA counts. Mixed models to estimate the average within-person correlation between self-reported recovery time and recovery time derived from survival analyses. A sample size of 30 will provide power to detect correlations with moderate to large effect sizes (r>.3) with a confidence interval of 0.1, but is not large enough for modeling with covariate adjustment. **Aim 2 analysis** will examine the distribution of individual and group means of physical performance and ADLs over time. Mixed models with repeated measures design will evaluate within-subject and between-subject variability at each time-point (baseline, 3 months, and 6 months) and include a home-clinic factor to measure slopes for each functional measure. This model will also identify the change score in each dyad. The correlation coefficient will be used to evaluate the relationships between each functional measure and FIM and the relationships between SPPB and handgrip (objective measures) and ADL scores (subjective measures) using the mixed model approach. **Interaction with Duke OAIC Cores:** Both aims will be supported by the Dr. K. Hall in the Physical Measures Core and Dr. Pieper of the Analysis Core, who have developed data management and analysis protocols for dealing with the complex accelerometer data generated by this project. In addition, Dr. V. Kraus of the Molecular Measures Core will work with this scholar to explore the relationship of IL-6, CRP, s-VCAM, miRNA, and LPS to functional measures of resilience as a mentored basic science integration experience.
Two papers resulting from this work are published, 1 is currently in press, and 3 are in preparation (see bibliography).

New Pepper Center Scholars' Mentored Minority Trainees

Heather Whitson, MD
Minority Trainee(s):
Liza Genao, M.D., She is doing research-comparing outcomes in Medicare Beneficiaries with COPD, and she is considering race-based disparity

Cathleen Colón-Emeric, MD, MHS
Minority Trainee:
Michael Cary, RN, PhD, is doing big data research on the impact of clusters of co-morbidities on functional recovery after hip fracture, and developing machine learning algorithms for implementation in the electronic medical record that can identify high risk patients who require additional interventions.

Publications Pertaining to Minority Research:

2015

1. Hall RK, Landerman LR, O'Hare AM, Anderson RA, Colón-Emeric CS. Chronic kidney disease and recurrent falls in nursing home residents: a retrospective cohort study. Geriatric nursing (New York, N.Y.). 2015; 36(2):136-41. NIHMSID: NIHMS657378 PubMed [journal] PMID: 25616732, PMCID: PMC4393772
2. Hall RK, Toles M, Massing M, Jackson E, Peacock-Hinton S, O'Hare, A, Colón-Emeric CS. Utilization of acute care among patients with ESRD discharged home from skilled nursing facilities. Clinical journal of the American Society of Nephrology: CJASN. 2015;10(3):428-34. PubMed [journal] PMID: 25649158, PMCID: PMC4348677

2016

1. Hall R, Colon-Emeric C, O'Hare A, Boler G. Incorporating Geriatric Assessment into Nephrology Clinic: Preliminary Data from Two Models of Care. Journal of the American Geriatrics Society, 2016, in press
2. Johnson KS, Payne R, Kuchibhatla MN. What are hospice providers in the Carolinas doing to reach African Americans in their service area? J Palliat Med 2016;19:183-89.
3. Johnson KS, Payne R, Kuchibhatla MN, Tulsky JA. Are restrictive admission practices associated with hospice enrollment for older African Americans and Whites? J Pain Symptom Manage 2016;51:697-705.
4. Johnson KS, Payne R, Kuchibhatla MN, Tulsky JA. Are restrictive admission practices associated with hospice enrollment for older African Americans and Whites? J Pain Symptom Manage 2016;51:697-705.