

Potential Research Collaborators

Clemson University

Veronica Parker, School of Nursing

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I am interested in utilizing a community-based approach to investigate diabetes and mental health risks among African American and Latino groups. In particular, I envision employing a holistic approach and evidenced-based tools to screen, identify, and create pathways of referrals to GHS and safety net providers for large numbers of high-risk individuals from marginalized communities. Community-based screenings, education and on-site consultations can be conducted at churches, special emphasis neighborhoods, and at GHS' signature health initiatives, the Minority Health Summit and Take a Loved One to the Doctor Day. Goals to: (1) screen and provide connections to GHS and community resources, and (2) improve early detection of diabetes, depression and mental illness.

Agneta Simionescu, Bioengineering

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In diabetes, elevated levels of blood glucose and lipids interact irreversibly with long-lived proteins, such as collagen and elastin from the blood vessel wall, via oxidation and crosslinking processes, resulting in formation of advanced glycation end products (AGEs); the consequence is vascular stiffening, the hallmark of diabetes. Furthermore, cells respond to diabetes-related altered environment by endothelial dysfunction and pathological remodeling that contribute to the onset and progression of vascular disease. Our goals are to understand these severe cell and extracellular matrix changes that result in activation of inflammation, impaired healing, fibrosis, and ectopic calcification.

Sara Lu Riggs, Industrial Engineering

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In a nutshell, I hope to design mobile technology to improve patient outcomes for people with diabetes. To this end, based on what I have done with the closed-looped artificial pancreas system and kids under 8 years of age, I am moving towards developing a remote/web-based system for all parties involved with patient care (clinician, parents, teachers, care providers, etc.).

John D. Desjardins, Bioengineering

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Pressure offloading is extremely important for both wound prevention and wound care in populations with diabetes or an amputation. In fact, approximately 75% of amputees will experience a skin issue that could lead to suspended prosthesis use¹, and 25% of all diabetics will develop a foot ulcer². Often these skin issues are preceded by uneven pressure distribution across

the foot or residual limb. Using 3D printing methods, we are developing custom foot orthotics that leverage commercially available 3D printed materials in combination with a suite of proprietary algorithms, which allow for customizable materials geometry and overall variations in hardness. The orthotic and inlay technologies have been evaluated using simulated loading, with the use of 3D print materials resulting in reductions in peak pressures similar to traditional materials, and we are seeking funding and collaborators for future clinical testing in both orthotics and prosthetic sockets.

Feng Ding, Physics and Astronomy

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Our research focuses on Islet Amyloid Polypeptide (IAPP), whose aggregation is responsible for beta-cell death in type-2 diabetes (T2D). We are investigating the aggregation mechanism, molecular origin of amyloid toxicity, cross-talk between T2D and other neurodegenerative diseases, and explore novel approaches to inhibit IAPP aggregation and mitigate aggregation-mediated cytotoxicity. We have shown that naturally-occurring polyphenols (e.g., resveratrol, curcumin, and EGCG) and de novo designed nanoparticles/nanomedicines can have anti-amyloid properties by reducing the population of toxic IAPP oligomer aggregates. Our work may offer novel therapeutic strategies to prevent the loss of pancreatic beta function in prediabetes or T2D patients with pancreatic transplant.

Daniel Whitehead, Organic Chemistry

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Our group has been investigating the development of small-molecule inhibitors of the polysaccharide metabolism of prominent gut microbes of the genus *Bacteroides*. We have recently published a paper describing our preliminary results with this strategy (<https://pubs.acs.org/doi/abs/10.1021/acscchembio.8b00309>). See also: <http://newsstand.clemson.edu/mediarelations/small-molecule-shown-to-target-bacteria-in-the-gut-microbiome-affecting-disease/> and <https://cen.acs.org/biologicalChemistry/microbiome/Small-molecule-help-modulate-microbiome/96/web/2018/05>. These efforts are relevant for Type I diabetes, because several studies have revealed a shift in the gut microbiota, particularly a bloom in members of the *Bacteroides*, prior to the onset of autoimmunity in genetically at-risk patients. It is hypothesized that the *Bacteroides* bloom may provide a trigger-point for the onset of autoimmunity that ultimately leads to T1D. Our ultimate goal would be to develop a small-molecule therapeutic that targets the gut microbiota as a new strategy for delaying or preventing the onset of T1D in at-risk patients.

Ron Gimbel, Public Health Sciences

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Ron Gimbel, PhD (Clemson) is an active health researcher who invests energy into improving diabetes care and preventing diabetes (focus on reversing prediabetes trends). He has been

funded, via DoD extramural grants, to develop mobile health solutions aimed at activating type-2 diabetes patients. This research embraces patient activation, tailored health messaging, algorithm-driven activity, medical device connectivity and data visualization, and more. His latest (summer 2018) grant proposal activity has shifted toward prevention; providing tools for prediabetics to reverse their trajectory to T2DM. Dr. Gimbel also advises the Emergency Department's (Dr. Pirallo-PI) efforts to develop a diabetes surveillance system aimed toward improving care coordination. I am already engaged with clinicians (Ron Pirallo, MD – ED) on a transformational seed grant re. diabetes surveillance system.

I would be excited to collaborate with additional clinicians who are students in the graduate certificate in clinical and translational research program AND/OR those who can demonstrate that they are serious about engaging in meaningful clinical and/or translational research. Also have 2 DoD pre-proposals pending that involve Michelle Stancil, RN, Hannah White, RD, and one proposal that includes the two of them plus Kerry Sease, MD. I will learn if we are invited to submit a full application in July. One of the proposals is for a digital Diabetes Prevention Program (DPP) and the other is a large (\$10M) multi-institutional Focused Research Program on prediabetes (stopping T2DM).

Joel Williams, Public Health Sciences

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Dr. Joel Williams is an Associate Professor in the Department of Public Health Sciences. His academic training is in exercise science, public health and applied evaluation. He has clinical experience working in sports medicine and hospital settings. Dr. Williams' area of expertise is implementation and evaluation of health promotion and disease prevention programs and interventions. His academic work has focused on obesity prevention and control in community and clinical settings. Currently, he is engaged in research involving the use of mobile technology for tracking symptoms, quality of life, health behaviors, and promoting chronic disease self-management.

Feng Chen, Food, Nutrition and Packaging

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I would like to make my contributions in the following area: 1. My lab is equipped with some advanced chromatographic instruments such as GC-FID, GC-MS and some HPLCs with different detectors such as HPLC-MS, HPLC-UV, HPLC-DAD, UHPLC-UV, and HPLC-ELSD; which can be used to identify various bioactive chemicals from natural matrix, such as fruits, vegetables, nuts, and medicinal herbs, as well as some synthesized chemicals; 2. Currently I am more interested in characterization of natural bioactive chemicals (nutraceuticals), such as natural phenolics, flavonoids and anthocynins and their bioactivities against diabetes through various in vitro and in vivo tests; 3. My research group has been working on the construction of some models to reveal the relationship of bioactivities and structures of the bioactive chemicals

so as to rapidly screen and search the potent nutraceuticals and/or medicines to fight against the diabetes;

Dilrukshi Thavarajah, Plant & Environmental Sciences

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I am working on specific nutritional components in lentil and its effect to reduce blood sugar level. Pulse crops are low glycemic, high protein, and low in energy especially lentil, chickpea, and field peas. One of my PhD student's work is to test the hypothesis on how lentil effect on gut microbiome and we are in the process of publishing our work. I see that our work can be link to diabetes related food research. I am happy to collaborate if you think I can be a help. Research work: Prebiotic-rich diets change microbial colonies leads to increased satiety, regulation of intestinal motility, production of short-chain fatty acids, prevention of diarrhea and constipation, and reduction of pathogen colonization.

Sarah W. Harcum, Bioengineering

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I do conduct research in general on the tools to generate the drugs used to treat diabetes, such as recombinant insulin. These tools are used to generate drugs to treat a wide variety of diseases. I do not study the diseases. I study how to manufacture the drugs.

Lu Shi, Public Health Sciences

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My interest in diabetes is to use the mindfulness meditation approach to modify risk factors (stress, binge eating, etc.) associated with diabetes outcomes. The role of mindful eating and mindfulness-based stress reduction in preventing diabetes among prediabetes patients is of particular interest to me, as well as the role of mindfulness training in patient adherence to medication among diabetes patients. Currently I am working with Dr. Meenu Jindal at GHS in a GHS seed grant to conduct mindfulness training among her prediabetes patients, a project that has her residents and my graduate students involved.

Next stage will be the Duke Endowment application (we just "missed" the June deadline but there will be a December one coming up), bringing this initiative to a broader community. In that project GHS (or other health systems) can lead and Clemson will be the subawardee.

Nathan M. Long, Animal & Veterinary Sciences

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My interest would teen to fall into the management and outcomes associated with gestational diabetes with a particular interest in placenta function and fetal growth and development. I can see this area of research having both a clinical/epidemical component and a more basis animal model component.

Susan Duckett, Animal & Veterinary Sciences

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My research uses large animal models (sheep) to determine how diet influences insulin resistance during pregnancy and growth. Our interest is in how specific fatty acids (n-7 monounsaturated fatty acids and n-3 polyunsaturated fatty acids) alter expression of transporters (GLUT4, CD36, FFAR4) that regulate uptake of glucose and fat into the cell. We have also found that supplementation of these types of fatty acids can reduce liver inflammation and expression of proinflammatory cytokines.

U of SC Investigators with Clinical Research Interests in Diabetes Mellitus

Arnold School of Public Health

Angela D. Liese, PhD

Professor, Department of Epidemiology and Biostatistics

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My diabetes research is epidemiological and focuses on youth and young adults with diabetes and the role of nutritional and social determinants of health (SDOH). Since 2000, I have been an investigator with the multi-center SEARCH for Diabetes in Youth study which recruits in South Carolina. I am currently leading a food security-focused cohort which will quantify the impact of food insecurity on diabetes outcomes and health care utilization. Other work involves studying the influences of intake of foods and dietary patterns on complications of diabetes. A recent project focuses on integrating SDOH screening into clinical settings and clinic-community linkages.

Anwar Merchant, DMD, ScD

Professor, Department of Epidemiology and Biostatistics

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My research focuses on using causal inference methods to evaluate the effect of treatment provided in a clinical setting on systemic outcomes. Using this approach, I have published a report characterizing the effect of long-term periodontal treatment given in a clinical setting on glycemic control among individuals with type 2 diabetes. This study was funded by NIH (PI Merchant), and used a big dataset constructed from electronic health records. I have also received PI funding from the American diabetes Association to evaluate the association between the oral microbiome and markers of diabetes complications among youth with type 1 diabetes, and the relation between antibodies against oral microorganisms and hyperglycemia among people with and without diabetes. I have been a co-investigator in the SEARCH for Diabetes in Youth Study. Currently I am a Co-Investigator in a clinical trial evaluating the effect of periodontal treatment on cardiovascular disease among stroke survivors, and the Impact of

Disparities in Food Security on Glycemic Control and Health Care Utilization Among Youth and Young Adults with Diabetes study, both of which are funded by NIH.

USC College of Pharmacy

Karen McGee, Pharm.D., CDE, BCGP
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My clinical research has focused on diabetes care among frail elderly in a South Carolina PACE (Program of All Inclusive Care for the Elderly) program, Palmetto SeniorCare. I have worked with a multidisciplinary team on projects to evaluate clinical practice issues and to improve patient and caregiver education. Example of diabetes projects include: Standardization of glucose monitoring, barriers to achieving diabetes and hypertension treatment goals, dietary education and improving medication adherence.

Cynthia M Phillips, PharmD, CDE
Clinical Assistant Professor, Department of Clinical Pharmacy and Outcomes Sciences
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Dr. Cynthia Phillips is a Clinical Assistant Professor in the Department of Clinical Pharmacy and Outcomes Sciences. She practices an ambulatory care pharmacist and a certified diabetes educator with an internal medicine clinic that is recognized as a patient centered medical home. As full time faculty, she is responsible for instruction within the Doctor of Pharmacy curriculum for topics such as diabetes, dyslipidemia, and patient centered interviewing. Current areas of research interest include transitions of care within the diabetic patient population, medication adherence, and active learning techniques in a professional curriculum.

Furman University

Kerstin Blomquist
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I am devoted to identifying risk factors that contribute to the development and maintenance of poor body image, disordered eating, including eating loss of control, and obesity, and to developing valid assessments of and effective prevention interventions for these problems. I am particularly interested in studying the assessment and prevention of eating loss of control, which is a critical feature of a binge eating episode and a known risk factor for the development of eating disorders, excess weight gain, obesity, and its sequelae including diabetes.

Melanie Sutherland

Post-doc in the Institute for the Advancement of Community Health (IACH)

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My research interests focus on the epidemiology of type 1 and type 2 diabetes in children, adolescents, and young adults. I am particularly interested in the prevalence and correlates of mental health disorders, such as depression and anxiety, in these populations and the impact of these disorders on diabetes self-management, clinical outcomes, and quality of life. I am also interested more generally in the role of socioeconomic and psychosocial factors in influencing diabetes outcomes in these populations.

Natalie The

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Despite the emergence of diabetes-related complications (i.e., subclinical cardiovascular disease, diabetic retinopathy, diabetic kidney disease) at early stages of diabetes duration, surprisingly little is known about the role of nutritional factors in these complications. I study associations of nutritional factors with: 1) markers of subclinical cardiovascular disease; 2) prevalence and severity of retinopathy; and 3) prevalence, severity and incidence of diabetic kidney disease in youth with diabetes. The significance of this research is to identify factors that lower risk for macro- and microvascular complications particularly early in the natural history of diabetes diagnosed during childhood when the vascular structure is still modifiable.

Greenville Health System**Dr. John Bruch**

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My research has involved use of Diabetes Education Program and Certified Diabetes Educators for remote BG monitoring and medication adjustment by algorithm. The educators are used as physician extenders, accomplishing medication and insulin adjustment between physician visits. Communication back to treating physician occurs through electronic medical record. Our initial study was with GHS employees with uncontrolled DM.

Dr. John Scott

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Our landmark study was published in 2013 in the *Journal of the American college of Surgeon*. Utilizing the statewide South Carolina Office of Research and Statistics (SCORS) uniform billing database, we were able to compare results from patients with T2DM versus patients with T2DM who also had bariatric surgery performed. Specifically, we were interested in determining the effect of bariatric surgery on the rates of subsequent surgical interventions

that are related to progression of macro- and micro-vascular disease in T2DM patients (retinopathy, amputations, dialysis access, coronary or lower extremity revascularization). Our research indicated that bariatric surgery was associated with a 65% risk reduction for developing T2DM macro- and micro-vascular events. This was a major breakthrough in the understanding of the long term effects of bariatric surgery on diabetes. Subsequent research has focused the economic benefits for expanding the access to bariatric surgical services for underserved populations with T2DM. We published an article in *The American Surgeon* in 2015 demonstrating that increasing bariatric surgical coverage to T2DM within the South Carolina state employee plan would lead to a 10-year cost savings of 5.4 million for every 1000 patients in the system. This added to the growing body of evidence that bariatric surgery is a cost-effective means of reducing the economic burden of T2DM.

Dr. Meenu Jindal (plus internal medicine residents)

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Multidisciplinary group based diabetes support project JUMP:

The construct of this project has been to provide patients with diabetes a group setting that focuses on self-empowerment through multidisciplinary education, collaborative learning, peer support, and development of diabetes-specific social capital, ultimately to improve glycemic control. This project established a multidisciplinary group composed of one to two resident physician facilitators, a clinical diabetic educator, nurse practitioner and 5-10 patients with diabetes. Each session had a loose framework with the majority of the discussion being patient-led. The core program comprised of three weekly sessions. The primary endpoint of this study was glycemic control, measured by patients' pre- and post-JUMP hemoglobin A1c (HgbA1c). JUMP participants showed a statistically significant decrease in HgbA1c. This project integrates various successful concepts for behavior change including motivational interviewing and reciprocal peer support to create a model of non traditional diabetes management, leading to a statistically significant decline in HgbAa1c.

This project was planned, designed and conducted between 2014 and 2017, and is currently in maintenance phase.

JUMP paved the way for our current project primarily addressing diabetes prevention.

An innovative approach with group counseling and Mindfulness Training among Prediabetes Patients :

This project was planned and designed in collaboration with Clemson and received GHS seed grant in 2/2018. Recruitment is currently underway.

In this study, we proposed to develop a new prevention model that combines group counseling with a low-cost mental health intervention to increase the intervention's impact on reducing stress and depression. In this study we extended our group counseling model of JUMP to prediabetes patients and enhance the intervention with the well-documented protocol of mindfulness-based stress reduction (MBSR). We hypothesize that the MBSR intervention will improve the glycemic control among prediabetes patients receiving group

counseling. Mindfulness intervention could also lead to more physical activity and healthy eating magnifying the impact of group counseling intervention. This study could contribute to the identification of a safe, low-cost and feasible improvement to our promising group counseling model (JUMP), for prevention of diabetes and reversal of prediabetes and diabetes.

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