We have had a busy, busy Spring. Many of you worked long, hard hours to compile a 900-page P30 Core Grant application for one of 12 Nutrition and Obesity Research Centers (NORCs) administered by the National Institute of Diabetes, Digestive and Kidney Diseases (NIDDK). Let me express my fondest thanks to all who had a hand in working on this enormous project. In the rush of writing, rewriting, and submitting, we had little time to savor our final product. However, the beginning of July provided some down time to do just that. One of the sections that I enjoyed rereading was at the end of the description of the Overall. It was a visionary view of what future scientific investigations may hold. I was surprised and pleased by the size of the role mathematics will play in this vision of the future of biological investigation, including statistics, bioinformatics, computer modeling, GIS, and causality networks. Here is what we wrote:

"As databases grow in size, 'enrollment' of patients in virtual clinical trials will become commonplace, based on ever more precise and robust carefully collected, curated and stored information on genotype and phenotype. The NORC is poised to lead in this wave of the future, given our clinical and informatics resources, such as the Human Metabolic Clinical Registry and Repository, the Bariatric Surgery Registry, and our Nutrition and Obesity Research Informatics System (NORIS), as well as the bioinformatics and computational resources of NORC and the Center for the Study of Biological Complexity. These resources include: The Bioinformatics Computational Core Laboratory (BCCL), the Nucleic Acid Research Facility (NARF), and the Center for High Performance Computing (CHiPC).

Agent-based modeling approaches to the epidemic of obesity have been explored by several investigators. Their efforts in this area have been pioneering, but their models are constrained by the number of attributes that can be applied to each agent. However, the advent of greater computational power will permit an expansion of the number of attributes per agent, making possible more robust explanations and predictions about the future of the obesity epidemic and the onset of associated disease, including type 2 diabetes, the metabolic syndrome, cardiovascular disease and some forms of neoplasia.

System dynamic modeling has also been applied to the urgent problem of developing useful interventions aimed at reversing the obesity epidemic. System dynamic modeling permits modelers to predict the effects of systemic perturbations in a given population, such as lowering the price of fruits and vegetables or taxing obesogenic food and drinks. Our current efforts are rudimentary but will become more useful as larger, well-curated databases become available to provide better in-depth descriptions of systems and the effects of perturbations on those systems.

The "omics" revolution and the advent of precision medicine are at the modest beginning of their ultimate impacts. The omics revolution permits agnostic approaches to understanding pathogenesis of disease without testing hypotheses or examining candidate genes. For example, comparing the abundance of messenger RNA (mRNA) transcripts in infants at risk for type 1 diabetes (T1DM) to that of matched infants not at risk showed significantly higher levels of interferon and interferon pathway mRNA transcripts in infants at risk. Prior to that discovery, no one had posited any relationship of interferon and its activated pathways to the pathogenesis of T1DM. The NORC is well poised to apply this method of discovery science to the problem of obesity and its associated conditions, given the wealth of expertise and state-of-the-art equipment to perform this kind of team science at VCU.

In the near future the "omics" revolution will permit the discovery of new biomarkers that predict the onset of obesity and each of its associated conditions. Eventually,
Message from Chair cont...

these biomarkers could be combined in various ways to develop multivariate algorithms that predict the onset of obesity and its associated conditions with far greater precision than is now available.

Precision medicine will succeed in developing new therapies for obesity and its associated conditions by finding new molecular targets for microRNA or other small molecule entities along inflammatory and apoptotic pathways (or other unexpected pathways) to block or reverse the onset of obesity and its inimical associated conditions. A VCU NORC has the potential to become a leader in the application of precision medicine, given its wealth of expertise in “omics” and discovery science.

The microbiome will also bring new and unexpected advances in understanding the pathogenesis of obesity and its associated conditions. We are only at the earliest stage of exploiting the microbiome’s potential for prediction of disease and for prevention and therapy of disease. It is possible that the microbiome can be altered by the introduction of transgenic bacteria that contain the genes for the manufacture of beneficial molecules, such as interleukin-10 (IL-10), that could reverse inflammatory processes that characterize obesity and inflammatory bowel disease.

We will work with other NORC consortia and with other national clinical and translational research networks for further expansion of the concept of the NORIS. We will adopt open standards Web-based platforms to enable data sharing among NORC investigators within VCU.

We will continue to apply novel approaches to nutritional science and obesity research, including “omics” techniques; development of models predicting phenotype; finding the molecular connections between risk factors and obesity-related disease; development of multivariate Granger causality models; modeling links between childhood growth and adult diseases using longitudinal data; and modeling geospatial patterns of obesity. Our expertise in geospatial statistical modeling of fast-food restaurant and obesity risk will be enhanced by collaboration with other centers conducting environmental health research, such as the US4 Global Obesity Prevention Center at the Johns Hopkins Bloomberg School of Public Health.

We will use the VCU NORC to encourage faculty members to develop grant applications. For example, members of the three biomedical Cores of our proposed NORC are in the process of applying for an NIDDK interdisciplinary training grant (T32) in bioinformatics and diabetes, obesity, and metabolic disease to promote the development of an interdisciplinary workforce for conducting bioinformatics research in diabetes, obesity and related metabolic diseases and to provide training programs for pre-doctoral and post-doctoral researchers with backgrounds in bioinformatics, mathematics and/or computational sciences with mentors from both computational and biological backgrounds.

We will continue to focus on developing improved treatment and prevention strategies for obesity and its co-morbid conditions in low SES African Americans individuals living in neighboring communities at high risk for the development of obesity and related comorbidities.”

Thanks for taking the time to peer around the corner with me to find inklings of what the future of biological research may hold for all of us.

Featured Presentations from our Graduate Students

Bhanu Evani
Presented his research entitled “Mediation Analysis of a Set of Correlated Predictors Using Weighted Quantile” at ENAR, Miami, Florida, March 17, 2015.

Kyle Ferber
- Presented his research entitled “Modeling Censored Discrete Survival Time in High-Dimensional Settings” at VAS, Harrisonburg, VA, May 22, 2015.

Jun He
Presented her research entitled “The Application of Last Observation Carried Forward (LOCF) in the Persistent Binary Case” at VAS, Harrisonburg, VA, May 22, 2015.

Keith Zirkle
Presented his research entitled “How to Best Compute Propensity Scores in Complex Samples in Relation to Survey Weights” at ENAR, Miami, Florida, March 17, 2015. Advised by Dr. Adam Sima.
Dr. Donna McClish has been with the department since Spring of 1988. She came here after positions in the Department of Epidemiology and Biostatistics at Case Western Reserve University in Cleveland and Department of Biostatistics at University of North Carolina, Chapel Hill. Dr. McClish’s research has encompassed a number of areas over the years including congestive heart failure, pain in sickle cell disease, cancer surveillance and women’s health issues. Dr. McClish’s methodological research has mostly focused on accuracy of medical tests, often concentrating on the area under the ROC curve. Recently, she has been particularly interested in developing methods to efficiently combine information from medical tests by performing them in sequence, with the administration of the second test dependent on the results of the first test. Under her direction, one PhD student (Anwar Ahmed) developed a new, less costly combination strategy, which only requires a second test when results of the first test are indeterminate. In addition, they developed testing strategies with sensitivity non-inferior to the best achievable sensitivity, resulting in considerable cost savings. Another PhD student (Amber Wilk) extended this work to estimate optimal thresholds for sequential testing strategies and determine guidelines for sample size to improve study design. Most recently, another PhD student (Hadiza Galadima, who is featured below) completed research that assessed methods of controlling for confounding when risk group differences are assessed with the area under the ROC curve. Future direction for research include continuing work on improving test sequencing, including choices of order of tests, and cost considerations, as well as new work in clinical trials.

Featured student
Hadiza Galadima, Ph.D. Candidate

Hadiza is originally from Niamey, Republic of Niger. She received her BS in Statistics - Concentration in Actuarial Science at St. Cloud State University. She recently defended her dissertation, “Controlling for Confounding when Association is Quantified by Area under the ROC Curve” under the advisement of Dr. McClish, and expect to officially graduate in August 2015.

In addition to her methodological research, Hadiza is currently involved in applied projects in the Department of Healthcare Policy and Research at VCU. Since 2013, she has collaborated with Dr. Kimmel and her team in conducting a systematic review, performing literature reviews and developing methods sections for incorporations in abstracts, manuscripts and grants. Their research agenda focuses on geographic variation in access to HIV care in the U.S. During her graduate training at VCU, Hadiza was also fortunate enough to have served as a teaching assistant for numerous biostatistics courses, an intern at UNOS, and collaborated with various research investigators as a statistical consultant. After graduation, Hadiza will continue to work at VCU Healthcare Policy and Research while exploring other employment opportunities.

In her spare time, Hadiza likes travelling and working on various graphic design projects ranging from making logos to taking photos and creating web pages.

Click a link below to visit that section of the Biostatistics Department website:

- Publications List
- Graduate Program
- Consulting a Biostatistician
- Biostatistician Research Interests
- Biostatistics Research Seminar Series

WWW.BIOSTATISTICS.VCU.EDU
GRADUATE PROGRAM SPOTLIGHT

M.S. in Biostatistics, Clinical Research & Biostatistics Concentration Program

For those of you who graduated from our Biostatistics program more than a few years ago, you may not be aware that we have a relatively new concentration for our M.S. program. We now offer an M.S. in Biostatistics with a concentration in Clinical Research and Biostatistics. Established in the late 1990s, the program is designed primarily for academic clinicians who would like to pursue clinical and/or health services research. Other academic medical centers, such as the University of North Carolina and the University of Minnesota, offer similar degrees.

Students entering this program must have a “terminal” degree – MD, DDS, PhD, PharmD. Students take a number of core Biostatistics courses, including two semesters of Statistical Methods, Clinical Trials, Analysis of Biomedical Data and Biostatistical Consulting. Also required are four elective courses that are related to their clinical or research interests and a course in responsible scientific conduct.

Under the direction of a research advisory committee, students select a research project, again according to their interests and intended career goals. The resulting manuscript is then submitted for publication in a peer-reviewed journal. Most students in the program enroll on a part-time basis. Taking one course in each of the fall, spring and summer semesters, part-time students can complete the degree requirements in three to four years.

The MS in Biostatistics, Clinical Research and Biostatistics concentration program has been successful on a number of levels. Since these students must take several of the same courses required for our MS and PhD in Biostatistics students, class room interaction is quite interesting and often productive. The clinicians see (and possibly appreciate!) the perspectives and probing questions from our Biostatistics students, and our Biostatistics majors learn from the backgrounds and clinical insight of the Clinical Research students. Also, this foray back into the academic realm is often seen as a refreshing break from the clinical duties of the Clinical Research students.

We generally have two to four M.S. in Biostatistics, Clinical Research and Biostatistics Concentration students in our program at any given time. We had our first graduate in 2001, and we now have 34 graduates, most of whom hold faculty appointments in academic medical centers. A few of our graduates of our program currently at Virginia Commonwealth University:

- Don Brophy, PharmD, MS: Professor and Chair, Department of Pharmacotherapy & Outcomes Science
- Chuck Janus, DDS, MS: Associate professor, Prosthodontics
- Betsy Ripley, MD, MS: Associate Chair for Internal Medicine Faculty Development and Executive Director of the Clinical Research Services of the VCU Center for Clinical and Translational Research.
- Steve Rothemich, MD, MS: Associate Professor, Co-Director, Ambulatory Care Outcomes Research Network
- Richard Sterling, MD, MS: Professor and Chief, Section of Hepatology, Medical Director, HIV-Liver Disease, Internal Medicine, Gastroenterology

Alumni Interest

Please contact Russell Boyle or Kellie Archer if you are interested in presenting at one of our Research Seminars in the 2015-2016 academic year

By the numbers....

We had a very good recruiting year for our graduate program. We are excited to report that we will welcome 12 new students for Fall 2015

- 9 PhD in Biostatistics (including a Fulbright scholar)
- 3 MS in Biostatistics, Clinical Research & Biostatistics concentration

More specifics on these students in the fall newsletter
Honors

- Jian (Kingston) Kang, Graduate Student, was awarded First Place at Biostatistics Student Research Symposium (BSRS).
- Amanda Gentry, Graduate Student, was awarded Second Place at BSRS.
- Rebecca Lehman, Graduate Student, was awarded Third Place at BSRS.
- Umaporn Siangphoe, Graduate Student, received the Biopharmaceutical Applied Statistics Scholar.
- Qing Zhou, Graduate Student, was awarded the Karl E. Peace Biostatistics Award for Excellence and Scholarship.
- Keith Zirkle, Graduate Student, received the C.C. Clayton Award.
- Keith Zirkle, Graduate Student, was accepted to the Second Annual Graduate Workshop on Environmental Data Analytics in Boulder, CO this July.
- Qing Zhou, Graduate Student, was inducted into the Graduate Student Honor Society, Alpha Epsilon Lambda.
- Xiuchun Ge, Amanda Gentry, Rebecca Lehman, Qing Zhou, Graduate Students, were inducted into the honor society Phi Kappa Phi.
- Kyle Ferber, Graduate Student, received the Phi Kappa Phi Scholarship.
- Le Kang, Assistant Professor, was awarded Teacher of the Year.

Recent Graduates

M.S. in Biostatistics
- Paul Hargarten, he will remain in the department to pursue a Ph.D.
- Jun He, she will remain in the department to pursue a Ph.D.
- Yongjia Pu

M.S. Concentration in Clinical Research & Biostatistics
- Dr. Xiuchun Ge
- Dr. Tuyet Nguyen

Ph.D. in Biostatistics
- Dr. Bhanu Evani is in the process of interviewing for Research and Teaching positions.
- Dr. Hadiza Galadima will continue to work at VCU Healthcare Policy and Research while exploring other employment opportunities.
- Dr. Mary Haynes is a biostatistician at PharPoint Research, Inc. in Durham, NC.

Ph.D. with Concentration in Genomic Biostatistics
- Dr. Mateusz Makowski is exploring employment opportunities.
- Dr. Paul Manser, is currently employed as a biostatistician at Genentech working in the neuroscience & metabolism therapeutic areas.

Newly awarded grants & contracts, November 2014–June 2015

Le Kang, Ph.D.

Co-Investigator on the Cystic Fibrosis Foundation Therapeutics award entitled “Project UPLIFT to Reduce Anxiety and Depression in CF Patients.” The PI of this study is Dr. Schechter in the Department of Pediatrics.

Yongyun Shin, Ph.D.

PI on a subcontract funded by WT Grant Foundation that is entitled “Learning from Variation in Program Effects: Methods, Tools, and Insights from Recent Multisite Trials.”

Adam Sima, Ph.D.

Biostatistician on the Thoratec Corporation award entitled “A Multicentered Evaluation of Octreotide for Secondary Bleeding Prophylaxis in Patients with LVAD’s” with Dr. Shah as PI in the Department of Internal Medicine.
Announcements

Other news...

Kellie Archer, Ph.D.
- Congratulations to Dr. Archer, she was promoted to Full Professor.

Victoria Garcia, Graduate Student
- Congratulations to Victoria, who is now engaged. She is looking forward to her long engagement while she continues her PhD work.

Yongyun Shin, Ph.D.
- Congratulations to Dr. Shin, he was promoted to Associate Professor with Tenure.

Adam Sima, Ph.D.
- Congratulations to Adam he was married May 24, 2015.

40 Year Anniversary

Russell Boyle & Yvonne Hargrove
- Congratulations to Russell Boyle and Yvonne Hargrove!!! They have dedicated 40 years of service to the Department of Biostatistics. We thank them and appreciate all of their hard work!!! Sticking with us for 40 years is no easy task and quite the accomplishment!!!

“I am extremely fortunate to have worked in such a supportive department with very nice people for all of these years. Yvonne and I have seen a few changes over the years, including three different addresses!, but the one constant has been the good people – faculty, staff and students – with whom we have worked (Russell Boyle)”.

“Forty years in the same department is a long time. But, we are still holding on. That says a lot about the people in this department (Yvonne Hargrove)”!

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