



# TABLE OF CONTENTS

1

**WELCOME**

2

**THE NORTH CAROLINA  
RESEARCH CAMPUS**

4

**UNC SYSTEM RESEARCHERS  
TAKE ON COVID-19 FROM  
KANNAPOLIS**

6

**RESEARCH HIGHLIGHTS**

Appalachian State University  
North Carolina A&T State University  
North Carolina Central University  
North Carolina State University  
University of North Carolina at Chapel Hill  
University of North Carolina at Charlotte  
University of North Carolina at Greensboro





**Cory R. Brouwer, PhD**

## Welcome to the North Carolina Research Campus

This year has brought truly unprecedented and challenging times. In the midst of this COVID-19 pandemic, the importance of the research done here at the NCRC on nutrition and healthy living has become even more essential.

Like everyone else, the NCRC was also affected by the pandemic. During the initial lockdown, many experiments were halted and delayed. As restrictions were loosened, research was able to resume, but with many additional precautions and additional expenses (PPE, restarting work that was halted, etc.). At the same time, many researchers took advantage of their natural curiosity and adapted some of their research towards studying the cause and possible treatments for this pandemic. Many of the research areas that have long been a major focus on campus, also have a direct impact on COVID-19: diabetes, obesity, inflammation, and immune support. Some of our COVID-19 research is the subject of the main article of this year's report.

Also, highlighted in this report are some of the exciting findings our researchers have made over the past year. For example, David Nieman, Ph.D., Appalachian, in collaboration with UNC-Chapel Hill, found that a flavonoid-caffeine supplement could increase calorie expenditures by 46 calories a day in adult women. Researchers at N.C. A&T and NC State recently obtained a joint patent for a group of compounds to treat inflammation and oxidative stress, and NCSU received a \$6.4 million dollar grant to build genomic resources for blueberry breeding, an important crop for North Carolina.

Looking ahead to fiscal year 2020-2021, the current pandemic is expected to continue in full swing, just like the second half of fiscal year 2019-2020. However, like most of the world, the campus has adapted, and research is back in full swing. I hope you enjoy reading about our accomplishments here at the North Carolina Research Campus, and I'll close with what has become the salutation of our time: "Stay Safe."

### **Cory R. Brouwer, PhD**

Executive Director of Research,  
North Carolina Research Campus

# THE NORTH CAROLINA RESEARCH CAMPUS

46

POSTDOCTORAL  
RESEARCH  
SCHOLARS

65

UNDERGRAD AND  
GRADUATE  
STUDENTS

## NEW FACULTY MEMBERS:

APPALACHIAN  
STATE:

**CRYSTAL WEST**

NC STATE:

**MARVIN MONCADA**

NCCU:

**WILLIAM F. PILKINGTON**

UNC - CHAPEL HILL:

**DELISHA STEWART**



253

PEER REVIEW SCIENTIFIC  
PUBLICATIONS





**\$159 Million\***  
Cumulative since 2008

FEDERAL AND  
EXTRAMURAL  
FUNDING

**8**

ACTIVE  
SEARCHES

**42**

SUPPORT  
STAFF

**71**

RESEARCH  
STAFF

**47**

FACULTY/PHD  
AND MD

**EDUCATION  
AND OUTREACH**

**COMMUNITY AND STEM**

**43** EVENTS WITH  
**9000** PARTICIPANTS\*

(Includes in person  
and online events)

# UNC SYSTEM RESEARCHERS TAKE ON COVID-19 FROM KANNAPOLIS

## THE NORTH CAROLINA RESEARCH CAMPUS IS PROUD OF ITS CONTINUED EFFORTS

The mission of the North Carolina Research Campus (NCRC) is to empower human health through nutrition and lifestyle, so naturally, our primary concern during the COVID-19 pandemic has been the safety of everyone on our campus, in our community, and beyond. While continuing the essential work we perform on campus, we have closely followed CDC guidelines and North Carolina mandates, requiring our researchers to wear protective face masks and maintain at least six feet of social distance. However, our commitment to health and wellness in the face of COVID-19 goes far beyond safety protocols.

**Top researchers from across the UNC System have refocused their efforts to come up with a better understanding of the novel coronavirus,** including how physical activity can be a primary prevention strategy for the virus, how to ensure equal access to tests and future vaccinations for underrepresented communities, and how bioinformatics can be used to predict potential treatments for COVID-19 patients. Our campus has also hosted a variety of contract researchers through the David H. Murdock Research Institute. In all, some of the nation's leading Coronavirus research is taking place right here in Kannapolis, NC.

**APPALACHIAN STATE UNIVERSITY:  
BENEFITS AND RISKS OF PHYSICAL ACTIVITY**  
Director of the Human Performance Laboratory and biology professor at Appalachian State University, David C. Nieman, Ph.D., published an article in the *Journal of Sport and Health Science* in April 2020 on how COVID-19 infects our bodies, what populations are most at risk, and how physical activity plays a role in prevention. According to Nieman, his review paper supports **“the viewpoint that regular physical activity and the avoidance of obesity maintain immune health while reducing the risk for several types of respiratory illnesses.”** While mitigation

activities (such as handwashing, face coverings, social distancing, etc.) play an important role in coronavirus prevention, the adoption of lifestyle practices consistent with good immune health is the main focus area for Nieman's research.

With the world currently moving in the direction of an older, more obese population, we are subsequently becoming more vulnerable to respiratory illnesses. Aging naturally leads to increased risks, and there is no stopping the inevitability of getting older. Obesity, however, “markedly increases the risk for hypertension, type 2 diabetes, and cardiovascular disease, three of the most important underlying conditions for COVID-19,” according to Nieman's article, and it is entirely preventable. All it takes to improve your health is a nutritious diet and a few minutes of exercise a day for most days of the week (within the confines of social distancing, of course).

In a joint Call to Action Statement with the American College of Sports Medicine, Nieman and company stated that moderate-to-vigorous physical activity (MVPA) for 30 to 60 minutes “stimulates the exchange of immune cells between lymphoid tissues and the circulation,”



and MVPA on a near-daily basis greatly reduces the risk of respiratory illness morbidity and mortality. However, as Nieman points out in the Call to Action as well as his journal article, **“participating in unusually high exercise workloads with the associate physiological stress is linked to transient immune dysfunction and elevated [respiratory illness] risk.” In other words, overexertion can actually lead to increased risk rather than prevention.**

To learn more about Dr. Nieman’s research, please read his full review, “Coronavirus disease-2019: A tocsin to our aging, unfit, corpulent, and immunodeficient society” online at [sciencedirect.com](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7041441/).

### **NORTH CAROLINA CENTRAL UNIVERSITY: HOPE PROGRAM HELPS UNDERSERVED COMMUNITIES**

Since March 2020, NC Central University’s Health Equity, Environment, and Population Health program, known as HOPE, has shifted focus to helping communities prepare for and respond to COVID-19. “The HOPE program was initiated to help develop a deeper understanding of the health disparities that exist in communities across North Carolina, and it is fortunate that this network

is in place to assist public health agencies in the areas,” NCCU’s Biomedical Biotechnology Research Institute (BBRI) Director Deepak Kumar, Ph.D. said. “As a National Institute on Minority Health and Health Disparities-designated research center, BBRI faculty and staff will be providing support for the HOPE team as needed throughout the pandemic.”

The more COVID-19 cases that North Carolina saw in the earlier months of the pandemic, the more it became clear that **minorities were being disproportionately affected by the virus.** To HOPE Program Director William Pilkington, Ph.D., however, this was no surprise. “Risk factors for infection, severe symptoms, and adverse outcomes from COVID-19 include diabetes, heart disease, chronic kidney and liver disease, lung disease, and immune disorders,” he said. “Most, if not all, of the risk factors are known health issues disproportionately affecting minority populations.” Additionally, the majority of underserved communities include homes without the technology necessary to access telemedicine, multifamily homes with a large number of residents, and homes containing essential workers exposed to the virus regularly. **“When you isolate a population like this with little to no available testing, the results are inevitable.”**

In an attempt to combat such results, the HOPE team has partnered with public health departments and other community-based organizations in going out to underserved communities and **providing free COVID-19 tests to thousands of citizens** who otherwise could not be tested.

### UNC CHARLOTTE: PREDICTING THERAPEUTICS WITH BIOINFORMATION

Natural Language is how scientific discoveries are communicated. In the course of scientific study, structured experimental results are taken and summarized in journal articles with sentences that have variable structure. Natural Language Processing (NLP) is the process by which this information, stored in natural language, can be placed back into a structured format that a computer can understand. Aaron Trautman, a current PhD candidate in UNC Charlotte's Bioinformatics and Computational Biology department, is using the NLP tool, I2E, from Linguamatics to extract associations from a subset of scientific publications, called CORD-19, that contains a mix of preprint and published articles on three similar coronaviruses: SARS-CoV-1, MERS-CoV, and SARS-CoV-2. These associations are added to a custom knowledgebase. Using machine learning and graph algorithms, this knowledgebase is being used to make

predictions on host biology and hypothesize nutritive and medicinal therapeutics for [COVID-19].”

To simplify, UNC Charlotte's team of bioinformation researchers is **compiling a database of relevant virus information** from previously published and yet-to-be published journal articles. By doing so, they'll be able to **analyze the data and make predictions regarding potential Coronavirus treatments**.

### ADDITIONAL COVID-19 WORK AT THE NCRC

Other important COVID-19 related work includes Leonard Williams, Ph.D., of North Carolina A&T who has been working on two funded projects—one that examines the characterization of plant extracts as potential contact surface disinfectant to help control COVID-19 and one that tests whether or not food animals can harbor coronavirus and spread infectious cells. Martin Kohlmeier, M.D., Ph.D., of UNC Chapel Hill who continues to stress the importance of aggressively exploring all opportunities to control the virus, including the possibility that a healthy amount of vitamin D can slow the transmission of COVID-19, in his recent publication with *BMJ Nutrition, Prevention & Health*.

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**We are so proud of all the incredible work that our researchers are doing to combat this global pandemic, and these are just a few examples of how members of the NCRC community are making a difference on both a broad and local scale.**

All this to say that as the pandemic continues, our researchers will do the same; they'll continue asking questions, exploring solutions, and doing their part to contribute to the health and safety of all people. We are happy to be the home of some of the nation's leading research.

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## HUMAN PERFORMANCE LAB

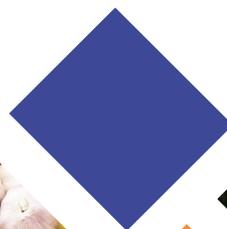
The mission of the Human Performance Laboratory (HPL) is to investigate unique nutritional products as countermeasures to exercise- and obesity-induced immune dysfunction, inflammation, illness, and oxidative stress.



**David Nieman, DrPH, FACS,**  
Director and Professor of  
Health and Exercise Science  
Department of Biology

## KEY FINDINGS

- ◆ Oxylipins are oxidized fats that are generated during stressful exercise, and help control inflammation and immune function. The influence of diet on oxylipin production and activity is an emerging area of research. In a collaborative study with UNC-Greensboro, we showed that **prolonged and intensive exercise evoked a transient but robust increase in plasma levels of oxylipins**. Carbohydrate intake, either from a sports drink or bananas, countered post-exercise levels of pro-inflammatory oxylipins. Athletes can thus improve recovery from stressful exercise by consuming carbohydrate-rich fruits such as bananas. This study was funded through Dole Foods.
  - *PLoS One*. 2019 Mar 18;14(3):e0213676.
- ◆ In a collaborative study with UNC-Chapel Hill, we showed that **a mixed flavonoid-caffeine supplement increased energy expenditure in a metabolic chamber by 46 calories per day** compared to placebo in adult women.
  - *Nutrients*. 2019 Nov 5;11(11):2665.
- ◆ In two collaborative proteomics-based studies with ProteiQ (Berlin, Germany), we showed that **extreme exercise (bicycle race across American, and a trek across Antarctica) caused immune dysfunction** especially in the innate immune system.
  - *Front Physiol*. 2019;10:1410. *Proteomes* 2020;8(1):4.



# North Carolina A&T State University

## CENTER FOR EXCELLENCE IN POST-HARVEST TECHNOLOGIES

The Center focuses on discovering better ways to preserve or process fruits and vegetables to prevent disease, enhance health, and increase value of North Carolina agriculture by finding better ways to retain freshness, preserve health-promoting compounds and nutrients, and make food safer for consumption.



**Leonard Williams, PhD, MBA,**  
Director, Lead Scientist for Food  
Safety and Microbiology and  
Professor of Food Sciences

## KEY FINDINGS

- ◆ **Ultrasound technology has proven bactericidal effects and effectiveness to obtain safe liquid foods and drinks such as fruit and vegetable juices, beverages, milk, wine, and beer with minimal impact on their sensory and nutritional properties compared with conventional thermal techniques.** However, existing ultrasonic reactors have slow microbial inactivation rate, leading to long pasteurization times. To address this issue, we developed a new batch ultrasonic reactor that enhances lethal effects of ultrasound on microorganisms having high resistance to ultrasound, significantly shortening the pasteurization processing time and lowering the cost.
  - Baboli, Z.M., Williams, L., & Chen, G. (2020). Design of a batch ultrasonic reactor for rapid pasteurization of juices. *Journal of Food Engineering*, 268, 109736.
- ◆ **Epidemiological evidence suggest regular consumption of cereal dietary fiber and phytochemicals, could help prevent and/or treat a number of chronic and degenerative diseases.** Bread is a staple food and has been extensively studied as a carrier of dietary fiber including cereal brans. However, incorporating high levels of cereal brans into bread results in unpleasant quality attributes or unpleasant flavors, making the bread less attractive to consumers. We resolved the issue effectively by optimizing the water content in bread formulas.
  - de Erive, M.O., Wang, T., He, F., & Chen, G. (2020). Development of high-fiber wheat bread using microfluidized corn bran. *Food Chemistry*, 310, 125921.
- ◆ **The major active phytochemicals in whole grain wheat, alkylresorcinols, and the major active intestinal microbial metabolite of fiber, butyrate, synergistically suppress the growth of human colon cancer cells via multiple molecular pathways,** which provides novel insights into the dietary prevention of colorectal cancer by the combination of different food bioactive compounds.
  - Zhao, Y.; Shi, L.; Hu, C.; Sang, S. Wheat bran for colon cancer prevention: The synergy between phytochemical alkylresorcinol C21 and intestinal microbial metabolite butyrate. *J. Agric. Food Chem.* 2019, 67, 12761-12769





## NUTRITION RESEARCH PROGRAM

Our research groups in NCCU/Kannapolis have established unique expertise in zebrafish and mouse models to study hematopoietic disease and cancer biology. Our unique research program facilitates collaborations with researchers from different universities on the NCRC as well as among different university campuses of the UNC System.



**Deepak Kumar, PhD**, Director of the Julius L. Chambers Biomedical and Biotechnology Research Institute, which includes the NCCU Nutrition Research Program

## KEY FINDINGS

- ◆ **Humanized zebrafish can support human leukemia and hematopoietic stem cells.** An invention disclosure was submitted to the Office of Research Compliance and Technology Transfer at NCCU: “Humanized zebrafish by transgenesis” for drug screening patients’ leukemia and bone marrow transplantation. Inventors: TinChung Leung at NCCU, and Drs. Paul Armistead and Jonathan Serody at UNC-Chapel Hill
- ◆ **In utero exposure to bisphenol A (BPA) induces mammary stem cell reprogramming and promotes mammary tumor risk;** Exposure to bisphenol F (BPF), a BPA substitute, is also a potent environmental hormone that induces breast cancer risk.
  - Ma Z, Parris AB, Howard EW, Davis M, Cao X, Woods C, Yang X. *In Utero Exposure to Bisphenol a Promotes Mammary Tumor Risk in MMTV-ErbB2 Transgenic Mice Through the Induction of ER-erbB2 Crosstalk.* *Int J Mol Sci.* 2020 Apr 28;21(9):3095. doi: 10.3390/ijms21093095.
  - Zhao Q, Howard EW, Parris AB, Ma Z, Xing Y, Yang X. *Bisphenol AF promotes estrogen receptor-positive breast cancer cell proliferation through amphiregulin-mediated crosstalk with receptor tyrosine kinase signaling.* *PLoS One.* 2019 May 6;14(5):e0216469. doi: 10.1371/journal.pone.0216469. eCollection 2019
- ◆ **Overexpression of Wnt modulator DKK1 promotes the development of triple negative breast cancer.**
- ◆ **The U.S. Patent and Trademark Office issued U.S. Patent No. 10,363,766, entitled “6-Shogaol Derivatives and Activities Thereof,”** for using 6-shogaol derivatives to treat recited disease states associated with inflammation and/or oxidative stress. Inventors: Drs. Shengmin Sang and Yingdong Zhu at N.C. A&T, and TinChung Leung at NCCU.

# North Carolina State University



## PLANTS FOR HUMAN HEALTH INSTITUTE

The NC State Plants for Human Health Institute uses a transdisciplinary approach to drive its research efforts toward the discovery and translation of the links between plant compounds, disease prevention, and health maintenance. NC State Extension provides a bridge to the community through K-12 STEM education and healthcare-focused outreach.



**Mary Ann Lila, PhD**, Director and David H. Murdock Distinguished Professor

## KEY FINDINGS

- ◆ **Epigenetically activating or silencing certain genes may create advantageous results, like plants with greater disease resistance or higher-yielding crops.** The DEMETER gene is the master regulator that flips the epigenetic switches in seeds. Without DEMETER, the genes that control seed development are not activated, or repressed, and the seeds die. Dr. Tzung-Fu Hsieh works with *Arabidopsis* to understand how the epigenetic switches are flipped within seeds, and how these switches may impact the plants, and their resultant grain (or food product).  
The Hsieh lab currently studies how the DEMETER protein finds its target sites in the genome. In a paper published in the *Proceedings of the National Academy of Sciences* journal, Dr. Hsieh reported that they have identified the region of the DEMETER protein responsible for its localization to the target genes to flip the epigenetic switch.
  - *Proceedings of the National Academy of Sciences Aug 2019, 116 (35) 17563-17571; DOI: 10.1073/pnas.1907290116.*
- ◆ **Funding Secured to Build Genomic Resources for Vaccinium Breeding.** Dr. Massimo Iorizzo was awarded a \$6.4 million grant from the US Department of Agriculture, along with secured, matching funds. “VacciniumCAP: Leveraging genetic & genomic resources to enable development of blueberry and cranberry cultivars with improved fruit quality attributes,” is significant because, while breeders and industry members understand that use of genomic tools represent an effective strategy to develop improved cultivars, DNA-based information is not commonly used in *Vaccinium* breeding.
  - *Mengist MF, Grace MH, Xiong J, Kay CD, Bassil N, Hummer K, Ferruzzi MG, Lila MA and Iorizzo M (2020) Diversity in Metabolites and Fruit Quality Traits in Blueberry Enables Ploidy and Species Differentiation and Establishes a Strategy for Future Genetic Studies. Front. Plant Sci. 11:370. doi: 10.3389/fpls.2020.0037011:370.*

## NUTRITION RESEARCH INSTITUTE

The Nutrition Research Institute is committed to conducting innovative basic and translational science studying precision nutrition, how individual differences in requirements and responses to diet affect our individual nutritional needs. We believe that our advances in nutrition science are leading to successes in preventing or mitigating the negative effects of chronic diseases and aging, and in improving human development, even prior to conception.



**Steven H. Zeisel, MD, PhD,**  
Director and Kenan Distinguished  
University Professor in Nutrition  
and Pediatrics

## KEY FINDINGS

- ◆ How prenatal alcohol exposure causes fetal alcohol spectrum disorders (FASD) is unclear. **Work from Susan Smith, PhD, has shown that maternal alcohol exposure causes an inflammatory response in the placenta that can be reduced by dietary iron fortification** (Kwan et al., 2020). Research identified a specific pro-inflammatory pathway that responds to alcohol exposure in an iron-dependent manner (Saini et al., 2019). The Smith lab is not only identifying cellular mechanisms linking alcohol consumption with FASD, but also potential nutrition-based therapeutic approaches.
  - Saini, N, Helfrich, KK, Kwan, STC, Huebner, SM, Abazi, J, Flentke, GR, Blohowiak, SE, Kling, PJ and Smith, SM (2019). "Alcohol's Dysregulation of Maternal-Fetal IL-6 and p-STAT3 Is a Function of Maternal Iron Status." *Alcohol Clin Exp Res* 43: 2332-2343.
  - Kwan, STC, Kezer, CA, Helfrich, KK, Saini, N, Huebner, SM, Flentke, GR, Kling, PJ and Smith, SM (2020). "Maternal iron nutriture modulates placental development in a rat model of fetal alcohol spectrum disorder." *Alcohol* 84: 57-66.
- ◆ Institute Director Steven Zeisel, PhD, a global leader in precision nutrition, **summarized the state of precision nutrition including our understanding of its principles and its potential to improve health** in a recent review.
  - Zeisel, SH (2020). "Precision (Personalized) Nutrition: Understanding Metabolic Heterogeneity." *Annu Rev Food Sci Technol* 11: 71-92.
- ◆ Sergey Krupenko, PhD, in collaboration with Natalia Krupenko, PhD, and Susan Sumner, PhD, is **uncovering how a pair of related proteins, ALDH1L1 and ALDH1L2, regulate folate metabolism**. ALDH1L1 functions in biosynthesis (Krupenko, 2019), while ALDH1L2 plays an entirely distinct role in energy production. Importantly, mutations to ALDH1L2 are linked to a disease known as Sjögren-Larsson syndrome (Sarret et al., 2019).
  - Krupenko, NI, Sharma, J, Pediaditakis, P, Fekry, B, Helke, KL, Du, X, Sumner, S and Krupenko, SA (2019). "Cytosolic 10-formyltetrahydrofolate dehydrogenase regulates glycine metabolism in mouse liver." *Sci Rep* 9: 14937.
  - Sarret, C, Ashkavand, Z, Paules, E, Dorboz, I, Pediaditakis, P, Sumner, S, Eymard-Pierre, E, Francannet, C, Krupenko, NI, Boespflug-Tanguy, O and Krupenko, SA (2019). "Deleterious mutations in ALDH1L2 suggest a novel cause for neuro-ichthyotic syndrome." *NPJ Genom Med* 4: 17.

# University of North Carolina at Charlotte

## BIOINFORMATICS RESEARCH AND SERVICES

Researchers from UNC Charlotte's Bioinformatics Services Division and the Department of Bioinformatics and Genomics work at the intersection of computer science and biology to develop the tools and resources necessary for analyzing large, complex datasets in order to answer critical biological questions.



**Cory Brouwer, PhD**, *Director, Bioinformatics Services and Professor of Bioinformatics and Genomics*

## KEY FINDINGS

- ◆ **In Dr. Xiuxia Du's lab, Dr. Aleksandr Smirnov is leading two Ph.D. students, Yunfei Liao and Ciara Conway, on the development of bioinformatics capabilities that will allow researchers to benefit from the massive amount of metabolomics data that is publicly available.** So far, the Du-Lab has developed integrated computational workflows and an online spectral knowledgebase that extract compound information from many biological studies and make the information searchable and findable. Most of the mass spectra that is currently in ADAP-KDB are derived from raw mass spectrometry data in the NIH's Metabolomics Data Repository and more spectra will be added as more studies are processed. ADAP-KDB enable scientists to do cross-species, cross-diseases, and cross-lab analysis which would greatly facilitate researcher's efforts on knowledge discovery from metabolomics data.
- ◆ **Dr. Jeremy Jay studies the intersection of high-throughput data integration and applications in precision nutrition.** In particular, how can we prepare for massive data sets and biomedical advances, while enabling computational analysis to keep up and be reproducible? Earlier this year, Dr. Jay's lab published Databio, a first step toward automating labor-intensive data annotation. The tool quickly identifies biomedical identifiers in an arbitrary data file, and can translate those identifiers to the myriad options required by existing biomedical pipelines. This ensures high data quality and better provenance so that each experiment can be reproduced. Automated data ingestion enables more complex analysis and machine learning approaches to integrate big data across biomedicine. More details on the computational algorithms are provided in the publication (<https://bmcresnotes.biomedcentral.com/articles/10.1186/s13104-020-05038-w>).
- ◆ **Genomic structural mutations are an important source of variation in many species and can play key roles in phenotypic diversification and evolution.** To better understand the role of these in sorghum, an important cereal and bioenergy crop, Dr. Elizabeth Cooper's group surveyed the sequences of 350 diverse lines of sorghum collected from across the world. In their study, they uncovered more than 24,000 deletions, duplications, and inversions. Moreover, different geographical populations had distinct subsets of structural variants, and in many cases these mutations occurred within genes that have known functions related to both abiotic and biotic stress tolerance. This suggests that not only are structural variants common in sorghum, but also that they may have played in key role in local adaptation throughout this crop's history.



# University of North Carolina at Greensboro

## CENTER FOR TRANSLATIONAL BIOMEDICAL RESEARCH

The UNC Greensboro Center for Translational Biomedical Research conducts basic and translational research in the area of liver diseases and diabetes. Our research is primarily focusing on the mechanisms and development of therapeutic approaches for treatment of alcohol-induced liver disease. We also focus on developing bioanalytical tools for systemic biological investigation of diabetes and early biomarkers of diabetic complications.



**Zhanxiang Zhou, PhD,**  
Co-director and Professor of Nutrition, UNC Greensboro Center for Translational Biomedical Research



**Gibin Zhang, PhD,**  
Co-Director and Associate Professor of Chemistry, UNC Greensboro Center for Translational Biomedical Research

## KEY FINDINGS

### ◆ An intestinal mechanism in the development of alcoholic liver disease was uncovered.

We demonstrated that reduction of intestinal antimicrobial peptides, which control pathogenic bacteria, accounts for alcohol-induced intestinal bacterial overgrowth and translocation to the liver.

• *Zhong W, Wei X, Hao L, Lin T-D, Yue R, Sun X, Guo W, Dong H, Li T, Ahmadi AR, Sun Z, Zhang Q, Zhao J, Zhou Z. Paneth cell dysfunction mediates alcoholic steatohepatitis through promoting bacterial translocation in mice: role of zinc deficiency. Hepatology 2020 May; 71(5):1575-1591.*

### ◆ How the hepatitis A virus, a common cause of acute hepatitis in humans, enters cells to initiate infection is a mystery.

In collaboration with virologists from UNC-Chapel Hill, we identified gangliosides, a special class of glycosphingolipids that are essential for hepatitis A virus entry into host cells.

• *Das A, Barrientos R, Shiota T, Madigan V, Misumi I, McKnight KL, Sun L, Li Z, Meganck RM, Li Y, Kaluzna E, Asokan A, Whitmire JK, Kapustina M, Zhang Q, Lemon SM (2020) Gangliosides are essential endosomal receptors for quasi-enveloped and naked hepatitis A virus. Nat Microbiol. 2020, 5(9), 1069-1078*



Moving discoveries made during basic research out of the lab and applying it to people's lives is called translational research. Our researchers at the North Carolina Research Campus are making a difference in people's lives through their research. Many discoveries they have made in their labs have been directly translated into ways to improve human health through better nutrition and disease prevention.

The North Carolina Research Campus, now in its second decade, has become the core of regional research and education for its seven UNC System partner universities:

- Appalachian State University
- North Carolina A&T State University
- North Carolina Central University
- North Carolina State University
- University of North Carolina at Chapel Hill
- University of North Carolina at Charlotte
- University of North Carolina at Greensboro



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