UNC NUTRITION RESEARCH INSTITUTE
IMPACT REPORT

FY25

UNC NUTRITION RESEARCH INSTITUTE

In FY25, the NRI was supported by

109

Dedicated Employees

–among them were **8** undergraduate students, **7** graduate students, and **4** postdoctoral fellows–all working side by side to push the boundaires of nutrition science.

They were supported by

21 Advisory Board Members

across **3** meetings.

The research was powered by the commitment of

409 Study Participants

who made **1,017** Visits

to our campus, and by the expertise of our metabolic kitchen,

5,000

Precisely Designed Meals

were made for the Nutrition in Precision Health (NPH) study.

From this foundation of people and purpose came discovery. NRI Principal Investigators contributed to

120 Authorships

by publishing

60 Scientific Papers

that advanced knowledge across many fields.

Education remained a cornerstone of the NRI's foundation.

11 Faculty Members

taught courses reaching

265 UNC–Chapel Hill Students.

Additionally,

54

High School Students

from across the country joined our Virtual Internship Program (VIP).

Our story continued beyond the lab and classroom. Through outreach we shared science with nearly

3,000 Community Members

The reach extended even futher online where

72,242

Visitors

explored our website creating more than

131,000

Pageviews.

FROM THE DIRECTOR'S DESK

REFLECTING ON A YEAR OF DISCOVERY

Dear Supporters of our Discovery,

It is a privilege to share the highlights of this past year at the UNC Nutrition Research Institute. As interim director, I continue to be inspired by the remarkable faculty, staff, students, and community partners who make the NRI a hub of discovery and collaboration in precision nutrition.

This year, we marked important milestones that underscore both the excellence and the impact of our work. Our faculty contributed to 120 authorships by publishing 60 papers, advancing knowledge in areas from cancer biology and brain health to metabolism and cardiometabolic disease. Their discoveries are shaping how the world understands nutrition and health.

The strength of our research enterprise was further demonstrated by the awarding of several new large grants from the National Institutes of Health including projects led by faculty including Drs. Carol Cheatham, Susan Sumner, Susan Smith, Sandra Mooney, and Blake Rushing. These highly competitive grants highlight the caliber of science at the NRI and ensure that we remain at the forefront of nutrition research.

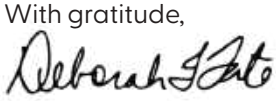
We also continued to expand the reach of our science beyond the laboratory. Through our clinical studies, we engaged 409 participants, who made 1,017 visits to our institute to help accelerate discoveries in precision nutrition. Our involvement in the Nutrition for Precision Health (NPH) study has elevated the role of our metabolic kitchen, which has produced more than 5,000 scientifically precise meals to help researchers uncover how different dietary patterns affect key health markers like blood glucose and gut microbiota.

Our commitment to education and community engagement remains strong. The Virtual Internship Program completed its sixth year, doubling participation to 54 high school and college-bound students who created and presented their own scientific posters. Our Appetite for Life series continued to offer engaging, accessible programs that connected cutting-edge research with real-world impact. And this spring, we were proud to host STEM Night at the Ballpark in Kannapolis, where more than 2,000 community members explored hands-on activities that brought science to life.

Each of these accomplishments reflects not only the dedication of our faculty and staff but also the steadfast support of our donors, board members, and community. Your generosity makes it possible for us to pursue ambitious science, train the next generation of researchers, and share discoveries that can improve lives of North Carolinians and people around the world.

Together, we are building a healthier future—one discovery at a time.

With gratitude,



Deborah F. Tate, PhD

Deborah F. Tate, PhD, is interim director of the UNC Nutrition Research Institute and professor in the Department of Nutrition with joint appointments in Health Behavior and at the NRI. An internationally recognized behavioral scientist, she has been continuously funded by the NIH for her pioneering work in digital health, obesity and diabetes prevention, and precision nutrition.

THE LEADERS IN PRECISION NUTRITION

The UNC Nutrition Research Institute (NRI) is a world leader in precision nutrition—research that recognizes each person's unique genetic makeup, metabolism, and lifestyle in determining how food affects health. Located at the North Carolina Research Campus in Kannapolis, the NRI is a proud center of the University of North Carolina at Chapel Hill. Our scientists study nutrition at the molecular, genetic, and behavioral levels, working to understand why people respond differently to the same foods. By translating these discoveries into practical guidance, we help improve lives, reduce the burden of chronic disease, and shape the future of nutrition science.

Our work matters because nutrition is not one-size-fits-all, and the health of our communities depends on moving beyond general dietary advice to targeted, evidence-based recommendations. The NRI's research informs public health policy, advances medical practice, supports economic growth in North Carolina through jobs and innovation, and trains the next generation of scientists. From our state-of-the-art metabolic kitchen and chamber to community-based education and outreach, every project we undertake brings us closer to a future where everyone can eat smarter, live healthier, and thrive.

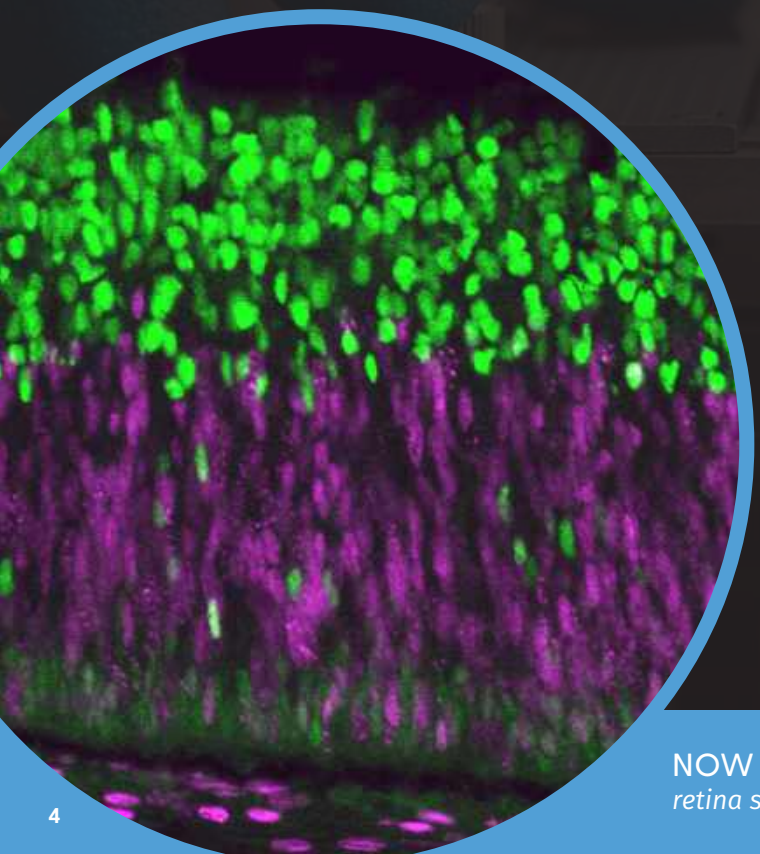
"Advancements in technology are accelerating smarter, more personalized health solutions, and the field of precision nutrition is poised to be truly lifesaving. The UNC Nutrition Research Institute stands as a powerhouse in this work, cementing Carolina's reputation as a leader in this critical, boundary-breaking science."

PENNY GORDON-LARSEN, PHD
VICE CHANCELLOR FOR RESEARCH, UNC-CHAPEL HILL

VISION
To use scientific discovery to ensure optimal health through individualized nutrition.

Mission: *To understand how nutrition affects individual health through our leadership in precision nutrition research, establishing how differences in our genes, microbiota, metabolism, and environment shape our individual disease risk.*

Guiding Scientific Premise: *Each of us is metabolically unique. The UNC Nutrition Research Institute is dedicated to finding out how these differences affect an individual's health so that current one-size-fits-all dietary guidelines can be replaced with customized nutritional recommendations and actions to improve an individual's health and quality of life.*



NOW VIEWING
retina stem cells

DISCOVERY STARTS WITH US

Each principal investigator brings a unique perspective to the complex puzzle of nutrition and health, asking bold questions, pursuing answers with rigor, and translating findings into knowledge that can change lives.

Together, these renowned faculty members form a community that thrives on collaboration. Their expertise spans cancer, brain health, cardiometabolic disease, and more, creating a powerful network of innovation. Beyond the lab, they mentor students, shape conversations on the global stage, and advance the mission of the NRI: to improve human health through the science of precision nutrition.

PRINCIPAL INVESTIGATORS

Carol L. Cheatham, PhD • Associate Professor of Psychology and Neuroscience
Rachel W. Goode, PhD, MPH, LCSW • Associate Professor of Social Work and Psychiatry
Stephen D. Hursting, PhD, MPH • Professor of Nutrition
Natalia I. Krupenko, PhD • Associate Professor of Nutrition
Sergey A. Krupenko, PhD • Professor of Nutrition
Katie Meyer, ScD • Assistant Professor of Nutrition
Sandra Mooney, PhD • Associate Professor of Nutrition
Wimal Pathmasiri, PhD • Assistant Professor of Nutrition
Blake Rushing, PhD • Assistant Professor of Nutrition
Nipun Saini, PhD • Assistant Professor of Nutrition
Susan Smith, PhD • Professor of Nutrition
Susan Sumner, PhD • Professor of Nutrition and Pharmacology, Director of Metabolomics and Exposome Laboratory
Deborah F. Tate, PhD • Professor of Nutrition and Health Behavior, Interim Director
Isis Trujillo-Gonzalez, PhD • Assistant Professor of Nutrition
Saroja Voruganti, PhD • Professor of Nutrition, Director of NRI Clinical Research Services
Steven H. Zeisel, MD, PhD • Professor Emeritus, Founding Director

FEATURED PRESENTATIONS

Cheatham C. Nutrients and cognition: synergy of nutrients in support of brain function. Fetal Alcohol Syndrome Study Group, Robertson, Western Cape Province, South Africa. Fall 2024.

Krupenko S. Invited speaker. 15th International Conference on One Carbon Metabolism, B Vitamins and Homocysteine, Nancy, France. June 24–27, 2024.

Mooney SM, Smith SM, Wetherill L, **Krupenko S,** Weathers TD, CIFASD Consortium. Functional polymorphisms in the choline modulatory gene ALDH1L1 are associated with behavioral outcomes in those with prenatal alcohol exposure (PAE). 47th Annual Meeting of the Research Society on Alcohol, Minneapolis, MN. June, 2024.

Rushing BR. The exposome, nutritional pharmacology and toxicology: a new application for metabolomics. Metabolomics and Human Health Gordon Research Conference, Ventura, California. February 2-7, 2025. [Invited speaker].

Saini N, Mooney SM, Smith SM. Prenatal alcohol exposure disrupts maternal hepatic and placental glucose metabolism to impair fetal growth and development. 8th Annual Meeting of the U.S. DOHaD Society, Chapel Hill, NC. October 14–16, 2024. [Invited oral talk].

Smith SM. Alcohol alters metabolic reprogramming in neural crest. Gordon Research Conference on Alcohol & End-Organ Disease, Ventura, California. March 2025. [Invited speaker].

Sumner S. The internal exposome and nutritional pharmacology/toxicology: the impact of metabolomics on nutrition research, past, present & future. 20th NuGo Week, Ghent, Belgium. September 2–5, 2024. [Keynote speaker].

Sumner S. Metabolomics in precision nutrition. NUTRITION 2024: Annual Conference of the American Society for Nutrition (ASN), McCormick Place, Chicago, IL. June 29 – July 2, 2024. [Platform presentation].

Trujillo-Gonzalez I. Beyond macronutrients: the influence of dietary choline on obesity and thermogenic regulation. Advance Center for Chronic Diseases (ACCDis), Santiago de Chile. March 14, 2025.

Voruganti VS. Genetic basis of variability in responses to nutrient intake. Nutrition Obesity Research Center Symposium, University of Michigan, Ann Arbor, MI. [Keynote lecture].

FEATURED PUBLICATIONS

Campos AP, Robles J, Matthes KE, Alexander RC, Goode RW (2025). Parenting practices to prevent childhood obesity among Hispanic families: A systematic literature review. Child Obes 21:113

Fu G, Molina S, Krupenko SA, Sumner S, Rushing BR (2024). Untargeted metabolomics reveals dysregulation of glycine- and serine-coupled metabolic pathways in an ALDH1L1-dependent manner in vivo. Metabolites 14: 696.

Goode RW, Blackman Carr LT, Xu Y, **Harper-Cooks T,** Wilhoit-Reeves S, **Alexander RC, Campos AP, Robles J, Tate DF** (2025). Preventing weight gain in adults who emotionally eat: An open pilot. Eat Behav 57: 101960.

Cao HH, **Molina S, Sumner S, Rushing BR** (2025). An untargeted metabolomic analysis of acute AFB1 treatment in liver, breast, and lung cells. PLoS One 20: e0313159.

Nieman DC, Sakaguchi CA, Williams JC, **Pathmasiri W, Rushing BR, McRitchie S, Sumner SJ** (2025). Selective influence of hemp fiber ingestion on post-exercise gut permeability: A metabolomics-based analysis. Nutrients 17: 1384.

Paules EM, VerHague M, **Lulla AA, Meyer KA,** Coleman MF, Albright J, Bennett BJ, North KE, Howard AG, Gordon-Larsen P, **Trujillo-Gonzalez I,** French JE, **Hursting SD** (2025). Sex-specific systemic metabolic predictors of resistance to calorie restriction-induced weight loss in obese Diversity Outbred mice. Am J Physiol Regul Integr Comp Physiol 329: R576-R585.

Trujillo-Gonzalez I, Zeisel S (2025). Choline. In: Modern Nutrition in Health and Disease, 12th Edition: 443–452.

Hurley L, O'Shea NG, Power J, Sciamanna C, **Tate DF** (2025). Measuring the influence of depressive symptoms on engagement, adherence, and weight loss in an eHealth intervention. PLOS Digital Health 4: e0000766.

Saini N, Mooney SM, Smith SM (2025). Alcohol reprograms placental glucose and lipid metabolism, which correlate with reduced fetal brain but not body weight in a mouse model of prenatal alcohol exposure. J Nutr 155: 1127.

Bridges MD, **Vennam SS**, Davis T, Wilcox ML, Maki KC, **Shea J,** Truesdale K, Lajoie D, Fabry V, Kohlmeier M, Shi Q, **Hursting SD, Voruganti VS,** Shaikh SR (2025). Effects of a palmitoleic acid concentrated oil on C-reactive protein levels in adults: A randomized double-blind placebo-controlled clinical trial. Am J Clin Nutr (in press).

**boxed publications are featured on the following page*

In FY25, NRI researchers added their voices to the global conversation in science with 120 authorships across 60 publications. Each authorship marks a moment where our faculty's expertise helped move research forward and bring new understanding to the field of nutrition.

Choline: Modern Nutrition in Health and Disease

A new global standard in nutrition education now includes research conducted at the NRI on the essential nutrient choline. The International Union of Nutritional Sciences has launched an open-access eLearning platform for nutrition students and professionals around the world, and the NRI's work—particularly on the role of choline in prenatal brain development—is featured as a foundational resource. This inclusion reflects the global recognition of the NRI's leadership in choline research and highlights the institute's impact on shaping how nutrition is taught, understood, and applied in clinical and public health settings worldwide.

Parenting Practices to Prevent Childhood Obesity Among Hispanic Families

Childhood obesity remains one of the most pressing public health challenges and prevention starts at home. This study, supported in part by donor contributions, reviewed what is known about parenting practices that help prevent obesity among Hispanic children. The research team identified strategies such as family mealtime routines, setting limits on screen time, and encouraging physical activity as promising ways to foster healthy habits early in life. These findings will help guide future community programs that are culturally responsive and family-centered—ensuring that every child has the foundation to grow up healthy.

Alcohol Reprograms Placental Glucose and Lipid Metabolism

NRI research determined that prenatal alcohol exposure disrupts how the placenta utilizes and delivers nutrients, including glucose and lipids, to the fetus. While this didn't impact fetal body weight, it did reduce brain weight. These insights suggest that conventional measures like body weight may miss crucial impacts of prenatal alcohol exposure and point to the need for new ways to assess—and intervene in—at-risk pregnancies.

Measuring the Influence of Depressive Symptoms on Engagement, Adherence, and Weight Loss in an e-health Intervention

This study explored how symptoms of depression impact people's success in digital weight-loss programs. While depression wasn't directly linked to weight outcomes, researchers found that individuals with higher levels of depressive symptoms were less likely to stay engaged with the program or follow through on healthy behaviors like tracking food or meeting exercise goals. This reduced engagement and adherence, in turn, led to less weight loss over six months. The findings suggest that digital health programs may be more effective if they account for participants' mental health needs—highlighting the importance of integrating emotional well-being into scalable tools for better physical health.

Untargeted Metabolomics Reveals Dysregulation of Glycine- and Serine-Coupled Metabolic Pathways in an ALDH1L1-Dependent Manner in Vivo

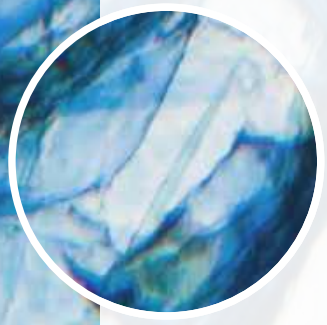
This study revealed how a folate metabolizing enzyme called ALDH1L1 helps regulate the availability of glycine and serine—two amino acids essential to nearly every cell in the body. These molecules play critical roles in DNA synthesis, methylation (which switches genes on and off), and neurotransmitter production in the brain. Using advanced metabolomics, the research team showed how disruption in these pathways could alter fundamental processes like cell division, energy production, and nervous system function. These insights help explain how subtle changes at the molecular level can influence health outcomes and point to new strategies for disease prevention and treatment.

NOW VIEWING:
spinal cord

KEY FINDINGS

BENCH to TRANSLATIONAL

Nutrition is a foundation of health, supporting everything from energy production and organ function to learning, memory, and growth.



NOW VIEWING:
celluar structure of an onion

PERSONALIZED DIET AND ACTIVITY PLANS LEAD TO NEARLY DOUBLE THE RESULTS

Research from { **DEBORAH F. TATE, PHD,** INTERIM DIRECTOR, PROFESSOR OF NUTRITION AND HEALTH BEHAVIOR

A 12-week clinical trial showed that personalized weight-loss plans, guided by self-experimentation and mobile health tools, led to nearly double the weight loss compared to a standard program.

Testing a Personalized Behavioral Weight Loss Approach Using Multifactor Prescriptions and Self-Experimentation: 12-Week mHealth Pilot Randomized Controlled Trial Results. Martinez, CE, Hatley, KE, Polzien, K, Diamond, M and **Tate, DF** (2025). Obes Sci Pract. 11:e70051. DOI:10.1002/osp4.70051; PMCID:PMC11794237.

The Challenge
Many digital health (eHealth) weight-loss programs prescribe set goals, leaving little flexibility. This rigid approach may not resonate with all participants, especially when they seek to address personal nutrition behaviors in ways that fit their lives.

The Discovery
In a 12-week pilot clinical trial, 35 adults who were overweight or diagnosed with obesity were randomly assigned to either a standard behavioral weight-loss program or a Personalized Behavioral Weight Loss (PBWL) program. Both groups used mobile health tools, including a custom weight-loss app, smart scale and activity tracker, and had weekly coaching calls. The PBWL group also used continuous glucose monitors (CGM) and participated in short "self-experiments," testing different combinations of diet type (low-fat or low-carb), meal timing (three meals or meals plus snacks), and activity frequency (daily or weekly goals). After one month, participants chose the combination that worked best for them and followed it for the remainder of the program. The results were striking: after three months, the PBWL group lost an average of 7.08 kg (15.6 lbs) compared to 3.79 kg (8.4 lbs) in the standard group. Those who achieved at least 5% weight loss lost even more—8.66 kg (19.1 lbs) in the PBWL group versus 4.76 kg (10.5 lbs) in the standard group. Retention and satisfaction were high in both groups.

Why It Matters
This study shows that personalizing weight-loss strategies using self-experimentation and real-time biofeedback from a CGM can nearly double weight loss compared to a standard program. By identifying the diet and activity approach that works best for each individual, participants may be more motivated, more engaged, and more successful in reaching their goals. These findings suggest that mobile health tools, combined with tailored coaching, could make highly personalized weight management strategies scalable and effective for broader populations.

Participants

+

12 week weight-loss program and **6 month** assessement **=**

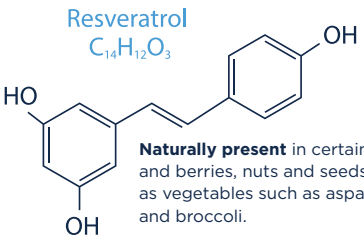
Personalized Behavioral Weight Loss (PBWL)
Lost 15 lbs. on average

vs.

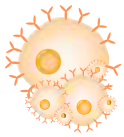
Behavioral Weight Loss (BWL)
Lost 9 lbs. on average

> "Giving people the tools to discover their best approach, optimized for both their physiology and their lifestyle, transforms weight loss from a one-size-fits-all plan into a plan that's personalized, sustainable and effective."
>
> **DEBORAH F. TATE, PHD**

CONCLUSION:
Personalized plans = greater weight loss than standard recommendations.



Naturally present in certain fruits and berries, nuts and seeds, as well as vegetables such as asparagus and broccoli.



CANCER CELLS

Untargeted metabolomics approach in two types of breast cancer cell lines where **cells were treated with different concentrations of resveratrol.**

MCF-7 *(hormone receptor–positive)*
MDA-MB-231 *(triple-negative, more aggressive)*

Resveratrol, when applied in the right dose, can dramatically **alter how breast cancer cells process energy,** especially by **increasing certain fatty acid transport molecules (acylcarnitines).**

Why is this important?

This research identifies a novel and promising path where we might leverage metabolic changes to **help slow or treat breast cancers,** especially hard-to-treat types like triple-negative.

REWRITING CANCER'S ENERGY STORY WITH A NATURAL COMPOUND

Research from **BLAKE RUSHING, PHD,** ASSISTANT PROFESSOR OF NUTRITION

The Challenge
Breast cancer remains a leading global health issue, with some subtypes, like triple-negative breast cancer, having particularly poor prognoses due to limited treatment options. Although resveratrol, a naturally occurring compound found in foods like grapes and berries, has shown promising anti-cancer properties, the mechanisms behind its effects remain unclear.

The Discovery
NRI researchers studied how resveratrol influences the metabolism of breast cancer cells. Using an untargeted metabolomics approach, which simultaneously measures the presence of many different molecules in a cell, they discovered that resveratrol altered the levels of acylcarnitines, small molecules that help shuttle fats into mitochondria so they can be turned into energy. Interestingly, the effects depended on the dose: higher concentrations of resveratrol greatly increased acylcarnitine levels, while lower concentrations reduced them. This suggests that resveratrol can reprogram how cancer cells process energy in a dose-dependent manner.

Why It Matters
Acylcarnitines are central to mitochondrial metabolism, helping to transport fatty acids for energy production. These metabolites are increasingly recognized both as markers and as potential contributors to the altered metabolism of cancer cells. The study indicates that resveratrol reprograms cancer cell energy pathways in a dose-sensitive way, revealing potential metabolic vulnerabilities. This opens the door for precision nutrition strategies or adjuvant interventions that modulate mitochondrial metabolism to support cancer prevention or treatment. Identifying the right dose of resveratrol, or combining it with other interventions that affect fatty acid metabolism, could maximize its therapeutic potential.

Resveratrol induces dose-dependent changes in breast cancer cell metabolism, marked by shifts in acylcarnitines, highlighting mitochondrial energy use as a promising target for nutrition-based cancer strategies.

Untargeted Metabolomics Reveals Acylcarnitines as Major Metabolic Targets of Resveratrol in Breast Cancer Cells. Falcone IG and **Rushing BR** (2025). Metabolites 15: 250. https://www.mdpi.com/2218-1989/15/4/250

> *Our findings show a completely novel function of resveratrol that help us understand how it may target cancer cells by altering how they generate energy. By uncovering these shifts in fat metabolism we're identifying new ways to think about nutrition's role in cancer research."*
>
> **BLAKE RUSHING, PHD**

CHOLINE UNDER PRESSURE:
MEETING THE NEEDS OF THE DEVELOPING FETUS

Research from {
HANNAH PETRY, DOCTORAL STUDENT
NIPUN SAINI, PHD, ASSISTANT PROFESSOR OF NUTRITION
SUSAN SMITH, PHD, PROFESSOR OF NUTRITION
SANDRA MOONEY, PHD, ASSOCIATE PROFESSOR OF NUTRITION

The study found that alcohol during pregnancy diverts choline away from critical gene-regulating processes toward fat production, meaning that pregnant women, especially those consuming alcohol, may need more choline than current guidelines recommend to support healthy fetal development.

The Challenge
Prenatal alcohol exposure (PAE) can impair fetal growth and brain development, a condition often resulting in Fetal Alcohol Spectrum Disorders, which affect cognitive and behavioral functions. Although prenatal choline supplements have been shown to reduce these alcohol-related deficits, scientists don't fully understand how alcohol alters choline metabolism or whether it increases the body's need for choline.

The Discovery
Choline is a vital nutrient used for making cell-building lipids and for donating "methyl" groups, which are chemical tags important for DNA, proteins, and other molecules. In a mouse model mimicking human PAE, the researchers found that alcohol doesn't directly cause a choline shortage; instead, it redirects choline toward making more lipids, reducing its availability for methyl donation. This shift weakens methyl-dependent pathways, evident in lower levels of key molecules like S-adenosylmethionine, a key methyl donor, and altered serine/glycine ratios, which are indirect signs of methyl stress. Importantly, adding extra choline partly restored these methylation related molecules, though lipid levels remained high, indicating the supplementation helped rebalance choline use.

Why It Matters
This research sheds light on why prenatal alcohol exposure worsens developmental outcomes and how nutrition can play a role in reducing the damage. The key finding is that alcohol changes the body's "choline budget," diverting it toward making fats (lipids) needed for cell membranes, and leaving too little for methylation, a process essential for turning genes on and off and for healthy brain development. Even if a pregnant woman consumes what is normally considered "enough" choline, alcohol's diversion effect can create a hidden shortfall.

For at-risk pregnancies, whether due to known alcohol exposure or low baseline choline intake, nutritional needs may be higher than current guidelines suggest. The results make a strong case for targeted choline supplementation during pregnancy, especially in combination with other nutrients that support methylation, such as folate and vitamin B12. For public health, this could influence dietary recommendations, prenatal supplement formulations, and counseling for women of childbearing age. The study adds to a growing body of evidence that precise nutrient strategies (precision nutrition) can help offset specific metabolic stresses and improve long-term developmental outcomes for children.

> *These results give us a clearer picture of how alcohol affects a baby's nutrition before birth and, more importantly, how we might help. By understanding that alcohol changes how choline is used, we can focus on making sure mothers get enough of this essential nutrient to support their baby's brain and body development.*
>
> It's a step toward giving more children the healthiest possible start in life."
>
> **SANDRA MOONEY, PHD**

Alcohol Exposure May Increase Prenatal Choline Needs Through Redirection of Choline into Lipid Synthesis Rather than Methyl Donation. **Petry HG, Saini N, Smith SM** and **Mooney SM** (2025). Metabolites 15: 289. https://www.mdpi.com/2218-1989/15/5/289

NOW VIEWING:
broccoli at the microscopic level

THE POWER OF PARTICIPATION

Clinical Research by

CHEATHAM LAB
GOODE LAB
TATE LAB
VORUGANTI LAB

Every person who volunteers for a study at the NRI contributes in two important ways: by helping advance scientific discovery and by gaining insights into their own health. In FY25, more than 400 individuals joined our studies – learning about factors like nutrition, metabolism, and genetic differences while also making it possible for researchers to uncover how nutrition affects people in unique ways.

ALL OF US
Inviting one million people across the United States to help build one of the most diverse health databases in history.

CHILDREN'S HEALTH STUDY
Identifying genes and lifestyle factors that affect children's health status and overall well-being.

EAT, MOVE, THINK
Discovering whether consuming blueberries and exercising can support brain health as we age.

HONOR
Examining the factors that affect eating behaviors of African American adults with Type 2 diabetes.

INFANT NUTRITION AND COGNITION
Showing how nutrition helps babies grow and learn.

NUTRITION FOR PRECISION HEALTH (NPH)
Developing algorithms that predict individual responses to food and dietary patterns.

PREGNANT WOMAN HEALTH STUDY
A community-based study looking to understand how genetic and lifestyle factors affect nutrient metabolism, particularly in glycine, purine and folate metabolism, in pregnancy.

UNCOVER ORAL HEALTH STUDY
Assessing the link between intensive periodontal therapy and changes in systemic health markers in partnership with Colgate.

In FY25 we welcomed 409 participants for 1,017 visits.

151: All of Us and NPH

Children's Health Study **28**

Eat, Move, Think **40**

HONOR **16**

Infant Nutrition and Cognition **13**

Pregnant Woman Health **7**

Uncover Oral Health **33**

121: External Studies

Today's volunteers are tomorrow's breakthroughs. Each person who takes part in our studies makes discoveries like those from the Satisfy Study, featured on the next page, possible.

COMPLETED STUDY:

A NEW PATH TO MAINTAINING A HEALTHY WEIGHT

RACHEL GOODE, PHD, MPH, LCSW, ASSOCIATE PROFESSOR OF SOCIAL WORK AND PSYCHIATRY • **TYISHA HARPER-COOKS,** PROJECT COORDINATOR • **RAMINE ALEXANDER, PHD,** RESEARCH PROJECT MANAGER • **ANA PAOLA CAMPOS, PHD,** POSTDOCTORAL RESEARCH FELLOW • **JULIAN ROBLES,** RESEARCH ASSISTANT • **DEBORAH F. TATE, PHD,** INTERIM DIRECTOR, PROFESSOR OF NUTRITION AND HEALTH BEHAVIOR

A behavioral program focused on recognizing and managing emotional eating helped adults who were overweight or were living with obesity prevent weight gain over the study period compared to a control group.

Why It Matters

- Emotional eating is a common but often overlooked driver of gradual weight gain.
- This approach focuses on prevention, offering a proactive alternative to traditional weight-loss programs.
- By addressing the emotional triggers behind eating, the strategy may reduce long-term risk for obesity-related chronic diseases.

Dive Deeper

The program was designed not for weight loss, but for helping participants stay at their current weight by understanding the link between emotions and eating habits. Participants learned how to spot emotional triggers, develop non-food coping strategies, and make more mindful eating choices. At the end of the study, those in the program were significantly more successful at avoiding weight gain than those in the control group. These findings show that tackling the emotional side of eating can be a powerful tool for long-term health.

> "By helping people manage the emotions that drive eating, we can prevent weight gain before it starts and support healtheir lives for the long term."
>
> **RACHEL GOODE, PHD, MPH, LCSW**

Goode, R. W., Blackman Carr, L. T., Xu, Y., **Harper-Cooks, T.,** Wilhoit-Reeves, S., **Alexander, R. C., Campos, A. P., Robles, J., & Tate, D. F.** (2025). Preventing weight gain in adults who emotionally eat: An open pilot. Eating Behaviors, 57, 101960. https://doi.org/10.1016/j.eatbeh.2025.101960

NOW VIEWING:
cerebral cortex

HONORS AND APPOINTMENTS

Susan Smith, PhD, served on the National Academies of Sciences, Engineering, and Medicine committee that produced the first comprehensive review of alcohol and health for the Dietary Guidelines for Americans since 2010.

The report examined how moderate alcohol consumption—defined as up to one drink per day for women and two for men—affects outcomes such as cancer, cardiovascular disease, weight change, and cognition. Findings confirmed increased cancer risk, potential cardiovascular benefits, and mixed effects on weight, while highlighting the need for better research methods and more diverse study populations. Smith's expertise was critical in shaping these conclusions, underscoring the NRI's leadership in addressing complex public health issues and ensuring that federal nutrition policy reflects the best available science.

> "Although alcohol isn't a nutrient, it contributes 3–5% of calories to a typical adult diet."
>
> **SUSAN SMITH, PHD**

The influence of NRI scientists extends far beyond our institute. In FY25, they were invited to share their expertise on national stages, elected to leadership roles in professional societies, and entrusted with shaping the future of science through advisory and review panels. These recognitions reflect the high regard in which our faculty are held by peers around the world.

The honors highlighted here represent a featured selection of accomplishments and do not encompass the full scope of our faculty's achievements.

Carol Cheatham, PhD
- ***Named Fellow,*** Institute for Child Success.

Natalia Krupenko, PhD
- ***Co-organizer and co-chair,*** FASEB SRC "B Vitamins and One Carbon Metabolism." Niagara Falls, NY. August 11–16, 2024.
- ***Served*** on two Cancer Drug Development and Therapy study sections and on the R13 Conference Grant Review Panel.

Sergey Krupenko, PhD
- ***Ad hoc reviewer,*** POMD Study Section, NIH. April 2025.

Katie Meyer, ScD
- ***Scientific advisory,*** American Heart Association. Hypertension.

Susan Smith, PhD
- ***Member,*** National Academies of Sciences, Engineering, and Medicine expert panel reviewing the evidence on alcohol and health for the 2025–2030 Dietary Guidelines for Americans.

Susan Sumner, PhD
- ***Invited expert,*** First Annual International Exposome Moonshot Forum. Bloomberg Center, Washington, DC. May 12–15, 2025.
- ***Chair,*** Gordon Research Conference on Human Health: The Interaction Between Humans, Lifestyles and the Environment Viewed through Metabolism. Ventura, CA. February 2–7, 2025.

Deborah Tate, PhD
- ***Invited presentation,*** From Bytes to Bites: Advances in Precision Nutrition and Public Health to Advance Health Equity. Precision Health Research Symposium, Medical University of South Carolina, Charleston, SC. November 2024.
- ***Plenary session speaker,*** "Leveraging Data Science & Technology: Optimizing tailored prevention programs and intervention services through data science and technology services." Society for Prevention Research (SPR2025), Seattle, WA. May 2025.

Isis Trujillo-Gonzalez, PhD
- ***Invited presentation,*** "Unlocking Choline's Potential: From Molecular Pathways to Clinical Trials." BALCHEM Scientific Advisory Board Meeting, New Jersey, USA. March 26, 2025.

Saroja Voruganti, PhD
- ***Elected Fellow,*** American Society for Nutrition.
- ***Member,*** Women Inspiring and Elevating Leadership in Diabetes (WIELD).

NOW VIEWING:
potato starch

ADVISORY BOARD

The Advisory Board serves as a guiding force for the UNC Nutrition Research Institute, helping to shape our direction and champion our mission. Board members act as ambassadors for the NRI, sharing our story in their communities and opening doors to new opportunities. Their diverse expertise strengthens our strategic vision, informs key decisions, and connects us to vital networks. Through their leadership and advocacy, our board ensures that the institute continues to advance precision nutrition research and its impact on human health.

Meg Dees • Salisbury, NC
John Fennebresque, Jr. • Charlotte, NC
J. Steven Fisher • Salisbury, NC
Erika Gantt, MD • Charlotte, NC
Melissa Harman • Portsmouth, NH
Jason Holt • Kannapolis, NC
Anita Jotwani • Durham, NC
Farzaneh Keshmiri-Sanchez, DDS • Concord, NC
Jean Kitchin • Rocky Mount, NC
Chris Komelasky • Chapel Hill, NC
Michele Langford • Chapel Hill, NC
Monique May, MD • Charlotte, NC
Jeffery Petry • Charlotte, NC
Almer Reddick • Zebulon, NC
Rina Shah (Chair) • Durham, NC
Samuel Taggard • West Simsbury, CT
Jenise Tate • Harrisburg, NC
Richard Vinroot • Charlotte, NC
Jason Walser • Salisbury, NC
Mary Jo Walter • Lumberton, NC
Amanda Watlington • Durham, NC

In FY25, the NRI welcomed three new Advisory Board members: Anita Jotwani, Jean Kitchin, and Michele Langford. Each brings valuable expertise and a unique perspective, and their enthusiasm for our mission will help the board strengthen and expand the institute's lasting impact.

> "I serve on the NRI Advisory Board because I believe that high-quality nutrition research has the power to improve lives, strengthen our state, and contribute to better health worldwide."
>
> **RINA SHAH,** CHAIR

Why I Serve { **RICHARD VINROOT,** CHARLOTTE, NC

I first learned about the UNC Nutrition Research Institute in 2011, when three trusted colleagues – my mentor Russell Robinson, former North Carolina Governor Jim Martin, and former UNC Charlotte Chancellor Jim Woodward – urged me to visit. They told me this institute in Kannapolis was destined to change lives, and that I needed to see it for myself.

When I toured the building, I was astounded. Here, in a small town just north of Charlotte, stood a world-class research institute dedicated to precision nutrition. Meeting the scientists and seeing their labs made clear the groundbreaking discoveries underway, research that could one day transform health for people everywhere.

Not long after that visit, founding director Steve Zeisel, MD, PhD, invited me to join the NRI Board of Advisors. He was looking for leaders who could help share the story of this extraordinary institute, and I did not hesitate. I saw both the promise of the science and the potential impact on North Carolina's future.

As a UNC-Chapel Hill law graduate and former mayor of Charlotte, I had witnessed firsthand how the Research Triangle reshaped the state's economy. I recognized the same potential in Kannapolis, a community still reeling from the closure of the world's largest textile mill. With the creation of the North Carolina Research Campus, anchored by the NRI, new energy and investment began to flow into the area. Today, the revitalized downtown streetscape stands as a symbol of that transformation.

But economics alone do not explain why I serve. The NRI's work has the potential to change health universally. That mission, improving lives everywhere through the science of nutrition, is what has kept me committed from the very beginning, and why I remain eager to share its life-changing work with the world.

TEACHING, TRAINING, AND MENTORING

At the NRI, education is about more than coursework—it's about inspiring curiosity and giving students the confidence to see themselves as future scientists and healthcare leaders. Our faculty and staff share their passion for discovery in ways that spark questions, encourage exploration, and show how nutrition can change lives. By opening doors to learning at every stage, the NRI helps prepare the next generation to carry forward the science of nutrition and make a lasting difference in the health of our communities.

PARTNERSHIP WITH RCCC

As neighbors on the North Carolina Research Campus, the NRI and Rowan-Cabarrus Community College (RCCC) have teamed up to close a critical gap in healthcare education: nutrition. Through a series of guest lectures from NRI faculty, nursing students are gaining critical knowledge on topics ranging from drug-diet interactions and nutrition myths to disease prevention and healthy biochemistry. This collaboration builds on pioneering work by former NRI scientists who first identified the lack of nutrition education in healthcare training and brings the expertise of today's faculty directly into the classroom. The effort has been enthusiastically received by students and continues to expand, equipping future nurses with the tools to integrate nutrition into their practice and improve the health of the communities they serve.

> "I love that the NRI gives me close mentorship and the chance to work directly in labs where discoveries are happening."
>
> **MADELINE CHILDRESS,** DOCTORAL STUDENT

> "Offering this type of opportunity to capable high school and pre-college students plays a valuable role in building early exposure to science and research."
>
> **SAM TAGGARD,** VIP PARENT

VIRTUAL INTERNSHIP PROGRAM (VIP)

In its sixth year, the NRI's Virtual Internship Program (VIP) welcomed 54 high school students from across the country—double the number from the previous year—for a four-week virtual experience designed to inspire future nutrition researchers. Selected from a record number of nearly 200 applicants, students ranging from rising ninth graders to college freshmen attended lectures, joined mentoring sessions, and learned from NRI scientists and staff. Instead of traditional papers, this year's participants created scientific posters on a nutrient of their choice, gaining hands-on experience in how researchers visually communicate their findings.

TEACHING AND MENTORING

At the NRI, teaching and mentoring are essential parts of our mission. In addition to leading innovative research, eleven of our faculty share their expertise in undergraduate and graduate classrooms, while also guiding students through one-on-one mentoring and research training both in Kannapolis and on Chapel Hill's campus.

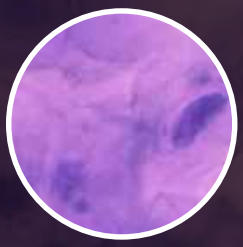
From undergraduates to doctoral candidates, our students gain invaluable training that bridges classroom learning with real-world science. This year, 17 undergraduates explored career paths in nutrition research through internships and hands-on lab experiences, while seven graduate students advanced their doctoral studies in fields such as nutrigenomics and metabolomics. Guided by NRI faculty, these emerging scientists are building the skills and insights needed to shape the future of personalized nutrition.

Many NRI principal investigators embody a dual role: world-class researchers who also guide, teach, and mentor the next generation of scientists.

Seminar, Development Psychology	Cheatham	Graduate
Nutrition and Metabolism	Hursting	Graduate
Intro to Nutritional Biochemistry	S. Krupenko, N. Krupenko	Undergraduate
Nutritional Epidemiology	Meyer	Graduate
Nutritional Biochemistry, Metabolism, and Health	Rushing, Sumner	Graduate
Pregnancy and Metabolism	Saini	Graduate
Human Metabolism: Micronutrients	Trujillo-Gonzalez	Undergraduate

COMMUNITY IMPACT

NOW VIEWING:
cheek epithelial cells



APPETITE FOR LIFE (AFL)
Appetite for Life invited our neighbors to discover the science of nutrition in ways that were both fun and meaningful. One month, a lunchtime audience logged in from their kitchens and offices to learn how diet can influence cancer risk. Another evening, families gathered at the ballpark, where kids explored nutrition and science hands-on during STEM Night. Whether tuning in virtually or joining us in person around Kannapolis, nearly 3,000 community members experienced how nutrition research connects to their everyday lives.

STEM NIGHT 2025
The NRI's first-ever STEM Night with the Kannapolis Cannon Ballers combined science, baseball, and community spirit for an unforgettable evening. More than 2,200 fans filled the stadium to experience science in action, from a dramatic liquid nitrogen demonstration to hands-on exploration with over 1,300 STEM kits provided through the NC Science Festival and NC BioNetwork. Seven mascots took over the stands, entertaining families and drawing crowds for photos, adding to the festive, high-energy atmosphere. Board member Richard Vinroot, a proud Tar Heel and NRI champion, threw the ceremonial first pitch.

The night also highlighted the collective impact of the North Carolina Research Campus. A video on the big screen showcased six academic institutes working together in Kannapolis to advance science and health. With over 50 volunteers, 100 free tickets for local children, and strong community partnerships, STEM Night left a lasting impression–celebrating discovery, inspiring future scientists, and reinforcing that the future starts here.

STEM Night featured our campus partners: NC State, UNC Charlotte, NC Agricultural and Technical State University, Rowan Cabarrus Community College and Duke University.

> "Perfect weather, high-energy mascots, and a thrilling win made for a standout evening—but the real victory was the community impact."
>
> **JASON HOLT,** NRI ADVISORY BOARD MEMBER

SWEET STREET
Each year, the North Carolina Research Campus horseshoe transforms into a festive parade of thousands of children in Halloween costumes, filling their buckets with candy from rows of decorated tents. This year, the NRI joined the fun with our Eat Uniquely tent, where every child received a set of eye-catching stickers–instant favorites among the crowd. With more than 10,000 people in attendance, we shared our mission in a memorable way through conversations, and flyers.

Between Sweet Street and the Christmas Parade, the NRI put our mission in front of more than

25,000
Community Members

CHRISTMAS PARADE
In our second year participating in the Kannapolis Christmas Parade, the NRI team proudly marched behind our mobile clinical unit, dazzling the crowd with thousands of twinkling lights. A glowing DNA strand on the back and a blow-up Ramses riding on top made the bus a true showstopper, earning a second place prize in our category. More than 15,000 people lined the streets to see our wrapped mobile unit, which highlights our precision nutrition mission and invites the community to take part in our research.

WHERE SUPPORT BECOMES DISCOVERY

Every discovery at the NRI begins with a question, and grants give our scientists the resources to find answers. In FY25, national funding agencies awarded competitive grants that will fuel discoveries in Precision Nutrition—advancing health, preventing disease, and moving us closer to truly personalized dietary guidance.

UNCOVERING THE GENETIC KEYS TO NUTRIENT METABOLISM

SERGEY KRUPENKO, PHD, PROFESSOR OF NUTRITION
SUSAN SUMNER, PHD, PROFESSOR OF NUTRITION
SAROJA VORUGANTI, PHD, PROFESSOR OF NUTRITION

Project PIs

$593,292 Award Total

Why it matters: Understanding how our genes change the way we process essential nutrients like folate could lead to personalized nutrition strategies that improve health and prevent disease.

This project explores how subtle genetic differences influence the way our bodies process folate (a vital B vitamin) and glycine (an amino acid important for many functions, from cell growth to metabolic health). Researchers are studying common variations in the ALDH1L1 gene, which are especially frequent in some populations, to understand how these changes affect nutrient metabolism and overall health. The findings could reveal why certain people respond differently to folate in their diets, offering clues for more personalized nutrition guidance and helping reduce risks for metabolic diseases.

PERSONALIZING NUTRITION TO PROTECT DEVELOPING BRAINS

SUSAN SMITH, PHD, PROFESSOR OF NUTRITION
SANDRA MOONEY, PHD, ASSOCIATE PROFESSOR OF NUTRITION

Project PIs

$479,164 Award Total

Why it matters: These findings can bring us closer to targeted nutritional therapies that protect vulnerable children and give them the best chance to thrive.

Prenatal alcohol exposure can have lifelong effects on learning and behavior, but nutrition may help soften the impact. This study explores how genetic differences in processing choline—a nutrient critical for brain development—affect whether children benefit from supplements. By uncovering which profiles respond best, researchers aim to tailor interventions that improve outcomes for children with Fetal Alcohol Spectrum Disorders and guide nutrition recommendations for at-risk pregnancies.

NOW VIEWING:
muscle tissue

Cross-University Collaboration

UNLOCKING THE GUT-BRAIN CONNECTION FOR MEMORY HEALTH

CAROL CHEATHAM, PHD, UNC-CHAPEL HILL
DAVID NEIMAN, PHD, APPALACHIAN STATE
MARY ANN LILA, PHD, NC STATE

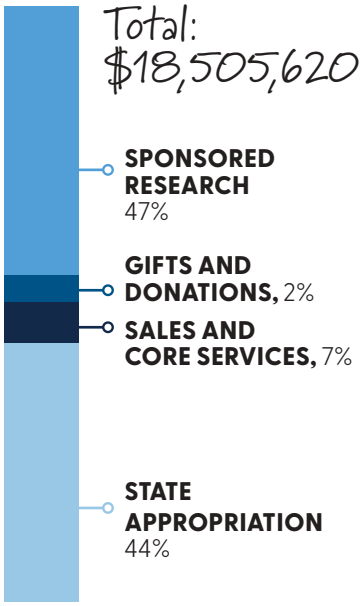
Project PIs

$563,533 Award Total

Why it matters: Identifying everyday choices that protect memory could help millions of people maintain independence and quality of life as they age.

As we age, even small changes in memory and thinking can signal the early steps toward dementia. This project investigates how simple lifestyle choices, like eating flavonoid-rich foods such as blueberries and staying physically active, work together to protect the brain. Researchers are also studying the role of the gut microbiome, which transforms plant compounds into powerful molecules that may reduce inflammation and boost brain function. By connecting diet, exercise, and gut health, this study aims to uncover practical ways to slow cognitive decline and support healthier aging.

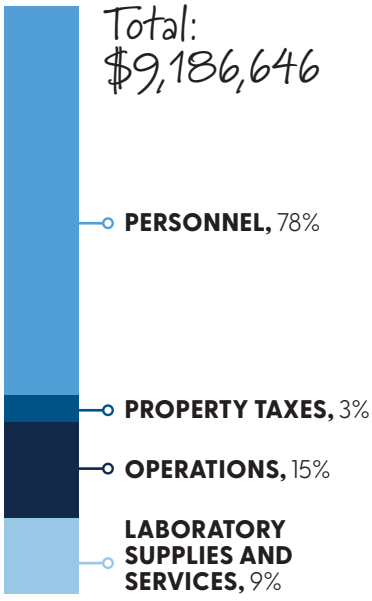
THE POWER OF YOUR INVESTMENT IN FY25



FUNDING

At the NRI, every dollar of support—whether from government, industry, or private philanthropy—fuels discoveries that improve health and strengthen our community. In FY25, total funding reached more than $18 million, with $9 million in competitive grants from national agencies. Together with the vital contributions of private donors, this investment supported 109 jobs in Kannapolis and ensured our scientists had the resources to ask bold questions and pursue life-changing answers.

Your partnership, alongside public investment, makes this growth possible. Thanks to you, the NRI is advancing the science of nutrition while helping our hometown prosper.



LOCAL EXPENDITURES

The impact extends well beyond our labs. Each dollar of National Institutes of Health (NIH) funding generates $2.64 in additional economic activity, multiplying the effect of your generosity. Local businesses benefit from our purchase of goods and services, new equipment, and the launch of innovative startups. Families drawn to this vibrant hub of science and industry have made Rowan, Cabarrus, and surrounding counties their home—shopping locally, supporting schools, and contributing to the revitalization of Kannapolis.

NOW VIEWING:
bone structure

LOCAL PARTNERS

Local partners are the vendors we purchase from and the organizations that collaborate with us on events—playing an important role in advancing our work and contributing to community growth.

Atrium Health
Barefoot Oil Company
Brother's Tire Sales
Cabarrus Regional Chamber of Commerce
Cannon Ballers
Catawba Valley Supply Company
Centerview Hardware
City Electric Supply
City of Kannapolis
Corner Crust Pizza
Desco
Duke University
Ferguson HVAC of Kannapolis
Food Lion
Gates Construction Company
GCL Development
Giovanni's Pizza
Hilbish Ford
Home Depot
Ideal Janitorial
Johnson Controls
Kings Auto Body Company
Kluttz Lumber Company
Lake Norman Printing Inc.
Lowes-Kannapolis
Napa Auto Parts of Kannapolis
North Carolina State University
North Carolina Agricultural and Technical State University
Old Armor Brewery
Pittsburgh Paints of Concord
Rowan Cabarrus Community College
Rowan Chamber
Sherwin Williams of Kannapolis
SiteOne Landscape Supply
Stitch98
Stroup Supply Co.
The Budd Group
The Slot Car Track of Kannapolis
Tipsy Hare Ciderworks
UNC Charlotte
United Refrigeration
Willie Moore Sign Decals

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