



# impact

*Advancing the business of  
biotechnology and life sciences*

**Behind the  
Biotech Buzz**

**inside:**

*Bank of America: Banking on Biotech  
Fill 'Er Up With Biofuel, Please  
Nutrition for You*

impact Magazine is published by Corporate Communication Solutions, LLC. and its impact partners.

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## *Bank of America: Banking on Biotech*

“Biotechnology is good economic, clean growth with well-paying jobs that’s a stabilizing, diversifying force in our economy.”

– Ken Vance, Bank of America

**From a micro to a macro level**, biotechnology is about life. Banking is about economic life from the micro level of an individual checking account to the macro level of investing the assets of a large corporation. With life as a point of commonality, it’s no wonder that biotechnology is becoming an increasingly important focus for Bank of America.

Ken Vance is among Bank of America’s professionals working with the biotechnology industry. From his office in Statesville, he manages Bank of America’s not-for-profit healthcare services in North Carolina. He is part of the larger global corporate and investment banking group, the division of Bank of America that includes not-for-profit and for-profit organizations in healthcare, higher education, government and other specialized industries.

“It’s prudent for us to look for opportunities that are good for our clients and shareholders, but we are also responsible for being facilitators of good economic growth,” Vance said. “Biotechnology is good economic, clean growth with well-paying jobs that’s a stabilizing, diversifying force in our economy.”

Vance works primarily with large, acute care hospitals and long-term care centers structuring funds mostly for equipment and facilities. He serves on the Biotechnology Advisory Committee for the North Carolina Biotechnology Center’s Greater Charlotte Office. The hospitals he works with are active research institutions. A critical mass of patients makes them first hand observers of medical needs and opportunities. They can leverage their research departments for their own studies or partner with universities and biotech firms to conduct research involving diagnostics, treatments or medical devices.

“You find larger hospitals have research departments that may be working on cures for leukemia or other cancers,” Vance said. “They see a lot of patients that help them identify and respond to needs. That research may result in a spin-off business.”

When a business spins-off, Vance often partners with Bill Burton. Burton manages for-profit healthcare and biotechnology clients from the Carolinas to Maryland. He oversees a variety of projects in healthcare and related scientific fields including biotechnology, medical devices and research. He and Vance are supported by approximately 60 senior professionals nationwide who specialize in healthcare and biotechnology.

Bank of America’s goal is to take companies as early start-ups and help them mature. Advising companies in their early stages helps Burton and Vance navigate their clients through a complicated pipeline of possible growth scenarios. “There are a number of pipelines out there,” Burton said. “Some of those are shorter. You may see the affect of a company in two or three years. Others have products that, after full FDA approvals, may not end up in your body for 10 years. There’s a whole set of pipelines with different exit points where a product is going to come out.”

As varied as the process can be so is the mix of companies going through it. “Some biotech or medical device companies have ideas that are not commercially viable, but they are working to get to that stage,” Burton explained. “Some will be viable as part of another entity. Some may be instantly viable upon proof of concept of their science. Some multi-million dollar drug development firms are very profitable. For the biotech firms that are profitable, they may want to move themselves into the realm with the larger drug companies.”

Facilitating is an area Vance and Burton most often find themselves. “This is not an industry sector that lends itself to a lot of debt,” Burton said. “They are science oriented and always looking for the next piece of data. The data doesn’t always come the way you want it. So you can’t lend a lot of money.

*“The options tend to multiply instead of narrow down as a company grows.”*

– Bill Burton, Bank of America

“There are a lot more options out there than management teams realize,” he said continued. “The options tend to multiply instead of narrow down as a company grows. A lot of our effort is in looking at these companies and trying to identify where the value is and giving them the options to best realize that value. We’ve had the situation where one project in a biotech company is valid on its own, and one is a good fit with a large pharmaceutical company. So you fund one and sell the other.”

Just as the pipeline for product development is varied so is the pipeline for funding. Bank of America regularly

# Behind the Biotech Buzz

“The most important thing we have to do now, the real challenge, is to expand our brand beyond RTP.”

– Emily Felt, Duke Energy

The biotech buzz is capturing a lot of headlines. Excitement about the industry abounds and hopes are high that it will live up to its promise as a sustainable source of jobs, new businesses and state revenue. One of the most promising aspects of the field is its diversity.

The diversity is driven by the fact that biotech, the use of living cells and their molecules to solve problems and make useful products, is one area of the even more diverse field of life sciences. Life sciences encompass the study of living organisms in disciplines like biochemistry, genetics, marine biology, molecular biology and plant biology.

The diversity is exactly why North Carolina invested in biotechnology 50 years ago by establishing the Research Triangle Park amidst the state’s major research universities in Chapel Hill, Durham and Raleigh. North Carolina’s return, so far, is a \$3 billion a year industry that has grown 5 to 10 percent a year since 1996.

RTP has gained international recognition, especially for pharmaceuticals. RTP’s dominance places North Carolina in the lead for biopharmaceutical job growth. The state is ranked third in the nation in biotechnology behind Massachusetts and California. RTP now has more than 157 companies in various aspects of life sciences and biotechnology.

*Emily Felt* worked as an economic development and life sciences liaison for the NC Department of Commerce in Asia before joining Duke Energy as business development manager. “One of North Carolina’s great stories is the growth of RTP. I traveled throughout Asia and told that story,” she said.



Emily Felt

“The most important thing we have to do now, the real challenge, is to expand our brand beyond RTP,” Felt said. “There’s certainly a lot of opportunity throughout the state for life science businesses to take off, but it’s not the same character in every place. Communities themselves need to look at their strengths, assets,

universities, workforce and existing industries to tell their story.”

The North Carolina Biotechnology Center (NCBC) is headquartered in RTP. In 1984, the General Assembly created the NCBC to foster the growth of biotechnology throughout the state. NCBC has launched more than 200 separate initiatives that have boosted biotech in regard to pharmaceuticals, human health, agriculture, industry, foods, natural medicines and biofuels.



Steven Burke

“Biotech has been part of a targeted policy,” said *Steven Burke*, vice president of corporate communications for the NCBC. “North Carolina with enormous prescience came to biotechnology clear that technology that deals with living organisms is well suited to a state with economic sectors based on living organisms.”

*“Innovation in life sciences is at the intersections of the disciplines. That’s where we have to be competitive.”*

– Robert McMahan, PhD, Western Carolina University

Biotech is in a time of transformation where scientific specialties and advancing technologies are merging. “Innovation in life sciences is at the intersections of the disciplines. That’s where we have to be competitive,” said *Robert McMahan, Ph.D.* and head of Western Carolina University’s Kimmel School of Construction Management and Technology.

McMahan, who served as the senior advisor for science and technology to the State of North Carolina and the executive director of the North Carolina Board of Science and Technology before accepting his current position, notes medical devices, nanotechnology, nanobiology and systems biology as areas with the most promising intersections. Those intersections are occurring all over the state, broadening as Felt puts it, North Carolina’s biotech brand.

# Behind the Biotech

## NANOTECHNOLOGY

Nanotechnology is a building block to the Charlotte region's science industry. Nanotechnology takes science and discovery to the molecular if not atomic level where scientists work with materials thinner than human hair. Already, renowned scientists at UNC-Charlotte and Carolinas Medical Center's Cannon Research Center in Charlotte are studying the production of polymers and biomaterials. Their ongoing research has implications for new medicines and medical treatments.

Nanotechnology has future potential for manufacturing as well, especially in the electronics and coatings industries, but it isn't a science of the future. At least 11 companies around Charlotte -- from a total of 58 in the state -- are listed on NCnanotechnology.com. They represent groundbreaking nanotech applications in different industries. Accuflex in Gastonia, for example, is the first to bring "nano shaft technology" to the marketplace. By working with the composites at the nano-level that make up the shaft of a golf club, the molecular structure is stronger and the surface area increased resulting in a denser yet lighter club shaft.

MMFX Technologies Corporation in Charlotte produces steel that is proven to be stronger than typical steel and more resistant to corrosion. These properties enable engineers to use less MMFX steel on projects reducing costs. Ziptronix in Mooresville created a scalable 3D technology that reduces production costs and increases the speed and performance of integrated circuits. INI Power Systems, also in Mooresville, is perfecting a methanol micro-fuel cell for the military and consumer electronics.

## NANOBIOLOGY

The Triad, the 12-county area around Forsyth where Winston-Salem is located, is gaining a reputation for nanobiology. Pioneered by Dr. Anthony Atala, tissue engineering is getting close to commercial application. The Wake Forest Institute of Regenerative Medicine (WFIRM) is discovering ways to take a person's cells and grow replacement organs and body parts in the laboratory that can be surgically implanted in the patient where, without concerns for rejection, they grow and attain normal functionality. Tengion, a company formed from WFIRM, is focused on clinical trials on bladder augmentation to reconstruct damaged or diseased bladders. Blood vessels and

kidneys are other products that Tengion is developing. For people needing transplants or with diseases that damage tissue, this technology may one day save their lives.

The Triad's focus on nanobiology will be supplemented by the construction of a 200-acre research park in downtown Winston-Salem and the development of a NC Center of Innovation in Nanobiotechnology made possible by a grant from the NCBC and collaborations between UNC-Greensboro, NC A&T and Wake Forest University.

## MEDICAL DEVICES

Medical devices are another emerging field in the Charlotte region. East Carolina University is a pioneer. "The eastern part of the state around Greenville is very fortunate to be the home of ECU medical, pharmacy and dental schools. The school is a tremendous asset," Felt said. "Eastern North Carolina has facilities doing research, a manufacturing base and contract pharmaceuticals."

ECU is a global training center for the DaVinci surgical system that uses robotics to make minimally invasive heart surgery possible. The opening of the \$34 million East Carolina Heart Institute – a partnership between ECU and University Health Systems of Eastern Carolina – will further research on heart disease and medical devices. ECU has also pioneered gastric bypass surgical technology, and is one of six National Institute of Health centers to study obesity, metabolic disorders and develop surgical standards for treatment.

## BIOINFORMATICS

The newer field of systems biology has possibilities, too. Systems biology combines other scientific fields to study entire biological systems instead of reducing systems to their parts. The approach is being used by NC State for cancer and Alzheimer's research and to improve the nutritional value of crops. This type of study depends on bioinformatics, the application of computational technology to solve biological problems. UNC-Charlotte's Bioinformatics Research Center, as part of the Charlotte Research Institute, integrates numerous disciplines like applied mathematic, statistics, computer science and several other sciences to analyze and generate digital images of data that previously were too complex for the human mind.

# Behind the Biotech

behind the biotech buzz *continued from page 5*



Robert McMahan, PhD

Both NC State and UNC-Charlotte are key players in the use of systems biology and bioinformatics on the NC Research Campus in Kannapolis. The \$1.5 billion investment by billionaire David Murdock, owner of Dole Foods and Castle & Cooke, Inc., to build the research campus gives the Charlotte area one of the largest biotechnology centers in the nation.

"The NC Research Campus is as bold as RTP was 50 years ago. It's a tremendous asset to market right now. The campus setting is bringing together world-class researchers focused on the particular sub-cluster of nutrition and human health," Felt, the Duke Energy business development manager said.

## MARINE RESOURCES

With the state's coastline stretching more than 300 miles, marine research is a natural scientific area for North Carolina. Marine-based businesses are already growing fish in on-shore tanks and cultivating microorganisms for pharmaceutical research at the new Marine Biotechnology in North Carolina (MARBIONC) incubator housed at the Center for Marine Science at UNC- Wilmington.

*"Molecular-level research techniques are yielding new insights into how populations interact"*

– Cindy Van Dover, Duke University Marine Lab

NCBC is funding the development of a Center of Innovation in Marine Biotechnology. Duke University has a Marine

Lab in Beaufort where it conducts studies on marine ecology, the fisheries industry, marine mammal populations and more. Through a recent endowment, the Marine Lab will move into the field of molecular biology.

"Molecular-level research techniques are yielding new insights into how populations interact and how organisms respond to changing environmental conditions," observed Marine Lab Director *Cindy Van Dover* in a news release. Van Dover's goal is for the Marine Lab to become a leader in marine conservation molecular biology.

## NATURAL RESOURCES

Dry land presents more possibilities for biotechnology. *Ray White*, vice president of Northeast North Carolina's Commission, the 16-county region from Halifax to Dare counties, names agriculture and nutraceuticals, extractions from crops for medical purposes, as their main asset. "We can grow, manufacture and distribute right here because of our abundance of land," White said. "That keeps businesses from going to Iowa or somewhere out West."

Abundant land isn't their only resource. The Vernon G. James Research and Extension Center focuses on improving agricultural resources. *Ventria Bioscience* is growing rice and extracting lactoferrin and lysozyme, both proteins found in breast milk, tears and saliva. The proteins have medicinal applications because of their antibacterial, anti-viral, anti-fungal and antioxidant properties. *Avoca, Inc.* is a botanical processing company internationally known in the fragrance market that is emerging in the dietary supplement market.

"Farmers have the opportunity to increase the price their products will bring and drive new innovations in biotechnology," White said. "If we can make it more worthwhile in terms of money, sons and daughters would continue to maintain their family's heritage instead of going into other industries."

Where crops grow, biomass, like woodchips, canola and grasses, is available for fuel production. *Agri-Ethanol Products* is planning a \$150 million ethanol plant in Beaufort County that is slated to produce 114 million gallons per year.

Western Carolina is looking at their natural resources in terms of medicinal plants and herbs, forestry, and agricultural to apply molecular biology, chemistry, bioinformatics and molecular modeling to bring new products to market.

# Buzz

“The biodiversity in western North Carolina is second only to areas in South America,” said *Dale Carroll*, executive director of Advantage West, the economic development corporation for the 23 counties of western North Carolina. “With such rich biodiversity, we have a big emphasis on native botanicals and natural products. We really believe based on our biodiversity that we can be a world leader in natural products.”

With the support of Western Carolina University, Appalachian State University, Biltmore Farms and the NC Arboretum, the Bent Creek Institute (BCI) will study the effectiveness of native plants for new medical treatments. BCI will have the nation’s first genetic repository, a germplasm, for medicinal plants. Using biotechnology, BCI staff will study plants like bethroot, part of the trillium family, and other botanicals once used by the Cherokee Indians to understand their chemical properties and medicinal benefits.

## THE BIO-BUSINESS CLIMATE

Sustaining biotechnology comes down to a skilled workforce. North Carolina has the strength of its university and community college systems. BioNetwork is a part of the North Carolina Community College System that offers associate degree and certificate programs for people entering biotechnology and worker training programs for companies in the industry. BioNetwork also offers hands-on biomanufacturing training at their Capstone Training Center, assistance for small businesses and seminars and workshops.

“North Carolina is positioning itself as a great state for biotech companies,” said *Matthew Meyer*, executive director of BioNetwork. “The human resource piece is something we directly impact. We’re improving day by day as the place for bioscience workplace development.”

Along with education and training, the state’s business climate is positive. “The cost structure is very favorable, the economic environment is very pro-business and the labor costs are reasonable,” *Felt* said. “Government entities understand the importance of permitting in a timely manner. We have the infrastructure here. We have a good team.” **i**



Field test in northeast North Carolina

## FOR MORE INFORMATION, PLEASE VISIT:

AccuFlex [www.accuflex.com](http://www.accuflex.com)

Advantage West [www.advantagewest.com](http://www.advantagewest.com)

Avoca, Inc. [www.avocainc.com](http://www.avocainc.com)

Biltmore Farms [www.biltmorefarms.com](http://www.biltmorefarms.com)

BioNetwork [www.bionetwork.org](http://www.bionetwork.org)

Carolinas Medical Center’s Cannon Research Center

[www.carolinas.org/research/cannon/](http://www.carolinas.org/research/cannon/)

Charlotte Research Institute

[www.charlotteresearchinstitute.com](http://www.charlotteresearchinstitute.com)

Duke Energy [www.duke-energy.com](http://www.duke-energy.com)

Duke University Marine Research Lab

[www.nicholas.duke.edu/marinelab/](http://www.nicholas.duke.edu/marinelab/)

East Carolina Heart Institute [www.uhseast.com](http://www.uhseast.com)

MARBIONC [www.uncwil.edu/cmsr/marbionc.html](http://www.uncwil.edu/cmsr/marbionc.html)

MMFX Technologies Corporation [www.mmf.com](http://www.mmf.com)

NC Arboretum [www.ncarboretum.org](http://www.ncarboretum.org)

NC Biotechnology Center [www.ncbiotech.org](http://www.ncbiotech.org)

NC Board of Science and Technology

[www.ncscienceandtechnology.com](http://www.ncscienceandtechnology.com)

NC Community College System [www.ncccs.cc.nc.us](http://www.ncccs.cc.nc.us)

NC Nanotechnology [www.ncnanotechnology.com](http://www.ncnanotechnology.com)

NC Research Campus [www.ncresearchcampus.net](http://www.ncresearchcampus.net)

NC University System [www.northcarolina.edu](http://www.northcarolina.edu)

Northeast North Carolina Commission

[www.ncnortheast.com](http://www.ncnortheast.com)

Piedmont Triad Research Park [www.ptpr.org](http://www.ptpr.org)

Piedmont Triad [www.piedmonttriadnc.org](http://www.piedmonttriadnc.org)

Research Triangle Park [www.rtp.org](http://www.rtp.org)

Tengion [www.tengion.com](http://www.tengion.com)

Vernon G. James Research and Extension Center

[www.ces.ncsu.edu/plymouth/](http://www.ces.ncsu.edu/plymouth/)

Ventria Bioscience [www.ventriabio.com](http://www.ventriabio.com)

Wake Forest Institute for Regenerative Medicine

[www.wfirm.org](http://www.wfirm.org)

Ziptronix [www.ziptronix.com](http://www.ziptronix.com)

## Fill 'Er Up With Biofuel, Please

"What's become clear is that we needed to be in the business of matching biotechnology with whole sectors of society."

– Steven Burke, NC Biotechnology Center

**In January**, two organizations came into being that marked the first step toward the formalization of a biofuels industry in North Carolina. The non-profit Biofuels Center of North Carolina opened in Oxford, the result of a statewide strategic plan with the goal of fostering the industry's growth. A group of biodiesel companies launched the NC Biodiesel Association to better promote the availability and advantages of biodiesel.

The NC General Assembly funded the biofuels strategic plan allotting \$5 million to start the Biofuels Center. The Biofuels Center is charged with enacting the statewide biofuels plan. One main goal is to have 10 percent of all liquid fuels sold in North Carolina generated from biofuels grown and produced in the state by 2017. That's 10 years to create an industry.

"It's a numerically audacious goal," said Steven Burke, vice president of corporate communications for the NC Biotechnology Center and chairman of the Biofuels Center's board of directors. "Over 5.6 billion gallons of liquid fuel a year are used in North Carolina for all purposes. Optimistically, two million gallons of biodiesel were produced in the state in the same time period."

The focus is on building a leading biofuels industry. Goals centered on education and sustained commitment from state leaders and the public are crucial to that effort. The establishment of a statewide biofuels commission that will be responsible for creating the "road map" to coordinate the research, production and commercialization of biofuels through-

out the state is another goal. A key strategy is to expand science and research through public-private partnerships that will create an Advanced Biofuels Acceleration Facility that will move research on feedstocks forward.

"What's become clear is that we needed to be in the business of matching biotechnology with whole sectors of society," said Burke. "The state, although very strong in agriculture, curiously did not have a policy or vision to better develop biofuels. It was an economic and strategic liability when other places are aggressively working with more resources than we had committed. A strategic determination was made last year to cultivate capabilities to develop and sell biofuels, biodiesel and ethanol."

*"Using biofuels in the engine is a win-win for North Carolina."*

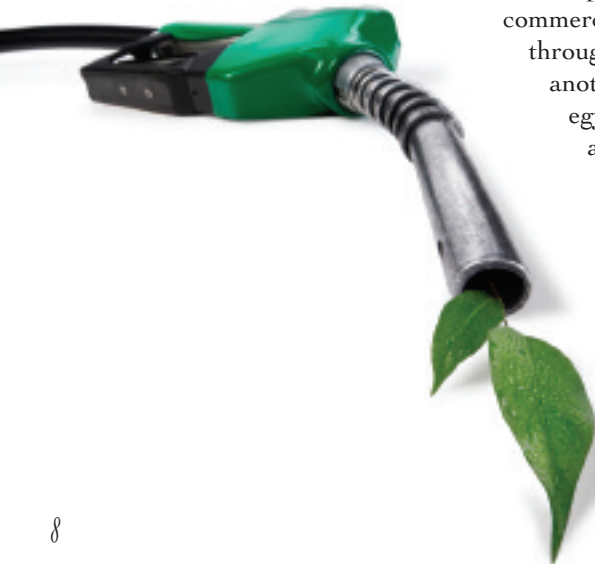
– Norman Smit, Biofuels Center of North Carolina

"We're acting as technology accelerator," said Norman Smit, marketing and communications director for the Biofuels Center. "We're hoping to give a kick start with a range of different eventualities from workforce training to research and grants and loans. We'll eventually fund analytics so that people can test whether or not the fuel they are researching matches the specifics they need."

The NC Biofuels Association counts biodiesel producers, distributors and retailers and industry leaders in its membership. They plan to reach out to more educators, workforce development specialists, engineers, consultants, contractors, law firms and financiers who will form the larger industry support system.

They are in an organizational phase, which includes defining position statements regarding sustainability and fuel quality. They've already held a statewide conference, and applied for funds from the Biofuels Center's first round of grants. They are planning their approach to the NC General Assembly to lobby for incentives that will support the industry's growth.

Despite the NC Biofuels Association's steps forward, feedstock is a major stumbling block. New strains of crops are needed that can be converted into fuels more efficiently to realize the goal of a new industry. Paul Knott is the curriculum coordinator for the BioNetwork BioBusiness Center at the Asheville-Buncombe Technical Community College in Candler. He's worked closely with the start-up



# Emerging Frontier

of the NC Biodiesel Association and serves on their board of directors.

“It’s the number one critical problem,” he said. “There’s no renewable, affordable feedstock that allows them (the biodiesel producers) to be profitable. We’re competing on price with petroleum diesel. The cost of feedstock keeps going up. There’s competition for all of these products.”

This is why one of the first focuses of the Biofuels Center is to develop a new body of research. “Very little research has been done relative to North Carolina,” said Smit. “The research is specific to the mid-West. For the first generation of fuels, we want to identify crops and feedstocks that are viable for this part of the U.S.”

North Carolina has several crops that are possibilities—canola, switchgrass, hulless barley, coastal Bermuda grass, industrial sweet potatoes and miscanthus. Poultry and pig farms and industries provide animal wastes that can be turned into biodiesel, which is made from fats. Wood products and even algae are additional fuel sources.

“First, we have virgin products like canola or soy oil that haven’t been used before,” said Knott. “Second we can use animal fats. Poultry processing plants have a level of fat that comes from the processing of hens. Fry oil from a food establishment or trap grease that a restaurant owner pays to have hauled away. Less refined sources of fats are what biodiesel is made from. Algae are not available. Algae are very hot right now. There are questions about the production, finding the right species and how to harvest it with the least cost and most efficiency.”

Regardless of the fuel source, there are questions concerning the development of production facilities and distribution capabilities. One plant is certified and has broken ground. There are several companies producing fuels. The ideal scenario is regional production and distribution facilities supplied by groups of local farmers.

Using farmland for fuel crops is yet another dilemma. “People who have been successful and continue to be are trying hard to use recycled products. There’s a little more margin,” Knott said. “That may be the answer to the dilemma we face with crops being grown for the food chain and the fuel chain. When there’s demand for both, there’s a dwindling supply and increased prices. We need alterna-



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tives so we don’t have to choose between growing fuel and growing food.”

The one problem biofuels does not have is demand. According to the Energy Information Administration of the US government, ethanol production in 2005 totaled 3.9 billion gallons or 2.9 percent of the total gasoline pool. In 2006, preliminary data showed an increase to 5.4 billion gallons. The NC Biodiesel Association released that biodiesel is the fastest growing alternative fuel in the US market with production up to 250 million gallons a year tripling between 2005 and 2006.

Biofuels have a number of environmental benefits and will lessen dependence on foreign petroleum. “If you’re driving a modern diesel, you can run 100 percent biodiesel in it, and actually get more out of it. It’s clean burning and has a pleasant aroma,” Smit said. “Using biofuels in the engine is a win-win for North Carolina to supply a fuel that’s made here.”

“How often does the State have the opportunity to create a new sector,” Burke said. “We have the fields, farmers, and people. We can have an impact on all users and all tanks where the fuel goes.”

If all goes as planned, North Carolinians will feel that impact by 2017. 

For more information,  
visit [www.biofuelscenter.org](http://www.biofuelscenter.org).

## EMERGING FRONTIERS

# Nutrition For You

“Alertness and response time between people, for example, will make them more or less in need of different nutrients to optimize their cognitive brain performance.”

– Dr. Steven Zeisel, UNC-Chapel Hill Nutrition Research Institute

**Figuring out people’s genetic codes** may one day unlock the mysteries of why metabolisms and nutrient requirements differ from person to person. After all, every person has their own version of the genetic code, and in their code could be as many as 50,000 mistakes.

“There are junk places, like junk DNA, that mostly don’t make a difference, but some do when it comes to a person’s metabolism,” said *Dr. Steven Zeisel*, director of the University of North Carolina at Chapel Hill’s Nutrition Research Institute (NRI) at the NC Research Campus in Kannapolis.

NRI will focus its studies on the application of the modern science of genomics and the newer field of metabolomics. Nutrigenomics is the study of how nutrition changes how genes work and how genes change nutrient requirements. Metabolomics is the simultaneous measurement of thousands of chemicals in blood or urine that more completely describes individual metabolism.

With the knowledge gained from research in nutrigenomics and metabolomics, individualized approaches to nutrition that enhance a person’s health and prevent diseases will be developed based on their DNA and metabolism. Ziesel is planning to take individualized nutrition to the point that it unlocks the secrets of brain development and the cures for diseases like Alzheimer’s, diabetes, obesity, eating disorders and cancer. This will make today’s one-size fits all approach of average daily recommendations inadequate. As an internationally recognized leader in nutrition research, Ziesel is dedicated to establishing the NRI as a world class center focused on making the era of individualized nutrition a reality.

As part of the NC Research Campus, Zeisel will be collaborating with like minds that also are doing their part to understand nutrition as a way to prevent, treat and cure diseases. The NC State Institute for Fruit and Vegetable Science is studying ways to increase the nutritional quality and yields of crops. UNC-Greensboro is researching bioactive food components like lycopenes and flavonoids and their nutritional benefits. North Carolina Central University is bringing their program on Transgenic Zebrafish to study nutritional models for brain development, cardiovascular disease, obesity, neurological disorders and cancer. As part of their School of Agriculture and Environmental Sciences, NC A&T is establishing the Center for Post Harvest Technologies that will look at nutritional requirements and other issues regarding foods from harvest to distribution.

The NC Research Center offers another distinct advantage- the 311,000 square foot David H. Murdock Core Laboratory Building. The David H. Murdock Research Institute will own the core lab and its highly specialized equipment and laboratories. David Murdock, owner of Castle and Cooke, Inc. and Dole Foods, is the visionary behind the NC Research Campus. The core laboratory will be home to the Dole Nutrition Institute, a partner with the NRI and NC State in research on nutrition, fruits and vegetables.

Existing research is paving the way for Zeisel. Studies already link changes in nutrients to changes in mental performance. “Alertness and response time between people, for example, will make them more or less in need of different nutrients to optimize their cognitive brain performance. So we will have a whole group working on nutrition in the brain,” he said.

Ziesel has successfully found links between brain development and nutrients in his own research. His areas of expertise include dietary requirements for the nutrient choline, the effects of choline in fetal brain development and overall brain development and cognition. Choline is a nutrient only recently identified as essential. Zeisel is the principal investigator for a clinical study funded by the National Institute of Diabetes and Digestive and Kidney Diseases to identify the recommended daily allowance for choline.

Zeisel and his research partners have found that choline deficiencies in the diets of pregnant women effect hippocampal development, areas of brain that are crucial to long-term memory. Low levels of fetal choline can lessen memory functions throughout a person’s life. Other research Zeisel participated in shows that organ dysfunctions in adults can result from diets deficient in choline.




# Emergi

Zeisel participated on the panel for the World Cancer Research Fund and the American Institute for Cancer Research's *Food, Nutrition and the Prevention of Cancer: a global perspective*, the most authoritative source on the links between nutrition and cancer prevention. His research on brain development is funded by the National Institute of Aging, and his work on cognition by the Gerber Foundation.

This summer, NRI will move to a 96,000 square foot facility that is part of one of the state-of-the-art research buildings on the NC Research Campus. The NRI's building will be the second facility to open after the core lab. The first floor of the NRI's facility will contain a café, a metabolic kitchen and an outpatient clinical examination suite for dietary studies. The second floor will feature conference facilities for seminars, NRI administration and a behavioral testing suite designed to study brain function in people. All four floors will have laboratories.

Zeisel is recruiting scientists from around the world to fill research positions. He already has a staff consisting of a deputy director, director of community outreach, office manager, grants specialist, accounting specialist and administrative assistant in place in temporary offices in downtown Kannapolis. The staff is estimated to grow to over 300 faculty and staff.

Duke University and UNC-Charlotte, BioMarker, Angiogen, LabCorp, CMC-NorthEast Medical Center and Cabarrus Family Medicine are examples of other organizations and companies that will occupy a portion of the million square feet of lab and office space that are available on the NC Research Campus. Training and workforce development will be available through the NC Community College System with specific representation from Rowan Cabarrus Community College and BioNetwork. 

**For more information about NRI, visit [www.uncnri.org](http://www.uncnri.org) or call 704-250-5000. For more information about the NC Research Campus, visit [www.ncresearchcampus.net](http://www.ncresearchcampus.net)**

## Bank of America *continued from page 3*

assists firms with their initial public offering or IPO. Before firms reach that point, they start with angel investors and venture capital firms. Angel investors primarily provide seed capital. Vance points out that for some biotech firms, angel investors are their family, friends, and credit card companies.

"Venture capital is a more formalized partnership investing in later stage companies," Burton said. "Angel investors will be in the single digit millions or even less than a million. Venture capital could get into nine figures with an investment of three to seven years before they expect some liquidity event to realize the value on their investment."


"Some companies may have two to three rounds of venture capital," Vance said. "One may be a group that specializes in a firm's science. A second might be a mix of investors that gives them exposure, and a third might have an international flair so that when they are ready to go public they are not just traveling to New York or Boston, but they could go to Paris or London to find the entities to buy into their science."

Regardless of a firm's investment partners, Bank of America offers some advantages. "Because of our size and national presence, we have resources that other banks don't have," Vance said. "We can leverage residential services, wealth management advisory services, and help the scientists uphold their fiduciary responsibility until they finish their research. Once the research reaches a certain point, we can help the companies continue to grow, merge, be acquired, or go public."

"We have colleagues at Banc of America Securities that spend a lot of time looking at this industry, colleagues in risk management that have a history in life sciences and biotechnology, and colleagues in for-profit healthcare in Boston, San Francisco, Houston, Nashville, and Chicago that have touched on the different issues we see here," Burton added. "We're able to draw on all of these resources and understand the industry better."

North Carolina's strength in biotech is the critical mass of biotech companies and research institutions anchored in the Research Triangle Park. Biotech is growing reaching to Winston-Salem and Kannapolis and stretching from the mountains to the coast. Still, many of the state's largest firms like Merck and GlaxoSmithKline have been imported. Large homegrown firms haven't emerged yet, but Burton predicts that will change within a couple of years.

For Vance, continuing to spur the industry's growth is essential. "Biotechnology complements existing industries like tourism, healthcare, and manufacturing and helps lessen the out migration of jobs from communities by providing well-paying, highly skilled jobs," he said. "There's a lot of community pride, activity and stability that comes from that can kind of disposable income."

The long-term benefits of biotechnology start with finding the value in the small start-up companies with a good idea. "At the end of the day," Vance said, "companies are looking for people like us who can bring them value, understand what they're going through, and know what it's like to start-up a biotechnology business." 

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