ON THE COVER:
Every year, UNMC honors outstanding researchers and names one the Scientist Laureate. Alexander “Sasha” Kabanov, Ph.D., D.Sc., is the fourth to receive that honor.

A GIANT IN A SMALL WORLD
Polymers, micelles and nanogels – tiny particles in nanomedicine – have made UNMC’s new Scientist Laureate a leader in the field.

SCIENTISTS HONORED FOR ACCOMPLISHMENTS
UNMC names 22 researchers to this year’s honor roll of Distinguished Scientists and New Investigators. Page 10

ON A MISSION TO SAVE SMILES
The genes associated with cleft lip and palate have been isolated. Now a UNMC researcher wants to stop the birth defect in its earliest stages.
DEFUSING A TIME BOMB
The only treatment for patients with small aortic aneurysms is a wait-and-see game. That may soon change.

NEW HOPE FOR PARKINSON’S DISEASE
People with this debilitating disease have new hope in a vaccine recently developed at UNMC.

STEPS TOWARD HEALTHIER INFANTS
One man dedicates his research career to reducing health disparities in high-risk patients. Page 16

SUCCESS COMES IN PAIRS
Working together is success – that’s what one researcher found when she teamed cardiac patients with their spouses in an exercise program.

NEW TECHNOLOGY TO DIAGNOSE A KILLER
Collaboration between a chemical engineer and an infectious disease physician creates an innovative way to diagnose tuberculosis. Page 20

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RESILIENCY, INNOVATION KEY TO SUCCESS

UNMC scientists have shown themselves to be extraordinarily successful at obtaining, keeping and increasing their research funding in difficult times, when competition has been at a very high level. As a result of their excellent work, UNMC researchers are well-established internationally, over a wider spectrum of biomedical problems than ever before.

We have celebrated this upward trajectory annually for more than a decade now – and this year has been no exception. I recently told the University of Nebraska Board of Regents that we topped $106 million in grants and contracts in 2008-09 – a new record – and that we were poised to do even better in 2009-10.

Part of the current success is the result of the economic stimulus package that gave a big boost to the National Institutes of Health (NIH), which the UNMC corps of researchers leveraged into a package of more than $20 million in research and infrastructure support. Although one of next year’s concerns is the possible fiscal cliff we will face after the stimulus dollars are spent, I believe we have a way to attenuate the danger.

First, the projects submitted by UNMC scientists will be competitive in the open, peer-review process. We achieve a significantly higher than average success rate for NIH funding (this remained true during the stimulus package competition) and I expect that success to continue. The projects started or expanded under the stimulus package give our scientists new directions for further success.

Second, the stimulus dollars we received for research equipment and renovations give us an improved infrastructure platform, which leads to more and better research. This is the pattern we have established, for example, with the new research facilities in the Durham Research Center and Durham Research Center II.

Third, President Obama has promised to make cancer research a national priority, a strategy that plays directly to UNMC: about half of our work is in cancer. We are poised to take optimum advantage of the convergence of this national priority with one of our strengths.

Only time will tell, of course; but the UNMC research community’s recent history of persistence, resilience, great innovation and boundless energy make me very optimistic that we will surpass our goals.

Tom Rosenquist, Ph.D.
UNMC Vice Chancellor for Research

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Until the flood of 1988, few had paid attention to cleft lip and palate in the rural hillsides of Bangladesh.

That changed when Ali Nawshad, D.D.S., Ph.D., arrived to help with relief efforts.

The young dental student was struck by the number of children he saw with the deformity. Suddenly, his plans to practice dentistry seemed insignificant.

“I realized then that I wanted to study craniofacial deformities,” said Dr. Nawshad, associate professor and researcher in UNMC’s College of Dentistry.

Twenty years after that fateful flood, he received a $1.8 million grant from the National Institutes of Health to continue his work to eliminate cleft palate in fetuses.

Cleft lip and palate occurs when the palatal shelves in the roof of the mouth fail to grow and fuse. “Although it is not life-threatening, it does disrupt feeding, digestion, speech, hearing and respiration,” he said.

It also can lead to emotional, psychological, social and learning problems and is an economic burden amounting to $1 billion in health care costs annually in the United States, according to the January 2006 Morbidity and Mortality Weekly Report from the Centers for Disease Control and Prevention.

Dr. Nawshad has spent the past decade studying – first at Harvard Medical School with renowned embryologist Elizabeth Hay and now at UNMC – how to fix cleft palate in children before they are born.

Dr. Nawshad has identified a major gene that is essential to normal palatal development called Transforming Growth Factor β (TGFβ).

“If you knock out this gene in mice, they are always born with cleft lip and palate and no other deformity,” Dr. Nawshad said.

Although TGFβ had been implicated in palate development, Dr. Nawshad has identified the pathways that TGFβ uses during palate development. He also learned there are lesser, but just as important, genes essential for normal palate development.

“Our goal is to reintroduce those genes into the pups of pregnant mice to determine if the deformity can be corrected in the womb,” Dr. Nawshad said.

While the rates of cleft lip and palate are still high in Bangladesh, he said, the highest incidence is among American Indians, as well as the indigenous people of South America. The lowest incidence rates are in African-Americans.

“As we better understand the basic science of cleft palate, we can improve the lives of children around the world,” Dr. Nawshad said.
College of Pharmacy moves up in research rankings

The UNMC College of Pharmacy now ranks fourth nationally among 110 pharmacy schools in funding per researcher from the National Institutes of Health (NIH). The college moved up two spaces from sixth last year.

The rankings – compiled annually by the American Association of Colleges of Pharmacy (AACP) – show that the College of Pharmacy’s doctoral-level investigators collectively received more than $6.6 million in NIH funds in 2009. That is a 31 percent increase in NIH funds from 2008, when the college’s researchers collectively brought in about $5 million.

UNMC also moved up to No. 16 from No. 23 in terms of total awards received by its investigators.

“This is an outstanding accomplishment,” said Courtney Fletcher, Pharm.D., dean of the UNMC College of Pharmacy. “It is the result of the creativity, persistence and dedication to improving human health on the part of everyone in the college.”

UNMC among top 40 best workplaces for postdocs

Postdoctoral fellows love UNMC so much that they ranked the medical center in the top 40 “Best Places to Work for Postdocs” in the United States.

The Scientist magazine, which published rankings in the March issue for U.S. and international institutions, surveyed postdocs around the world.

“This affirms the progress we’ve made to provide a good environment for postdocs,” said Iqbal Ahmad, Ph.D., associate dean and director of postdoctoral education and research at UNMC. “Being ranked among the top 40 will help us attract the best and brightest postdocs.”

Ranked 39th, UNMC was one of 11 comprehensive academic health science centers on the list.

UNMC has 120 postdocs from all over the world, the majority from India and China. They work with mentors in laboratories for two to five years.

Dr. Ahmad said UNMC was the first institution in the United States to mandate a minimum salary level for postdocs and was among the few in the nation to offer these benefits:

- A series of workshops on scientific and grant writing and public speaking; and
- Travel fellowships and awards to facilitate comprehensive training and encouragement toward an independent career.

UNMC receives $16 million in earmarks for research

UNMC secured more than $13.6 million in direct earmark funds, plus $2.4 million as part of a collaboration to support research projects for the 2010 federal fiscal year.

The efforts of UNMC’s research corps and support personnel such as Paula Turpen, Ph.D., and government relations specialists Mark Bowen, and Sara Czepa Going, J.D., were key to this funding success, said Tom Rosenquist, Ph.D., vice chancellor for research.

Members of Nebraska’s congressional delegation – in particular U.S. Sen. Ben Nelson and U.S. Rep. Jeff Fortenberry – deserve praise for their efforts to help UNMC secure the funds, Dr. Rosenquist said.

Dr. Oakley receives grant from American Cancer Society

Reg Oakley, Ph.D., a cancer researcher at the UNMC College of Dentistry, has received a four-year $720,000 grant from the American Cancer Society to study DNA damage and how cells repair themselves.

Dr. Oakley studies the process by which cells, good or bad, are damaged by chemotherapy and looks for ways to protect the healthy cells. He hopes to do this by targeting a protein called Replication Protein A (RPA).

“Once a cell is damaged, RPA jumps into action to begin the repair process by recruiting other proteins,” Dr. Oakley said. “If we can find a way to inhibit the activation of this protein in cancer cells, then it could be a useful target for cancer therapy.”

Dr. Oakley, who has degrees in toxicology and pharmacy, came to UNMC in 2006 from the University of Cincinnati Medical Center where he first studied RPA in 1996.
Drs. Larsen, Kratochvil to lead clinical research efforts

Jennifer Larsen, M.D.  Christopher Kratochvil, M.D.

To help bolster its clinical research enterprise, UNMC has appointed Jennifer Larsen, M.D., as associate vice chancellor for clinical research. She will work with Christopher Kratochvil, M.D., who has been named assistant vice chancellor for clinical research and chief medical officer of UNeHealth Corporation.

Dr. Larsen is the Louise and Morton Degen Professor and chief of diabetes, endocrinology and metabolism at UNMC. She has served as associate dean of clinical research in UNMC’s College of Medicine since 2006 and director of the Center for Clinical and Translational Research since 2007. She also is founder and leader of the Clinical Research Center at The Nebraska Medical Center.

Dr. Kratochvil, professor of psychiatry, will lead the expansion of contract-related clinical research on campus. UNeHealth is a not-for-profit entity formed to coordinate clinical opportunities between UNMC, UNMC Physicians and The Nebraska Medical Center. The goal of UNeHealth is to streamline all aspects of clinical research, such as contracting, IRB approval and support by clinical research associates.

Study shows common farm chemicals may pose risk for thyroid disease

A recent UNMC study has found that farm women who work with common pesticides have a greater risk of thyroid disease.

During the Agricultural Health Study, a long-term study of licensed pesticide applicators, UNMC researchers found 12.5 percent of the farm women studied had thyroid disease compared to 1 percent to 8 percent in the general population.

The researchers evaluated five commonly used insecticides and 39 other pesticides in the study, which was published in the American Journal of Epidemiology.

“There is increasing evidence that environmental exposure to pesticides should be considered a potential risk factor for thyroid disease,” said Whitney Goldner, M.D., assistant professor in the UNMC Department of Internal Medicine and one of the paper’s authors.

The study was sponsored by the National Institute of Environmental Health Sciences and the National Cancer Institute and evaluated data of 16,529 women married to farmers licensed to apply pesticides in Iowa and North Carolina.

The study is the first and largest to show an association between pesticide exposure and thyroid disease.

UNMC kicks off new outreach program

UNMC has launched a new outreach program, UNMC Simply Science, to share the latest in health care information to communities across the state.

“An essential component of our mission is to serve the citizens of the state of Nebraska, and we think UNMC Simply Science is an exciting new mechanism through which we will do that,” said Bob Bartee, vice chancellor for external affairs at UNMC.

As part of UNMC Simply Science, faculty members travel to different regions of the state and present on various topics of health care. The program, launched in southeast Nebraska, also provides a greater understanding of how UNMC can better serve the communities.

Visits will take place four times per year to different corners of the state with travel sponsored by Blue Cross and Blue Shield of Nebraska.

For more information, visit www.unmc.edu/publicrelations/simplyscience.htm.

“THERE IS INCREASING EVIDENCE THAT ENVIRONMENTAL EXPOSURE TO PESTICIDES SHOULD BE CONSIDERED A POTENTIAL RISK FACTOR FOR THYROID DISEASE.”

Whitney Goldner, M.D.
articles that revolutionize drug delivery live in a world 1,000 times smaller than the head of a pin.

Alexander “Sasha” Kabanov, Ph.D., D.Sc., strode into that world of nanomedicine before the term had even been coined. More than 25 years ago, he discovered two fundamental concepts for the field – polymer-based gene delivery and polymeric micelles that can introduce genes and drugs to kill cancer cells.

His internationally-recognized work is in novel drug delivery systems that cross the blood brain barrier to treat cancer and neurodegenerative diseases and use polymer-based nanotechnologies to carry drugs and DNA to targeted sites.

His work with amphiphilic block copolymers, which protect drugs in the bloodstream until delivered to the target cell, to overcome multi-drug resistance in cancer led to human clinical trials that are effective against resistant tumors.

Dr. Kabanov is the Parke-Davis Professor of Pharmaceutics in the College of Pharmacy and director of the Center for Drug Delivery and Nanomedicine at UNMC. This spring, the 48-year-old was named the 2009 Scientist Laureate, UNMC’s highest honor for an investigator.

“Dr. Kabanov is a uniquely innovative scientist who operates very well in both the basic and translational realms,” said Tom Rosenquist, Ph.D., vice chancellor for research. “His creativity is exceeded only by his energy. He is an ideal model for a 21st-century scientist.”

No stranger to high honors and early achievement, Dr. Kabanov remains humble about growing up in this field.

“I was lucky to work and report on some polymeric drug delivery topics – polymeric micelles, DNA/polycation complexes and others – that later became important.”
Luck had little to do with it – although being born the only son of a brilliant chemist may have had some benefits. Dr. Kabanov simply wanted to prove himself without his father’s help.

“My cousin said, ‘No matter what you do, people will say you succeeded because of your father.’ I realized I couldn’t do anything about that, except be so much better than anyone else,” he said.

And that’s what he did.

Dr. Kabanov earned his doctorate degree in a record 30 months from Moscow State University and received the Lenin’s Komsomol Prize – USSR’s highest award for young scientists. He was awarded a doctor of chemical sciences – the highest scientific degree in Russia – at age 28, becoming the youngest chemist in Russia with that distinction. He earned that degree four years faster than his father.

He found, like his father, that the world opens up when you pay attention to details.

“I spent an incredible amount of time trying to understand every little detail,” Dr. Kabanov said. “It would disturb and distract me if I didn’t know the little things. Then I reached a certain level and I started to see the big picture. My father was like that – always interested in the details.”

His father, Victor Kabanov, Ph.D., D.Sc., professor and chairman of Polymer Science, School of Chemistry, Moscow State University, died four years ago at the age of 72. His poster-sized photo dominates his son’s office in the Durham Research Center.

Once established, Dr. Kabanov started to collaborate with his father and others. He co-founded three companies: Supratek Pharma in Montreal, InnovaForm Technologies in Philadelphia and Neuprel Pharma, which he formed with Howard Gendelman, M.D., chairman of the UNMC Department of Pharmacology and Experimental Neuroscience. Its mission is to develop therapeutics to treat neuro-AIDS and Parkinson’s disease. (See story page 15)

“Sasha is an extraordinary person and, even more so, a talented scientist,” Dr. Gendelman said. “I am blessed to have learned and shared so much with him in science and friendship.”

Dr. Kabanov received the U.S. National Science Foundation (NSF) Career Award in 1995 and the NSF Special Creativity Award in 2002. He was named a UNMC Distinguished Scientist in 2006 and received the University of Nebraska Outstanding Research and Creative Activity Award in 2007.

His work has been supported by grants from the NSF, National Institutes of Health, Department of Defense and industry. This includes a $10.6 million COBRE grant, which is awarded through the NIH’s National Center for Research Resources. The COBRE grant supports the research of nine junior faculty members on their way to launching their own careers.

Dr. Kabanov has published more than 200 scientific papers, edited five books and journal issues and was named an inventor or co-inventor on more than 100 patents worldwide. His work has been cited more than 7,500 times.

Dr. Kabanov is an entrepreneur at heart, said Michael Dixon, Ph.D., president of UNeMed Corporation, UNMC’s technology transfer arm. “He is able to focus not only on the science at hand but also on the patent rights and business opportunities for potential products and their markets.”

As the world of nanomedicine grows, so will Dr. Kabanov’s contributions – not just to the expansion of scientific breakthroughs, but also to the mentoring of future researchers.
UNMC named 22 researchers as Distinguished Scientists and New Investigators for 2009, in addition to the Scientist Laureate. The scientists are recognized leaders in their fields and represent the UNMC Colleges of Medicine, Pharmacy, Nursing and Public Health, as well as the Eppley Institute for Cancer Research.

Now in its fourth year, the Distinguished Scientist award is sponsored by the chancellor and recognizes UNMC researchers who have been among the most productive scientists in the country over the past five years.

“Every year, a new set of UNMC scientists rise to meet the rigorous requirements for recognition as members of this elite group,” said Tom Rosenquist, Ph.D., vice chancellor for research.

“This year’s group demonstrates those high levels of innovation, productivity and funding success that make me and all of UNMC proud.”

Both the 2009 Distinguished Scientists and New Investigators received a merit-based salary supplement of $10,000. Alexander “Sasha” Kabanov, Ph.D., D.Sc., Parke-Davis Chair in Pharmaceutics and director of the Center for Drug Delivery and Nanomedicine, received a $20,000 supplement for being named scientist laureate at an April 6 ceremony.

Distinguished Scientist recipients must lead an outstanding research program, publish research results in journals of the highest quality and show an ability to attract and retain extramural funding.

This is the third year New Investigator awards were given to outstanding UNMC scientists who, in the past one to three years, have secured their first federal funding from the National Institutes of Health, the Department of Defense or other federal sources.

The New Investigator recipients also must demonstrate that their research has been published and/or the findings have been presented at national conventions.

The first UNMC Scientist Laureate award was given in 2006 to Stephen Rennard, M.D., Larson Professor of Medicine in pulmonary and critical care in internal medicine and courtesy professor of pathology and microbiology. Irving Zucker, Ph.D., professor and chairman of the cellular and integrative physiology department in the UNMC College of Medicine, received the top award in 2007.

Last year, the honor was given to Howard Gendelman, M.D., the Larson Professor of Internal Medicine and Infectious Diseases, chairman of the UNMC Department of Pharmacology and Experimental Neuroscience.
2009 Distinguished Scientist
Award Winners

Steven Caplan, Ph.D.*
(new investigator 2007)
College of Medicine

John Davis, Ph.D.
College of Medicine

Youri Pavlov, Ph.D., D.Sc.
Eppley Institute for Cancer Research

Tahir Tahirov, Ph.D.
Eppley Institute for Cancer Research

Paul Dunman, Ph.D.
College of Medicine

Tsuneya Ikezu, M.D., Ph.D.
College of Medicine

Tammy Kielian, Ph.D.
College of Medicine

Lie Gao, Ph.D.
College of Medicine

Neena Haider, Ph.D.
College of Medicine

Duygu Dee Harrison-Findik, D.V.M., Ph.D.
College of Medicine

Nora Sarvetnick, Ph.D.
College of Medicine

James Turpen, Ph.D.
College of Medicine

Paul Sorgen, Ph.D.
College of Medicine

Feng Xie, M.D.
College of Medicine

Bernice Yates, Ph.D.
College of Nursing

Peter Kador, Ph.D.
College of Pharmacy

Luis Marky, Ph.D.
College of Pharmacy

Elena Batrakova, Ph.D.
College of Pharmacy

Todd Wyatt, Ph.D.
College of Public Health &
College of Medicine

2009 New Investigator
Award Winners

UNMC discover
WALKING ON AIR
As director of biomechanics at UNMC’s Munroe-Meyer Institute (MMI), Max Kurz, Ph.D., takes technology typically reserved for astronauts and athletes and uses it for children with disabilities.

Athletes like Shaquille O’Neill and Yao Ming use the NASA-developed Alter-G anti-gravity treadmill to stay in shape. Dr. Kurz uses it to help those with cerebral palsy walk.

His research in the Motion Analysis Lab at MMI, the only such lab for children with disabilities in the area, features eight high-speed cameras that capture precise changes in the child’s movement pattern. Dr. Kurz collaborates with UNMC neurologist and MEG scientist Tony Wilson, Ph.D., to integrate brain imaging in the lab. Such technology will show neuroplastic changes that take place in the area of the brain that controls movement.

Along with pediatric physical therapists, Wayne Stuberg, Ph.D., Reggie Harbourne, Ph.D., and Brad Corr, Dr. Kurz hopes to unlock the potential inside children with disabilities.
Timothy Baxter, M.D., senses the fear when a patient learns they have an aortic aneurysm.

Surgical repair is immediate if the abnormal bulge reaches 5.5 centimeters – equivalent to the short end of a credit card. Until then, there is no treatment, only watchful waiting.

“Patients are scared; they feel like it’s a time bomb,” said Dr. Baxter, professor of surgery. “A ruptured aneurysm can cause life-threatening bleeding, so patients want a more proactive treatment.”

Now, Dr. Baxter and his colleague, Wanfen Xiong, M.D., Ph.D., may have an answer.

Using mouse models they developed in 2000, Drs. Baxter and Xiong have discovered that doxycycline, a common and inexpensive antibiotic, is effective in slowing or stopping the growth of aneurysms.

Pending grant approval later this summer, they will launch the first clinical trial in the United States for medical treatment of aortic aneurysms. Coordinated at UNMC, the 15-center trial would enroll 250 study participants in a two-year, double-blind study.

Participants would receive the doxycycline pill, which blocks enzymes that break down tissue and cause aneurysms to grow, or a placebo. CAT scans, which provide more precise measurements than ultrasounds, would follow every six months to monitor growth.

“If we could slow the growth, we might never need surgical intervention,” Dr. Baxter said, noting that small and slow-growing aortic aneurysms don’t rupture, but large and fast-growing ones may.

Aortic aneurysms affect 3 percent to 5 percent of the population, but are most common in men age 65 and older who smoke or have smoked, have a family history of aneurysms and high blood pressure. Women account for about 20 percent of aneurysms.

“It’s considered a silent killer,” Dr. Baxter said, “because there are no symptoms until it ruptures. Most aneurysms we find by luck when imaging is done for other medical conditions.”

Ninety percent of these aneurysms are below the threshold for intervention at the time of detection. So, the game of wait-and-see begins for an already anxious patient. The average growth for aneurysms is 2.5 millimeters per year. In mouse models, Dr. Baxter said, doxycycline slowed the growth by 40 percent.

In addition to treatment options, Drs. Baxter and Xiong want to develop markers to identity small aneurysms at earlier stages, as well as learn more about the genes involved.

“It would mean a lot if we could offer patients a more proactive treatment approach,” he said.
Over the years, researchers have had little success in effectively treating Parkinson’s disease. No drugs are available that slow – or stop – the progression of the disease.

Now, thanks to research at UNMC, there is renewed hope for the more than 4 million Parkinson’s patients worldwide.

A team of UNMC researchers has taken a significant step forward in developing a vaccination to reverse the neurological damage seen with Parkinson’s disease. The findings appeared in the March 1 issue of the Journal of Immunology.

The research, which was done on mice, is still in its infancy, but it has created a buzz within the scientific community.

“WE BELIEVE THIS COULD BE A REVOLUTIONARY MEANS FOR PARKINSON’S DISEASE THERAPEUTICS.”

HOWARD GENDELMAN, M.D.

In mice with an experimental form of Parkinson’s disease, researchers were able to reverse the neurodegenerative effects of alpha synuclein by changing immune responses through a vaccine injection.

The vaccine produced a neuroprotective response by allowing the immune system to produce T cells that migrated to the damaged area of the brain and reversed the damage. The T cells are key components of the immune system, as they search out and destroy infectious organisms.

Dr. Gendelman said additional work is needed to determine how to translate the study results into a therapy for humans and to make sure the treatment is safe for patients.

Human studies are currently being conducted at the University of Alabama-Birmingham and will soon start at UNMC to determine if the immune deficits seen in mice also are present in humans with Parkinson’s disease. Such studies are required before vaccine trials can be performed in humans, he said.

“Early results are encouraging,” said Lee Mosley, Ph.D., associate professor, pharmacology and experimental neuroscience, and a co-investigator on the study. “We think this immunization approach could be applicable to other neurodegenerative disorders.”

If all goes well, Dr. Gendelman predicts that human trials with the vaccine could begin within a couple years.
Steps toward healthier infants

by Jo Giles
For some women, life just isn’t easy.

Environmental stressors like poverty, unstable housing and lack of social support can make life difficult for anyone. But, for some high-risk pregnant women, these factors are especially challenging and contribute toward higher rates of poor pregnancy outcomes including pre-term birth and low birth weight babies.

“The latest technological advances mean the tiniest babies can often survive. Yet, they are at a higher risk for developmental and learning disabilities. When it’s a mother and child with limited financial resources, taxpayers often pick up the cost,” said Ayman El-Mohandes, M.B.B.Ch., M.D., M.P.H., dean of UNMC’s College of Public Health.

As a practicing neonatologist, Dr. El-Mohandes cared for and saved the lives of many of these tiny babies. Yet, as a public health professional, he was motivated to help overcome disparities in reproductive health and the related infant mortality rates within minority populations. That’s why he dedicated his research career to improving birth outcomes in high-risk patients.

Recently, he published several studies as part of the National Institutes of Health - DC Initiative to Reduce Infant Mortality in Minority Populations. The study examined whether cognitive-behavioral interventions could reduce the rates of preterm and low birth weight to improve pregnancy outcomes in African-American women with limited resources.

“Disparities in infant mortality of African-Americans are more than double the rate of other U.S. populations,” Dr. El-Mohandes said. “While much of the current research is focused on cause and effect correlations, our study was the first to examine an intervention designed to address specific risk factors.”

Dr. El-Mohandes’s team studied the following risk factors which have all been associated with poor pregnancy outcomes:
- Smoking;
- Environmental tobacco smoke exposure;
- Depression; and
- Intimate partner violence.

Data showed it was common for the women to have more than one risk factor.

Women were screened repeatedly for these risks. Individually designed counseling sessions were offered during their prenatal visits. The women learned coping skills and received interventions (like smoking cessation behavioral techniques) to improve their pregnancy outcomes. Because they answered survey questions at various stages of their pregnancy, researchers learned a great deal about their lives and the stressors that varied throughout their pregnancy.

Results indicated the women benefited from the counseling sessions. In addition, the studies confirmed a link between the intervention and a reduction of birth rates in the highest risk categories (i.e. very preterm and very low birth weight). This occurred despite a lack of compliance by some women who received only one or two intervention sessions.

“Even brief interventions during pregnancy had measurable effects on reducing intimate partner violence and improving pregnancy outcomes,” said Michele Kiely, Dr.P.H., of Eunice Kennedy Shriver National Institute of Child Health and Human Development.

While the study involved African-American women – whose babies have the highest prematurity risk – researchers believe the interventions could be beneficial to other patient populations.

“It is a simple intervention that could be carried out in the clinical setting,” Dr. El-Mohandes said. “We recommend health care providers go beyond screening for risk factors and provide specific cognitive-behavioral interventions during prenatal visits. The potential cost savings with reduction of high risk births should become a health policy priority.”

These studies were conducted collaboratively and were funded by the Eunice Kennedy Shriver Institute of Child Health and Human Development.

Collaborating institutions include:
- Children’s National Medical Center;
- Georgetown University;
- George Washington University;
- Howard University Children’s National Medical Center;
- The National Center for Minority Health and Health Disparities; and
- Research Triangle Institute, which served as the data coordinating center.
SUCCESS COMES IN PAIRS

by Lisa Spellman

SPOUSES OF CARDIAC PATIENTS CAN DO MORE TO HELP WITH REHABILITATION.
For a year during nursing school, Bernice Yates, Ph.D., cared for her mother who was dying of cancer. She held her hand, bathed her and helped her family navigate the medical maze.

Her mother never saw her graduate. But, the personal caregiving experience gave Dr. Yates a richer perspective on the most effective way to help patients make a stronger recovery.

An associate professor in the department of adult health and illness in the UNMC College of Nursing, Dr. Yates will launch a two-year pilot study to look at the outcomes of cardiac rehabilitation on patients and their spouses.

The 40-couple study, funded by a $225,000 grant from the National Institute of Nursing Research, a division of the National Institutes of Health, is being done through the outpatient cardiac rehab centers at The Nebraska Medical Center and Nebraska Methodist Health System.

All patients will participate in exercise and education classes at the cardiac rehab outpatient center, but only half of the patients’ spouses will join their partner in the activities. Dr. Yates hypothesizes that cardiac patients have better long-term success if their spouses are included in their rehabilitation program.

“The hope is that what they learn in cardiac rehab will stay with them long after they leave,” Dr. Yates said. “And if their spouse is involved in rehab with them, their chances for success go up.”

Their support is similar to the compassionate care and support she provided her own family during her mother’s illness and after her death. “I was considered the health expert in the family, someone who could provide a caring perspective,” she said.

Her study participants will receive similar guidance. For six months, Dr. Yates will follow their progress, noting each milestone in diet and exercise and then tally the results. For the partners of the cardiac patients, Dr. Yates and an interdisciplinary team of nurses, physicians, exercise physiologists and dietitians will assess and counsel them on their risk of heart disease. Goals will be set for all involved and activity levels and lipid profiles will be measured at the beginning, midpoint and end of the study.

Along with their partners, spouses will learn how much exercise they need to do on different types of equipment, such as a treadmill, stationary bike and elliptical to meet their individual goals.

“Everyone should get at least 150 minutes of aerobic activity of moderate or greater intensity per week to maintain optimum health,” Dr. Yates said.

Cardiac patients often are uncertain as to how much exercise they can or should do after surgery, she said. “They think they have to take it easy, but the blockages are fixed and their heart is working more efficiently than it has in a long time.”

The idea for the study spawned from an earlier research project in which Dr. Yates tracked the behavioral patterns of couples. Out of the 10 observed behaviors, she found that seven were shared behaviors between partners. For example: if one person was inactive, the other person was inactive.

“They either shared positive or negative behaviors,” Dr. Yates said.

Her goal is to use the research to secure funding for a larger study. “It’s so important to translate the complex instructions we give people into lay terms so they can understand what we want them to do and be successful,” she said.

And while surgical techniques to repair heart blockages have been perfected, it won’t make a difference, Dr. Yates said, if the patient doesn’t adhere to the necessary lifestyle changes.

Dr. Yates’ research complements the work being done by her colleagues through a five-year, $1.5 million National Institutes of Health grant to create a Healthy Heart Center that promotes health in Nebraskans in rural areas with, or at risk, for heart disease.

“We have a unique opportunity to help people in rural Nebraska lead healthier lives,” Dr. Yates said.
New technology to diagnose a killer

Hendrik Viljoen, Ph.D., didn’t plan to tackle one of the world’s deadliest bacteria.

He was, after all, an engineer, not a clinical researcher.

But, Dr. Viljoen (pronounced fill-u-in) has developed new technologies that have the potential to diagnose tuberculosis (TB) in the developing world more quickly and more accurately than any test used today.

“It’s an engineering novelty,” said the professor, who has a joint appointment in UNMC’s Department of Internal Medicine - Infectious Diseases and the University of Nebraska-Lincoln’s Chemical and Biomolecular Engineering Department.

“When people move comfortably between disciplines they become more innovative.”

Alison Freifeld, M.D., agrees. Since 2008, she has provided the medical expertise and collaborative laboratory studies that have resulted in clinical testing of the technology in Dr. Viljoen’s native South Africa.

“One-third of the world’s population is infected with the microbes that cause TB,” said Dr. Freifeld, professor of internal medicine/infectious diseases at UNMC.

“For more than 100 years, smear microscopy has been used to diagnose TB - we want to replace that with a 21st century technology that is adapted to the constraints of resource-poor areas of the world. It must be fast, simple and cheap.”

Smear microscopy has many constraints in the developing world, said Dr. Viljoen. Culture samples (sputum) are sent to the nearest large city with a lab and usually take six weeks. The test is time-consuming, labor intensive and 60 percent sensitive at best, meaning 40 percent of cases are missed, mostly patients with HIV and young children.

“Our goal is to have a diagnosis made while the patient is still sitting in the waiting room of the health clinic,” Dr. Freifeld said.

“Prompt treatment is key to controlling the spread of the disease.”

Drs. Viljoen and Freifeld along with a team of engineers and scientists have devised a point-of-care diagnostic device...
that collects sputum samples, extracts and amplifies target regions on the DNA using a polymerase chain reaction (PCR) and then optically detects TB products with fluorescent molecular beacons.

Using their unique thermocycler, the PCR reaction takes less than 20 minutes and appears to be more sensitive than existing diagnostics.

The final version of the technology is expected to cost less than $10 a test and reduce staff demand and the infection risk of health care workers. Existing devices take two hours to diagnose, an $80,000 machine and costly reagents.

“The rapid PCR technology has been tested in South Africa and holds much promise as a point-of-care device for third-world countries,” said Michael Dixon, Ph.D., president of UNeMed Corporation, the technology transfer arm of UNMC. “It’s also generating revenue for the university.”

To commercialize his PCR instrument and products, Dr. Viljoen founded Philisa (Zulu for “be healthy”) Technology Corporation in 2007 in Lincoln. Philisa’s assets have since been purchased by Streck, Inc., a privately held Omaha company that develops and manufactures control and calibration materials for the clinical laboratory. Streck also has purchased additional rapid PCR technology from UNeMed, providing revenue for the university.

Dr. Viljoen’s unique engineering perspective puts him in a position to improve the health of millions of people around the world. “He’s a chemical engineer with a heart of gold,” Dr. Freifeld said.

“When people move comfortably between disciplines they become more innovative.”

Hendrik Viljoen, Ph.D.
Christopher Fisher, Ph.D., talks about sex in a matter-of-fact, non-judgmental way. It wasn’t always easy until he learned to teach and counsel youth about sex 20 years ago while in college.

“Once you get beyond the snickers, giggles and embarrassment, sex is really quite fascinating,” he said.

Assistant professor of health promotion, social and behavioral health in UNMC’s College of Public Health, Dr. Fisher is trained in community-based participatory research (CBPR), sexuality education, sexual health, gender and human sexuality.

He came to UNMC last year by way of San Francisco and Bloomington, Ind., where he began his education at Indiana University in business and marketing. Later, he returned to the Midwestern city – home of the famous Kinsey Institute for Research in Sex, Gender and Reproduction – to complete his studies in sexuality and public health.

“Sex is a complex field,” he said. “It’s not just biology and disease; it also takes into account things like social norms, brain structure and our culture.”

The subject of sex, he’s finding, is a double-edged sword. There’s a lot of interest, but an enormous amount of ignorance, as illustrated by questions he’s been asked:

- Can I get herpes from a towel?
- Can my girlfriend get pregnant if there’s a blanket between us, we have our clothes on and I orgasm?

Then, there is Douglas County’s sexually transmitted disease (STD) epidemic, which is double the national rate for chlamydia and nearly twice the rate for gonorrhea over the past five years.

“Everyone in the county who is having sex is at some level of risk. But, the single largest age group affected by STDs in Omaha is 15- to 19-year-olds,” Dr. Fisher said. “To stop this epidemic we must provide more education and increase the opportunities to be tested and treated. We have many research questions about behaviors and motivations related to sex and need answers in order to better address the public health needs related to them.”

In addition to his STD work with state health and education leaders, Dr. Fisher wants to establish community-based participatory research projects to determine needs in the lesbian, bisexual, gay and transgender communities. He also wants to study HIV prevention among men in the South Omaha Latino communities.

“The community is a partner in CBPR research – members help design the study, collect data and disseminate findings,” he said. “Not a lot of people are doing CBPR in sexual health research, but there’s a better, more actionable outcome when the community is involved.”

Much of the existing sexual research has been done on the coasts, but not the Midwest. “Nebraska is fertile ground for sex research.”

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**TEST YOUR KNOWLEDGE OF SEX**

Take this quiz to determine how much you know about sex.

**True or False:** Sexual orientation (straight, bisexual, gay/lesbian) is genetically determined.

**Answer:** False. No definitive research has shown there to be a purely genetic cause of sexual orientation. One study looked at genetic twins and found only about 50 percent of the pairs share the same sexual orientation.

The test continues online at: unmc.edu/discover
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