

# THE VOICE

*of Cancer, Aging, and Antioxidant Research*



**SUMMER STUDENTS**

## Antioxidants and Prostate Cancer

By Joe M. McCord, Ph.D.



*Joe M. McCord, Ph.D.*

During this year alone, prostate cancer will be diagnosed in nearly 200,000 American men and more than 30,000 will die of the disease. Last month, the National Cancer Institute launched one of the largest cancer prevention trials ever to determine whether dietary supplementation with the antioxidants vitamin E and selenium can protect against prostate cancer.

About two years ago, two Webb-Waring scientists, Drs. Joe McCord and Daniel Hernandez, began a related study to evaluate whether regulatory mutations in the body's most important antioxidant enzyme (superoxide dismutase, or *SOD2*) might be responsible in part for the inherited genetic risk for prostate cancer. Superoxide dismutase, vitamin E, and selenium are all naturally-occurring antioxidants that play related roles in protecting cells from oxidative stress. They can neutralize toxins known as "free radicals" that might otherwise damage the genetic material of cells and possibly lead to cancer. "Cancers of various organs behave remarkably differently," says Dr. McCord, "especially in their response to prevention by antioxidants." Of all cancer types studied, prostate cancer has shown the largest response. In a 1996 study designed to see if selenium could prevent skin cancer, investigators found that while the supplement did not reduce skin cancer, it did decrease the incidence of prostate cancer by more than 60 percent. Another large trial, published in 1998, examined whether beta-carotene and vitamin E could prevent lung cancer in men who smoked. Those who took vitamin E had 32 percent less prostate cancer, although neither beta-carotene nor vitamin E prevented lung cancer.

"The *SOD2* gene has usually complex regulation," says Dr. McCord, "and we believe certain mutations affecting how much of the enzyme is produced, and under what physiological conditions, have a lot to do with putting a tissue at risk for becoming cancerous." The Webb-Waring study began by examining the gene in patients with lung cancer. About 65% of those patients showed a specific mutational pattern seen in only 9% of subjects without cancer. Similar results are being seen in patients with prostate cancer, but these mutations are in a completely different regulatory region of the gene – one that enables more enzyme to be produced under conditions of inflammation. "The exciting part of this study," says Dr. McCord, "is that *SOD2* mutations are strongly associated with two very different types of cancer, and the mutations impair gene regulation in very different ways. These results suggest that misregulation of antioxidant defenses in cancer may be more common than we previously believed."

See the back page to find out how you can help with this important research.

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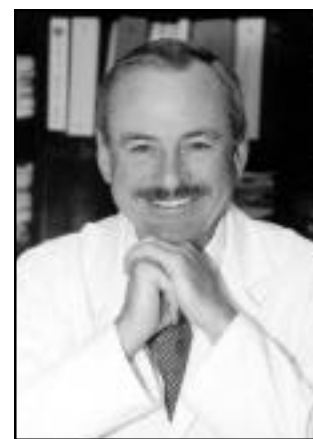
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professional.*

# FROM THE DIRECTOR

Training the scientists of the future is an important and long-standing goal at Webb-Waring. As you read about the students in this newsletter, you will see that each student is a special individual. Our students represent all ages, all backgrounds and all ethnicities. One of my favorite situations is the one, not unlike my own many years ago, in which a non-research inclined student is exposed to research for the first time and becomes unexpectedly enchanted. Each year, we have a few students who decide to work at Webb-Waring for the summer because it is a needed summer job. These students ostensibly have no prior interest (or experience) in research and no pre-existing interest in scientific careers related to research. Every year, at least one of these students becomes intrigued with research and this interest leads them to make educational and career altering decisions. It is enjoyable for me to watch these students then progress through their training and eventually become independent investigators. Our students also learn a great deal from each other about career options. It should also be noted that a summer experience in Webb-Waring's research laboratories also benefits the individuals who do not pursue a career in research. For example, young physicians who go on to become practicing medical doctors read scientific papers more critically. Those students who go on to become teachers have a better understanding of the scientific method. Everyone gains a better appreciation of the benefits of our research and its impact on the health of mankind.



*John E. Repine, M.D.*

## The Latest News on Vitamin C

New research shows that there may be downsides to the popular vitamin C. Taken to help fight the common cold and cancer, scientists have long said that vitamin C supplements don't appear to do any good, but probably don't do any harm either.

Now, a new study published in the journal *Science* shows that vitamin C can cause damage to DNA at the same time that it appears to protect cells. At the University of Pennsylvania, chemist Ian Blair found that vitamin C did destroy certain free radicals (that can damage DNA in cells and potentially cause cancer) but at the same time created free radicals by reacting with a common component of fat. Blair did a study combining vitamin C with a byproduct of linoleic acid (commonly found in vegetable oils) and ended up with dangerous free radicals, called lipid radicals. There is no evidence to suggest that vitamin C supplements cause cancer, but it may be that the newly discovered negatives cancel out the expected positives of taking vitamin C.

Overall, there is evidence that people who eat vitamin-rich fruits and vegetables have lower rates of cancer and better health. Blair suspects it was "simplistic to assume that taking vitamin C alone would have the same effect." The Institute of Medicine recommends that women need 75 mg of vitamin C daily and that men need 90 mg. Smokers need an additional 35mg. A healthy body can only absorb about 200 mg daily, so more than that is generally considered useless. Those levels are easily achieved by eating a balanced diet.

Source: Faye Flam, Knight Ridder News Service

# WEBB-WARING SUMMER STUDENTS - 2001

## Rola Altoos

Rola is currently a second year student at the University of Denver, with a double major in biochemistry and molecular biology. She grew up in Kuwait, and then moved to Colorado with her family, following the Gulf War. She became interested in cancer research after volunteering in the oncology department at Lutheran Hospital. Rola was then motivated to discover the mysteries cancer presents and to better understand the complexities of cancer.

Rola is working with Dr. Joe McCord and Dr. Daniel Hernandez on mutations in the regulatory regions of the MnSOD gene in lung cancer. She is studying the biochemical properties of the mutant forms of the MnSOD enzyme. "This laboratory experience has exposed me to the field of research and its importance in advancing medicine," said Rola. "Working collaboratively with people that are more educated in the field than I am is providing me with an atmosphere where intellectual enhancement and skill development are encouraged." As this group discovers more information on the molecular dysfunctions of cancer cells, the more practical these findings become in treating patients with cancer. This research combined with other research on MnSOD will contribute to a more effective use of antioxidants in cancer prevention and therapy.

"I am very grateful to have the opportunity to work with Dr. McCord and Dr. Hernandez, who have made this summer research program my most rewarding experience. It has been great to work with people socially and professionally in a cooperative laboratory environment," Rola added.

## Megan Dines

Born and raised in Colorado Springs, Megan will be entering her junior year at Cornell University in Ithaca, New York. She is majoring in biological engineering and is working towards a minor in materials science engineering. Megan was introduced to the Webb-Waring Institute through Zoya Dickins Miller, Director of Research Development at the Institute. Megan is a **William Randolph Hearst Fellow**. "I was able to tour the laboratories and realized what a great opportunity it would be to spend a summer working with amazing researchers," said Megan.

She is enjoying working on a myriad of projects with Richard Wright, Ph.D. Her research ranges from analyzing lung sections to sequencing part of the aldehyde oxidase gene. "Dr. Wright is so enthusiastic and knowledgeable about research. It is always fun to sit next to him and hear him talk about the next step in a procedure," commented Megan. Megan is enjoying being back in Colorado for the summer, where she bikes in the mountains and rides horses at home. She is a member of Cornell's varsity equestrian team. She plans to start work on her master's degree in biomedical engineering in the Spring of her senior year.

## Mark Edson

Originally from Ft. Morgan, Mark is a senior, majoring in molecular biology at the University of Denver. He completed a Summer Cancer Research Fellowship under the direction of Dr. Joe McCord and Dr. Daniel Hernandez last summer and enjoyed the experience so much that he decided to return for another summer. "Webb-Waring doctors are amazingly helpful and insightful. Their guidance fosters an environment that promotes learning scientific techniques and problem solving through trial and error experiments," commented Mark.

Through his summer research projects, he has learned that there is much more to the world of medicine than seeing and treating patients. "Behind the scenes, the work that occurs at Webb-Waring greatly contributes to our overall medical knowledge. My research experiences have been so positive that I plan on remaining in touch with this aspect of medicine during and after medical school. My time at Webb-Waring has been both enjoyable and worthwhile," added Mark.



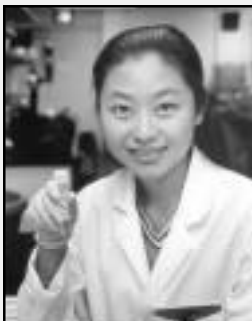
*Rola Altoos*



*Megan Dines*



*Mark Edson*



*Wonha Kim*

### **Wonha Kim**

Born in South Korea, Wonha Kim moved to the U.S. in 1991. It was an event that changed her life. “At the age of 10, I had to learn a new language, adjust to a new culture, and see the world from a new perspective.” Her determination and love of learning helped her adjust quickly. “My passion for learning was limitless,” she said.

That same passion has brought her to the Webb-Waring Institute. Wonha is a sophomore at Princeton University, studying to be a *medicine sans frontiere* (i.e. a medical missionary). “I have always been fascinated by the world of science and have always felt the desire to serve mankind,” commented Wonha. “I enjoy learning about living things and helping others live a better life.” When she is not doing research, Wonha volunteers at her local YMCA as an ESL teacher and participates in the College Council at Princeton.

Wonha is the second recipient of the annual **Brian Fitzgerald Fellow Endowment** through Princeton University. “I learned about the Brian Fitzgerald Fellowship Program through my molecular biology professor,” says Wonha. She jumped at the chance to spend the summer in Denver and do medical research. “Life is full of wonderful opportunities and I am thankful that Webb-Waring and Mr. Fitzgerald have made this learning experience possible for me.” Brian Fitzgerald is a member of the Webb-Waring Institute’s Board of Trustees.



*Ron Morley*

### **Ron Morley**

Ron is a second year medical student at the University of Colorado Health Sciences Center School of Medicine. Ron attended the University of Colorado in Boulder, and earned both his undergraduate degree and his MBA. After working 10 years in information systems, pharmaceutical manufacturing and micro-capital companies, he realized that although his life was very busy and full of activity, he wanted to create a lasting legacy. So Ron decided to change his career pathway and study medicine. His goal is to be able to go to developing countries and assist people who may otherwise go without medical care. “It’s a big change,” Ron said, “but when I look back on my life, I know that the hard work will have been worth it.”

“Working with Dr. Hybertson and Dr. Repine at Webb-Waring has given me the insight into the sort of basic research that is driving much of the pharmaceutical technology that will provide potent new drugs for my career in medicine,” Ron commented. “Both the people and the technology here are great, and I know that my time here will give me insights into new therapies. I’m just lucky and thankful to have this opportunity.”



*Jessica Ruiz-Suarez*

### **Jessica Ruiz-Suarez**

A senior at the University of Puerto Rico - Mayaguez Campus, Jessica is majoring in biology with a minor in agricultural sciences. Jessica is working with Dr. Sonia Flores this summer. “I chose to come to Webb-Waring because I wanted to have a research experience and I’m interested in biomedical research,” said Jessica.

Her interest in science began in high school after taking biology and environmental science; and she hopes to obtain a license this year, to teach biology to high school students. She is here assisting in research studies regarding the HIV protein, Tat, as an inflammatory agent. Tat may provide key insights into the mechanisms of endothelial cell dysfunction in HIV infection. “I am grateful to Dr. Flores and Dr. Adela Cota-Gomez for this incredible opportunity to learn about research,” said Jessica.

## **Mildred Santana**

Entering her senior year at the University of Puerto Rico - Mayaguez Campus, Mildred is from Hormigueros, Puerto Rico and is majoring in industrial microbiology. "My interest in research began my junior year while working with Dr. Ines Sastre on a project. After this experience, I decided that I wanted to direct my education towards the study of infectious diseases," said Mildred. She would eventually like to work in the healthcare field, specializing in diagnosing diseases and finding treatments for rare diseases that will lead to the improvement of human health.

She is working in Dr. Joe McCord's laboratory this summer, under the guidance of Daniel Hernandez, Ph.D. They are researching the Bmpr2 gene that may be associated with Primary Pulmonary Hypertension. "I have learned many scientific techniques and acquired the enthusiasm necessary to continue to develop my goals. I would like to thank Dr. Hernandez for teaching me the necessary skills that I will need to know for a successful experience in molecular research. I am very proud to be a part of this wonderful team that has contributed greatly to the scientific community," added Mildred.



*Mildred Santana*

## **Rachel Woodcock**

Born in Boston, MA, Rachel Woodcock moved to Boulder in the third grade and is currently a senior at the University of California San Diego completing her major in biochemistry. She is a recipient of the Student Cancer Fellowship offered through the University of Colorado Health Sciences Center and is spending the summer at Webb-Waring in Dr. Sonia Flores's laboratory. "I have always been fascinated with the complexity of the human body and my desire is to use the knowledge about it to alleviate people's health problems," said Rachel. Rachel has decided to pursue a career in medicine and will be applying to medical schools this summer.

During the summer of 1999, Rachel learned about third world medicine in Gilgit, Pakistan and became committed to becoming a part of the medical world. She worked in an eye hospital as well as a pediatric hospital while she was there. She came to Webb-Waring this summer to experience a different type of medical research learning about laboratory experiments and the "basics" of biomedical research. "During my short time here, I have already been introduced to the excitement of possible new discoveries and the depth of the work and knowledge involved," Rachel added.



*Rachel Woodcock*

## **Megan Thomas**

A 2001 graduate from Heritage High School in Littleton, Megan will be a freshman at the University of Colorado at Denver this Fall. She is planning to major in biology, but is especially interested in genetics. "I am fortunate to get an introduction to the medical field this summer at Webb-Waring. It is interesting learning new procedures and techniques from the scientists," commented Megan. While she is here, Megan is focusing on ARDS research with Dr. John Repine and Wonha Kim. Megan feels that the hands-on experiences she has had in the laboratory this summer will help her decide on her medical career and she is grateful to Dr. Repine and all the scientists for their help.



*Megan Thomas*

# WHAT'S HAPPENING

## UPCOMING EVENT...

The Board of Trustees would like to announce  
**Kilimanjaro 2002**  
a climb to benefit the Webb-Waring Institute.

Please join us to kick off the year long series of events leading to the summit of Mt. Kilimanjaro. For more information, call Mary Schaefer at 303-315-3314.

Kilimanjaro 2002



a climb to benefit the Webb-Waring Institute

## NEW TO THE BOARD...

The Board of Trustees would like to welcome two new members: Jenifer Kennedy and Kirk MacDonald. Jenifer has her Ph.D. in biomedical engineering and is active in the Boulder community. Kirk is the President and CEO of the Denver Newspaper Agency.

## NEW TO THE INSTITUTE...



*Anna Casullo*

Anna Casullo is the newest member of the Webb-Waring staff. She grew up in Lincoln, Nebraska and graduated with honors in biology from Grinnell College in Iowa. After college, Anna moved to Denver in 1998 and took a research position at Denver Health and decided that she would make research her career. Under the direction of Dr. Sonia Flores, Anna is a member of her HIV/AIDS research team. "I've always wanted to do some sort of AIDS research, since my aunt died from the disease in 1995. This is my commitment to her," commented Anna. "I'm really excited about the opportunities for growth that this position will offer," added Anna.

We welcome her to the team!

## EDUCATION...



*Nick Brechun*

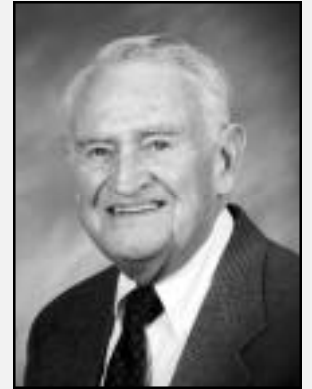
Nick has been at Webb-Waring for almost two years, as a research assistant to Dr. Joe McCord and Dr. Sally Nelson. Born in Baltimore, Nick grew up in Denver and is a graduate from Metro State University in Denver. He has a degree in exercise physiology and is currently working on a second degree in biology. Before coming to Webb-Waring he was interested in the effects of exercise-induced free radicals and the body's antioxidant defense mechanisms. "I believe that illness and disease can largely be avoided by maintaining proper diet as well as engaging in physical activity. I also feel that adopting a healthy lifestyle can delay the aging process," Nick commented.

His position at Webb-Waring has allowed him to not only develop his skills as a research scientist, but has also given him a better understanding of the biochemical relationship between antioxidants and free radicals. When he completes his degree in biology, he hopes to continue his education as either a medical or a graduate student. Nick's goal is to help solve the mystery behind both cancer and the aging process.

# AT WEBB-WARING

## ***IN MEMORIAM...***

Dr. Milton Wiggins, a former Webb-Waring Trustee, died at the age of 77 this June. He studied medicine at The Johns Hopkins University School of Medicine and moved to Colorado Springs in 1952 to practice pulmonary medicine until his retirement in 1986. In addition to his professional career, Dr. Wiggins was President of the El Paso County Medical Society, Chief of Staff of Memorial and St. Francis Hospitals, and a member of the Clinical Faculty of the University of Colorado Medical School. In 1968, he received the "Humanitarian of the Year" award from the Colorado Springs chapter of the American Lung Association. He was married to Mary Ellen, the father of five and grandfather of twin girls. His fellow Trustees, the staff and the scientists at Webb-Waring were privileged to know him and are truly grateful for his service to the Institute.



*Dr. Milton Wiggins*

### **MEMORIAL GIFTS GIVEN TO THE WEBB-WARING INSTITUTE**

**May 1, 2001 - July 31, 2001**

We received generous donations in loving memory of the following people:

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### **DID YOU KNOW?**

Americans spend more than \$17.4 billion annually on outdoor "home improvement." That landscape, lawn, and tree care spending would fund the National Science Foundation (NSF) for nearly 4 years!!!

Source: American  
Nursery & Landscape  
Association

## NEW AWARDS AND GRANTS

Dr. John E. Repine has received a \$1 million dollar grant from the NIH to determine the contribution of xanthine oxidase (XO) derived oxygen radicals to lung epithelial cell injury, lung inflammation and lung leak in rats with ARDS. His collaborator on the grant is Dr. Richard Wright.

Dr. Joe McCord has received a grant from the Elsa U. Pardee Foundation for \$87,000 to study superoxide dismutase (SOD) and its defective regulation in patients who have breast and prostate cancers.

## Participate in Cancer Research

Your participation is needed, whether you have received a cancer diagnosis or not. Genetic screening requires a large number of subjects for statistical analysis, and the Institute needs your help. Sampling your DNA now requires only a simple rinse with Scope™ mouthwash, and it can be done by mail. For more information, visit our website at [www.webb-waring.org](http://www.webb-waring.org) and click on "Participate in a Cancer Research Project", or call Dr. Joe McCord at 303-315-6257.

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