Nobel Laureate Roger Kornberg elucidates mechanism of transcription

By Amy E. Hamaker

The use of genetics in medicine and science is growing exponentially. Although much is known about genetic instructions being transmitted through DNA and RNA, the mechanics of how this happens haven’t always been clear.

Nobel Prize winner Roger Kornberg of the Stanford University School of Medicine explained some of those mechanisms, speaking to a full room on April 10 at the Keck School of Medicine of USC. Kornberg received the Nobel Prize in Chemistry in 2006 for his work on understanding how DNA is converted into RNA, a process known as transcription.

Kornberg’s lecture covered highlights of his course of work on transcription over the years, as well as some of the most recent and some unpublished work. Much of his lecture focused on the enzyme RNA polymerase II found in cells with membranes. RNA Polymerase II is a complex multi-subunit protein. The enzyme uses contacts within specific protein components to pull the two halves of the DNA helix apart and allows complementary RNA to form. The new RNA then separates from the DNA and exits the structure. When this structure works perfectly, the result is a faithful copy of the genetic material.

“Polymerase II is the platform on which all the other components rest in this process,” said Kornberg. “If you want to understand such a complex process, you must study the structure of the components. The DNA enters the atomic resolution crystal structure as a double helix, makes a sharp bend in the middle of the structure. RNA transcription occurs and the RNA exits almost at a right angle to the DNA coming in.”

Kornberg and his colleagues answered many questions about the basic functions of this system, including how a very stable DNA-complementary RNA structure can be interrupted and the RNA peeled off. He explained that protein loops called Raiders and lids enforce the separation, while a fork loop prevents the unraveling from continuing on to the active center, where the RNA is being produced, and stopping the whole process.

During the mid-1980s, another component that is absolutely required in RNA transcription...
Acid reflux device gives two patients new hope for normal life

By Allison Trinidad

I had GERD for the last 30 years, so I’ve kind of forgotten what it’s like to live without it. Now, I have no reflux whatsoever. I hate to use the word, but it’s a miracle at this point.’

—Rodd Foster, patient at the Keck Medical Center of USC

The Keck Medical Center of USC was launched in 2011 thanks to a campaign to raise $900 million to expand the Keck Medical Center and increase the dedicated resources and the clinical programs at the USC Norris Cancer Hospital. The center, in Room 1362 on the first floor of the USC Norris Cancer Hospital, is online at: http://www.usc.edu/uscw/.

The center, in Room 1362 on the first floor of the USC Norris Cancer Hospital, helps patients undergoing chemotherapy and/or radiation cope with any alterations in their appearance that may result from the treatment, including hair loss and changes in complexion.

Traditional reflux disease is treated using a surgical procedure called a Nissen fundoplication, which involves recreating the esophageal sphincter. While fundoplication is recommended for those with severe reflux, it is a complicated procedure that prevents the ability to belch or vomit and often leads to bloating or gas problems.

The new LINX device, which has been available in Europe for about two years, is designed to augment the patient’s native esophageal sphincter and return it to a competent valve. The magnetic beads open with pressure, allowing patients to belch, vomit and swallow normally. By allowing patients to belch normally, the device allows air to escape from the stomach, preventing the gas and bloating issues.

Lipham, who has worked with the device since its inception, says the LINX system is best for patients with mild to moderate reflux that cannot be adequately controlled by medication or for patients who do not want to take medication to manage the disease. Both Foster and Barmby, who were taking a cocktail of antacids to little avail, were good candidates for the procedure.

“The Keck Medical Center of USC delivers world-class medicine to its patients every day thanks to innovative research by doctors like John Lipham,” said Scott Evans, COO and interim CEO of Keck Hospital of USC.

Keck Hospital employees ratify new three-year contract that boosts pay

Five hundred and seventy-two employees at Keck Hospital of USC have voted to ratify a contract between USC and the National Union of Healthcare Workers (NUHW). The three-year contract is effective through April 30, 2015.

Hospital leadership commended the negotiating teams on both sides for successfully reaching consensus on a contract that meets the needs of employees and the organization. The total number of employees at Keck Hospital is 2,584.

“ar goal throughout the negotiations has been to develop a contract that reflects the commitment by all sides to make sure that the exceptional care for our patients and ensure the success of Keck Hospital,” said Scott Evans, interim CEO and COO of Keck Hospital of USC. “This contract underscores the pride we all have in our academic medical center and the dedication to our patients, research and education.”

Contract highlights include:

• Salary increase over four years to maintain competitive compensation for staff
• Increase in paid time off
• Increase in tuition reimbursement
• Increase in USC contribution to retirement plan

Keck Hospital of USC and USC Norris Cancer Hospital are part of the Keck Medical Center of USC, which also includes the more than 500 faculty physicians in the Keck School of Medicine of USC.

The Keck Medical Center of USC was launched in 2011 thanks to a transformative $150 million gift from the W. M. Keck Foundation.

The USC Norris Cancer Hospital’s Image Enhancement Center will host an open house from a.m. to p.m. on April 26, offering visitors an opportunity to see the specialized services it can offer to patients.

The center, in Room 1962 on the first floor of the USC Norris Cancer Hospital, helps patients undergoing chemotherapy and/or radiation cope with any alterations in their appearance that may result from the treatment, including hair loss and changes in complexion.
awarded the Massry Prize. He is one of only six pairs ranging from loss of flowers in plants to colon cancer in said. “Mediator mutations can cause transcription errors essential in the chain of communication,” Kornberg found a mediator complex that was common to all Continued from Page 1 KORNBERG: Take campus shuttles to world-class services.” We appreciate this important expansion of USC’s research,” said Bill Bogaard, mayor of the City of Pasadena. “Our citizens have relied on the research, and pharmacy. can accommodate up to 400 patients a day, also canister practices are part of a larger plan to expand USC’s network of care. “We are leveraging every opportunity we have to bring our brand of medicine to patients throughout the region, whether that be through clinical partnerships or satellites facilities such as this one,” said Jackiewicz. “This space reflects our ongoing commitment to high quality, advanced care, as well as our focused efforts on growth and expansion.”

Take campus shuttles to L.A. Times Festival of Books

This year’s Los Angeles Times Festival of Books at the University of Southern California runs April 21-22 at the University Park campus. USC’s Intercampus Shuttle will provide service between the University Park campus, Union Station and the Health Sciences campus throughout the festival. Pick-up and drop-off for the University Park campus will be on Jefferson Blvd at Hoover St. Pick-up and drop-off for the Health Sciences campus will be on Eastlake Ave. at San Pablo Ave. The shuttle will leave the University Park campus approximately every 30 minutes from 8:30 a.m. to 8 p.m. on Saturday, and from 8:30 a.m. to 7 p.m. on Sunday. For more information, visit: http://tinyurl.com/eykqwyy.

KORNBERG: Nobel Laureate visits Keck School of Medicine

Continued from Page 1 was discovered through examining yeast cells: researchers found a mediator complex that was common to all cells with membranes, not just to yeast cells. “Mediator complexes interact directly with polymerase II, and are essential in the chain of communication,” Kornberg said. “Mediator mutations can cause transcription errors ranging from loss of flowers in plants to colon cancer in humans.” Kornberg’s last visit to USC was in 2003, when he was awarded the Massey Prize. He is one of only six pairs of father/son Nobel Prize winners; his father, Arthur Kornberg, was awarded the Nobel Prize in Physiology or Medicine in 1959 for studies of how genes are transferred from a DNA molecule to another. This visit to the Keck School included a lunch with 12 Keck School students and Dean Carmen A. Puliafito. “We thank Dr. Kornberg for his generous contribution of time to meet with our faculty, students and postdocs,” Puliafito said. To view the archived webcast of Kornberg’s lecture, visit http://tinyurl.com/85fh2a.

USC research suggests Viking landers found life on Mars

By Leslie Ridgeway

In 1976, the National Aeronautics and Space Administration (NASA) launched the Viking program, sending space probes to Mars to determine whether there was life on the red planet. Thirty-six years later the debate about life on Mars is not over, but research conducted in part at USC offers more proof that life may exist on this neighboring world. Joseph D. Miller, associate professor of cell and neurobiology at the Keck School of Medicine of USC, and colleagues conducted an independent analysis of the labeled release (LR) data from the Viking 1 and 2 landers. The researchers applied mathematical measures of complexity to the data, which indicate a high degree of order that is more characteristic of a biological rather than a nonbiological, purely physical process.

The research was published online April 9, 2012, in the International Journal of Aeronautical and Space Science.

In the experiments, the Viking landers dropped on Mars about 4,000 miles apart, scooped up soil samples and applied a radio-labeled nutrient cocktail to the soil. If microbes were present in the soil, they would likely metabolize the nutrient resulting in the release of carbon dioxide or possibly methane. The active experiments did indicate metabolism, and control experiments on sterilized soil samples produced little or no gas release. But due to lack of support from two other Viking experiments that did not find any organic molecules in the soil, most scientists believed the LR data had been compromised by a nonbiological oxidizing property of Mars soil.

Miller and colleagues did not accept this interpretation, and over the last six years applied measures of mathematical complexity to the data from active and control Viking data, as well as terrestrial biological and nonbiological data sets. Not only did the active Viking LR experiments exhibit higher complexity than the control experiments, but the active experiments clearly sorted with terrestrial biological data series whereas the Viking LR control data sorted with known terrestrial nonbiological data.

“To paraphrase an old saying, if it looks like a microbe and acts like a microbe, then it probably is a microbe,” said Miller, who is a neuropharmacologist, but also studies circadian rhythms at USC and is an author on the research. “The presence of circadian rhythmicity and a high degree of mathematical complexity or order in the LR data most likely mean Viking discovered microbial life on Mars over 35 years ago.”

Without a protective atmosphere similar to Earth’s, life on Mars is more likely to exist underground, where it is safe from ultraviolet radiation, Miller said. If life does exist on Mars, the knowledge could unlock secrets of life here on Earth.

“We have only one example of life in the universe—we are it,” said Miller. “Finding another example of life somewhere else could be the biggest step forward in biology since the delineation of the genetic code by Crick and Watson.”

From left, USC dignitaries Char Ryan, Edward Crandall, Tom Jackiewicz, Scott Evans and Vaugn Starnes join Pasadena Mayor Bill Bogard at the April 10 ribbon cutting. The event attracted nearly 150 USC staff, physicians and members of the local community.

PASADENA: Keck Medical Center expands its reach

can accommodate up to 400 patients a day, also includes an onsite infusion center with a laboratory and pharmacy.

“The Keck Medical Center of USC, Pasadena adds to our city’s growing reputation as a premier destination for medical services and biomedical research,” said Bill Bogard, mayor of the City of Pasadena. “Our citizens have relied on the expertise of USC faculty physicians for years. We appreciate this important expansion of USC’s world-class services.

This is the fourth satellite office for the Keck Medical Center of USC, with other locations in downtown Los Angeles, Beverly Hills and La Cañada Flintridge.

Tom Jackiewicz, senior vice president and CEO for USC Health, said these off-site physician practices are part of a larger plan to expand USC’s network of care.

“We are leveraging every opportunity we have to bring our brand of medicine to patients throughout the region, whether that be through clinical partnerships or satellites facilities such as this one,” said Jackiewicz. “This space reflects our ongoing commitment to high quality, advanced care, as well as our focused efforts on growth and expansion.”

KORNBERG: Nobel Laureate visits Keck School of Medicine

An April 16 story in Wired featured cardiologist Leslie Saxon, professor of clinical medicine at the Keck School, and her project Everyheartbeat.org, a sort of “Facebook for medicine” that encourages patients to record and upload health data using smart phone accessories.

An April 12 report in National Geographic quoted Joseph Miller, associate professor of cell and neurobiology at the Keck School about his research, which suggests that the Viking Mars landing program likely found life on Mars in 1976. The research also was featured by news outlets around the globe including Popular Science, Futurity, RedOrbit, International Business Times, SmartPlanet, YG Daily, Digital Journal, The State Column, The Huntsville Times, Asian News International, Discovery News, Daily Mail (U.K.), National Post (Canada), Slobodna Dalmacija (Croatia), O Globo (Brazil), NTN (Turkey), Iltalehti (Finland), VnExpress (Vietnam), and Giammattismo (Italy), among others.

An April 12 article in the Pasadena Star-News quoted Scott Evans, COO and interim CEO of the Keck Medical Center of USC hospitals, and Tom Jackiewicz, senior vice president and CEO of USC Health, in a story about the opening of a new Keck Medical Center of USC Pasadena medical office. The story also appeared in the Daily Trojan.

The Hindu (India) ran an op-ed on April 6 by Jay Desai, assistant professor of clinical pediatrics at the Keck School, about plans to allow doctors with Overseas Citizens of India status to practice medicine within the country or become faculty members in Indian medical colleges.

The Weekly NEWSMAKERS

An April 16 story in Wired featured cardiologist Leslie Saxon, professor of clinical medicine at the Keck School, and her project Everyheartbeat.org, a sort of “Facebook for medicine” that encourages patients to record and upload health data using smart phone accessories.

An April 12 report in National Geographic quoted Joseph Miller, associate professor of cell and neurobiology at the Keck School about his research, which suggests that the Viking Mars landing program likely found life on Mars in 1976. The research also was featured by news outlets around the globe including Popular Science, Futurity, RedOrbit, International Business Times, SmartPlanet, YG Daily, Digital Journal, The State Column, The Huntsville Times, Asian News International, Discovery News, Daily Mail (U.K.), National Post (Canada), Slobodna Dalmacija (Croatia), O Globo (Brazil), NTN (Turkey), Iltalehti (Finland), VnExpress (Vietnam), and Giammattismo (Italy), among others.

An April 12 article in the Pasadena Star-News quoted Scott Evans, COO and interim CEO of the Keck Medical Center of USC hospitals, and Tom Jackiewicz, senior vice president and CEO of USC Health, in a story about the opening of a new Keck Medical Center of USC Pasadena medical office. The story also appeared in the Daily Trojan.

The Hindu (India) ran an op-ed on April 6 by Jay Desai, assistant professor of clinical pediatrics at the Keck School, about plans to allow doctors with Overseas Citizens of India status to practice medicine within the country or become faculty members in Indian medical colleges.

From left, USC dignitaries Char Ryan, Edward Crandall, Tom Jackiewicz, Scott Evans and Vaugn Starnes join Pasadena Mayor Bill Bogard at the April 10 ribbon cutting. The event attracted nearly 150 USC staff, physicians and members of the local community.

KORNBERG: Nobel Laureate visits Keck School of Medicine

An April 16 story in Wired featured cardiologist Leslie Saxon, professor of clinical medicine at the Keck School, and her project Everyheartbeat.org, a sort of “Facebook for medicine” that encourages patients to record and upload health data using smart phone accessories.

An April 12 report in National Geographic quoted Joseph Miller, associate professor of cell and neurobiology at the Keck School about his research, which suggests that the Viking Mars landing program likely found life on Mars in 1976. The research also was featured by news outlets around the globe including Popular Science, Futurity, RedOrbit, International Business Times, SmartPlanet, YG Daily, Digital Journal, The State Column, The Huntsville Times, Asian News International, Discovery News, Daily Mail (U.K.), National Post (Canada), Slobodna Dalmacija (Croatia), O Globo (Brazil), NTN (Turkey), Iltalehti (Finland), VnExpress (Vietnam), and Giammattismo (Italy), among others.

An April 12 article in the Pasadena Star-News quoted Scott Evans, COO and interim CEO of the Keck Medical Center of USC hospitals, and Tom Jackiewicz, senior vice president and CEO of USC Health, in a story about the opening of a new Keck Medical Center of USC Pasadena medical office. The story also appeared in the Daily Trojan.

The Hindu (India) ran an op-ed on April 6 by Jay Desai, assistant professor of clinical pediatrics at the Keck School, about plans to allow doctors with Overseas Citizens of India status to practice medicine within the country or become faculty members in Indian medical colleges.
Calendar of Events
This Calendar of Events is also online at www.usc.edu/hsccalendar for the Health Sciences campus community

Tuesday, Apr. 24

Wednesday, Apr. 25


Thursday, Apr. 26
10 a.m. - 2 p.m. Image Enhancement Center Open House. The center’s specially trained staff provides cancer patients the techniques and encouragement necessary to help patients maintain a positive self-image. USC Norris Cancer Hospital First Floor. Info: (323) 965-3169

Neon, Dean’s Translational Medicine Seminar: “Fostering Innovation and New Medical Device Development in Academic Medical Centers: The University of Michigan Medical Innovation Center Experience.” James Gajjar, Univ. of Michigan. MCH 149. Info: (323) 442-7332

Friday, Apr. 27
8 a.m. Pathology and Laboratory Medicine Grand Rounds. “Expression of SMARCB1/INI1,” Alexander Judkins, GIHLA N08-7409. Info: (323) 442-1180


Neon, Center for Applied Molecular Medicine: “Microfluidics for Cancer Cell Chemotaxis,” Mingming Wu, Cornell University. C28 250. Info: (323) 442-3849

Sunday, Apr. 29
3 p.m., KSOM Orange County Reception: Dean Puliafito hosts the OC Trojan Family and introduces the newly appointed director of the USC Norris Comprehensive Cancer Center, Stephen Grobler. Balboa Bay Club, 1221 West Coast Highway, Newport Beach, CA 92663. To RSVP: ksock.uscuddh balloonbayclub Info: (323) 442-1767

Monday, Apr. 30

Saturday, May 12
7 a.m. - noon, Revlon Run/Walk. For Women at Los Angeles Memorial Coliseum at Exposition Park. The cost to run/walk is $55 through May 11 ($40 day of the event). Your registration fee includes an EIF REVLOn Run/Walk for Women T-shirt and goodie bag. It will also include a USC Norris Team T-shirt. Info: (323) 965-0668

Notice: Deadline for calendar submission is 4 p.m. Monday to be considered for that week’s issue—although three weeks’ advance notice of events is recommended. Please note that timely submission does not guarantee an item will be printed. Send calendar items to The Weekly, KAM 400 or fax to (323) 442-8123, or email to eblaauw@usc.edu. Entries must include day, date, time, title of talk, first and last name of speaker, affiliation of speaker, location and a phone number for information.

By Robin Heffler
USC researchers have identified cells that can initiate healing of a damaged liver, which promises to help physicians find treatments for acute liver disease and liver failure.

Laurie D. DeLeve, a Keck School of Medicine of USC professor and associate chair for scientific affairs in the Department of Medicine, was the principal investigator of “Liver sinusoidal endothelial cell progenitor cells promote liver regeneration in rats,” which was published on March 12 in the online version of The Journal of Clinical Investigation. Joining her in the research was Lin Wang, a postdoctoral student from the Fourth Military Medical University in X’an, China.

The liver, which detoxifies chemicals, metabolizes drugs and makes proteins important for blood clotting and other functions, is the only solid organ that has the ability to regenerate after it has sustained significant tissue damage and even after partial surgical removal.

With funding from the National Institutes of Health, DeLeve and her colleagues from the USC Research Center for Liver Diseases sought to pinpoint specific cells that are needed for such regeneration.

“Through animal models, we showed that liver regeneration requires the recruitment of these bone marrow progenitor cells,” she said. “The results also may shed light on liver complications in patients with bone marrow suppression.” Suppression of bone marrow function can be a serious side effect of chemotherapy and certain drugs, and is seen in various diseases.

In the most recent research, DeLeve’s team discovered that after partial surgical removal of rat livers, cells from the bone marrow are recruited to the liver and repopulate the vascular lining of the organ.

“The recruited bone marrow cells are called progenitor cells, and are the offspring of stem cells. Once lodged in the liver, the progenitor cells become liver sinusoidal endothelial cells, that specialized cells that line the liver’s vascular system and perform a variety of functions. These progenitor cells also are a major source of hepatocyte growth factor, which stimulates liver cell proliferation when a portion of a rat’s liver is removed.

The study demonstrated that without recruitment of these bone marrow progenitor cells, the liver is not able to regenerate normally.

DeLeve’s laboratory is now investigating the various signals that regulate how progenitor cells are recruited from the bone marrow.

Keck School study sheds light on cells that help heal liver

USC program helps healthful eating habits take root at local elementary school

Lauren Cook (center right) of the USC Childhood Obesity Research Center (USC-CORC) helps fifth graders during a cooking demonstration at the Monte Vista Elementary School Garden Celebration and LA Sprouts Open House on March 27.

A garden was planted at the school as part of the LA Sprouts program, a collaboration with USC-CORC, the UCLA Fielding School of Public Health and other community partners.

USC-CORC researchers hope the intervention program will curtail childhood obesity and resulting health problems by encouraging kids to connect with food by growing and cooking it. LA Sprouts expects to add other schools in the future.

In case of an emergency...

Call the Emergency Information Phone: (213) 740-9233 The emergency telephone system can handle 1,400 simultaneous calls. It also has a backup system on the East Coast.

Visit the USC Web: http://emergency.usc.edu This page will be activated in case of an emergency.

Backup Web servers on the East Coast will function if the USC servers are incapacitated.