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Dear Reader,

Welcome to this special issue of *Synthesis*, in which we focus on a population that deserves increased attention when it comes to cancer diagnosis, treatment and survivorship: adolescents and young adults (AYA).

Although cancer in the AYA population is less prevalent than in older adults, survival rates have not improved over several decades, the result of problems in diagnosis, treatment compliance and low rates of health insurance coverage. In our ongoing quest to break barriers to beat cancer, we explore these particular challenges in this issue, and introduce you to several AYA survivors who describe their life-changing diagnoses and survivorship. Among them is Andre Cote, whose thyroid cancer diagnosis at 22 made him a more serious student, and who now dreams of becoming a doctor.

Our AYA focus in this issue also includes a story about some innovative new technology research aimed at improving treatment compliance and support for AYA patients. These include a Web-based educational intervention and a smartphone application to help with patient-care monitoring as well as communicating non-medical information with friends and loved ones.

Our efforts to reach out to the AYA population will be enhanced when the expanded Cancer Center opens its doors in the summer of 2012. The 46,000-square-foot addition will bring our pediatric cancer program under the same roof with our adult patients, enhancing continuity of care for children and adolescents as they transition from treatment to survivorship. There are many ways to offer financial support for the expansion, also described in this issue of *Synthesis*.

Finally, you will read about our unique collaboration with Jackson Laboratory West to use a new type of mouse model using human tumor samples to test drug therapies and a study that delves more deeply into the controversial topic of the role of stress in breast cancer.

We hope you enjoy this issue of *Synthesis*. And we invite you to send your comments, thoughts or suggestions to the editor at Dorsey.Griffith@ucdmc.ucdavis.edu.

**Ralph deVere White**

*Director, UC Davis Cancer Center*
*Associate Dean for Cancer Programs*
*Professor, Department of Urology*
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Adolescence and young adulthood generally is a time when young people step out on their own, start romances, attend college, launch careers and begin to build a life independent of their families.

It is a time for hubris, adventure, maybe even rebellion. So how does a cancer diagnosis fit into this period of life? Not well, according to researchers, patients and the health-care professionals who treat young adult cancer patients.

Adolescent and young adult (AYA) cancer patients – those between ages 15 and 39 – have shown little or no improvement in cancer survival rates for several decades, even while other age groups have shown marked improvement. Researchers and health-care professionals theorize that several reasons contribute to the cancer-survival disparity, including late diagnosis, poor treatment compliance, the aggressiveness of cancer in patients in this age group and low health-insurance rates.

The lack of compliance often can be the most frustrating factor for physicians. “It’s tough enough to be a teenager and want to be independent, and then you have someone say, ‘You have to take this medicine,’” says Jonathan Ducore, professor of clinical pediatrics, hematology/oncology and principal investigator for the Children’s Oncology Group at UC Davis Cancer Center. “It’s harder to make an 18-year-old take his meds than it is an 8-year-old.”

People of this age also often feel invincible. The notion of mortality is alien – or at least something that applies to other, older people – not to them.

“They say – ‘I don’t want to take my medication,’” says Ducore. “We say, ‘Well, if you don’t take your medication you could die.’ It’s sort of like they shrug their shoulders, and you know that on a deeper level, they don’t believe it. It’s why they make such great soldiers – they think they are not going to get shot.”
As a child, Kirollos “Cookie” Gendi thought of himself as “sporty,” a kid who could play soccer, basketball and run around with his siblings. But when he was diagnosed with stage 1 Ewing’s sarcoma at age 9, his self-perception changed, and he adapted. “I picked up a pair of sticks and I began to drum,” he says.

Gendi, now 22, endured months of chemotherapy after his diagnosis, as well as the removal of part of his leg and the insertion of a metal rod in his shin. After his treatment, his newfound “sport” of drumming in his junior high and high school bands helped define who he is and helped him build a new sense of community.

Cancer-free now for more than a decade, Cookie says the illness still shapes his life, pushing him to give back to others and cherish the people around him.

“I like to go and speak at relays so people can know it’s possible to go through this treatment and that they’re not alone,” says Gendi. “They see me, and they see others, and it’s kind of reassuring.”

Gendi had to eventually drop drumming too, due to leg pain, but takes comfort in the fact that his younger brother picked up the drums. Cancer also pushed him to narrow his career focus. He now wants to go to medical school and give back to others the way doctors gave back to him.
This period of life also is a time to explore one’s sexuality, search for a partner and generally dive headlong into the dating world. Appearance is key to the mating dance, making AYA patients even more reluctant to comply with chemotherapy, which may cause hair loss, or to take medications that could cause unseemly bloating.

“Oftentimes the treatment means you are going to have a different feeling about your body or about sex,” says Marlene von Friederichs-Fitzwater, assistant professor of hematology and oncology at UC Davis and director of outreach programs for UC Davis Cancer Center. “It’s something they can’t deal with, so they stop treatment.”

How does the medical community turn the tide on these poor outcomes for AYA patients? Advocates such as von Friederichs-Fitzwater and others believe education and mentoring by other cancer survivors are key. The WeCARE! Peer Navigator Program, run by von Friederichs-Fitzwater, is a new program designed to link AYA cancer survivors with patients of similar age who are going through treatment.

“They will have a role model of someone who survived this,” says von Friederichs-Fitzwater, who also serves on The LIVESTRONG Cancer Center Working Group of the Lance Armstrong Foundation, which is working with AYA patients and the general public to increase awareness of treatment and diagnosis challenges for this age group.

Azadeh Afkhami is an AYA cancer survivor who mentors cancer patients her age through the Peer Navigator program. She likes to send the message to others struggling through treatment that they can

KARMINA BARRALES

Karmina Barrales says she named her daughter Natalia Guadalupe because she prayed to the Virgin Mary of Guadalupe to make her a mother if it was meant to be and, if – as an ovarian cancer survivor – she could conceive.

Barrales has had a long journey to motherhood. As a 22-year-old student at California State University, Chico, she noticed strange symptoms in her abdominal area, but didn’t follow through with testing because she had no health insurance.

Fast forward a year or so, and the symptoms and pain increased enough to send her to the emergency room, where she had a vaginal ultrasound. Doctors found a tumor and ultimately diagnosed her with stage 3 ovarian cancer. After aggressive chemotherapy and surgery to remove her ovary, Barrales, now 32, has been cancer-free for nearly a decade.

As a young woman and newlywed, her initial diagnosis was devastating on two levels – for the possibility of her not surviving the cancer and the possibility that she could not conceive. Barrales says she and her husband were at peace with the idea of adopting children, but still tried for three years to conceive. Barrales endured a miscarriage and the couple were about to give up trying when – without the help of fertility treatments – they conceived Natalia, now 17 months.

“She’s our little mascot for the National Ovarian Cancer Network,” says Barrales.

Barrales credits her husband, Antonio, as much as her doctors, for saving her.

“If it wasn’t for Antonio driving me, I wouldn’t have shown up for chemo,” she says.

The cancer and treatments solidified their bond as husband and wife, she says. Now Barrales is raising their daughter, working on her master’s degree in education, and with the National Ovarian Cancer Coalition, guiding others throughout diagnosis and treatment.
Andre Cote, 27, says his cancer diagnosis at 22 may have stunned his doctors as much as it did him. “Doctors don’t want to believe that someone as young as I was has cancer,” says Cote. That’s not an uncommon phenomenon for young adults with cancer. Doctors sometimes rule out cancer as a possibility for seemingly healthy young adults. Cote had lost his father to lung cancer when he was 17, so when he himself was diagnosed with thyroid cancer five years later, he knew it was serious. In fact, at first he was certain the cancer would kill him, as it had his father.

But Cote’s doctor reassured him that thyroid cancer is extremely responsive to treatment, with a cure rate of 99 percent if caught early. And Cote and his doctors hit his cancer hard. His treatment was rigorous, requiring him to take iodine and have two surgeries.

“It makes it much easier to know that there is someone out there who you can lean on for support – who themselves have faced a similar experience or challenge.”

~ Azadeh Afkhami
Lisa Ann Marie Stamps was 36 and home from her honeymoon just a few weeks when she was diagnosed with stage 3 cervical cancer. A former beauty queen, hula dancer and martial artist, the diagnosis slapped Stamps doubly hard because she has always taken impeccable care of her body. But as she knows now, cancer can strike indiscriminately.

Any cancer diagnosis is traumatic, but for Stamps the news as a newly married woman was particularly hard. “I wanted to have children,” she says, and knew that the surgery and radiation treatments would leave her infertile.

Stamps’ cancer diagnosis brought out the fight in her.

“There were two things I could do,” says Stamps. “I could live, or I could die.” She chose to endure aggressive treatments, including internal and external radiation. Nearly six years later, she says she is “two years and two months cancer free.”

She has grown accustomed to the idea that she cannot bear children. “We have a cat and dog, and they’re our kids,” she says. “We also have a lot of nieces and nephews.”

These days, Stamps works as a home health nurse and teaches water aerobics. She also is being trained as a peer navigator for others diagnosed with cancer. “As a martial artist, I learned how to fight,” she says. “But I never knew this would be my fight.”

The battle has brought rewards. One of those is gratitude. “I get up in the morning and I say, ‘I feel good. I feel great. I love life.’”
DANNY COCKE

At age 22, Danny Cocke was reveling in the newfound independence of young adulthood when cancer sent him back home into the fold of his family, and into an awkward period of dependence.

“For a young adult, it’s just a weird time to be a human being,” says Cocke, who adds that moving in with his parents during his cancer treatments was “like a giant summer vacation.”

Just prior to his diagnosis of testicular cancer, Cocke had hit a groove in his music career. In fact, it was during a band rehearsal that searing back pain sent him to the emergency room. Within a matter of hours, the attending physician there told him he had what appeared to be cancerous tumors throughout his body. For the next year, Cocke’s world shifted out of the recording studio and into hospitals as he underwent chemotherapy and other cancer treatments. Now 29, he appears to be cancer free.

Oddly, Cocke says he wouldn’t trade his cancer experience for anything. He says it was a gift that taught him not to take life for granted and to love while there still is time.

“Oddly, Cocke says he wouldn’t trade his cancer experience for anything. He says it was a gift that taught him not to take life for granted and to love while there still is time.

“It gave me peace with life,” he says.

Cocke’s independence came back in time, and he again is playing with a band and composing music for movie trailers. He also works with other cancer patients, using his personal triumphs to pass along hope.
The search for better cancer treatments remains an uphill battle. Chemotherapy temporarily wipes out the immune system and kills millions of cells needed for health. Other treatments can provoke severe autoimmune attack, and cancer often develops resistance to even the most effective medicines.

So, it’s a big added burden when mice used to model different types of human cancers become progressively poorer mirrors of the disease the longer they are bred. Experimental animals that at first provide vital insights about cancers and how to treat them may start to confound researchers after being bred for a few generations.

Take mice models of prostate cancer, for example. When scientists examine tumors from fourth or fifth generations of the mice, they often see ramped-up activity in key receptors, or molecular docking stations that can speed tumor progression. Mutations crop up in genes that normally suppress tumors, disrupting normal defense. The errant behavior does not necessarily model the traits and progress of human cancer, and so the original research intent is compromised.

Even more distressing is the fact that more than 90 percent of treatments that are effective in mice never save a human life. This gives false hope and adds billions to the cost of health care.

Vast room for improvement exists, and this is the core mission of a potent new collaboration between the UC Davis Cancer Center, Jackson Laboratory-West and the National Cancer Institute (NCI) Center for Advanced Preclinical Research (CAPR).

Of the dozen university cancer centers participating in the project, UC Davis Cancer Center is the consortium’s principal university partner. Research support comes from the National Institutes of Health (NIH).

The Primary Human Tumors Consortium integrates complementary cancer research and clinical capabilities of the three institutions. The aim is to strengthen the ability to diagnose cancers quickly and more precisely, and to develop targeted treatments. The consortium has started “growing” a public library of living primary human tumors to aid cancer research worldwide.

“Our animal models have provided great insights, but their inherent limitations have been a hurdle to faster progress,” says Ralph deVere White, director of the UC Davis Cancer Center.

The Jackson Laboratory (JAX)-West is the Sacramento-based arm of the preeminent East Coast mammalian genetics institute, while NCI-CAPR has long supported top cancer research.
We need to find, say, the five or six characteristics that are shared by all the cancers – the most common mechanisms. That's where we should focus treatment.

~ David Gandara

nationally. JAX-West has developed and maintained a new mouse line called NSG that lacks immune defenses, and so has a very high “take” rate of engrafted human tumors. The proximity of the lab to UC Davis Cancer Center means that tumor tissue surgically removed from patients can be rushed to JAX and engrafted intact onto mice within hours. The tumor’s growth at the cellular and tissue level closely resembles that seen in the patient, making it more likely that the tumor will behave similarly.

The lab’s procedures quickly and efficiently establish viable new lines of mice carrying specific cancers, and provide prime conditions for scientists to apply molecular and genetic tools to understand the tumors’ pernicious strategies, as well as their vulnerabilities. The setting is designed to test different drug regimens against specific types of tumors from different patients.

“There are at least 150 different types of lung cancer, so every patient a physician sees is going to be a little different,” says David Gandara, an oncologist and special advisor for experimental therapeutics at the cancer center. “We need to find, say, the five or six characteristics that are shared by all the cancers – the most common mechanisms. That’s where we should focus treatment.”

In collaboration with JAX and CAPR, Gandara uses a genetically engineered mouse model, or GEMM, to study cancer’s growth strategy. Gandara and other researchers can seek a target in the tumor cells that a new drug or combinations of drugs can exploit.

The Jackson Laboratory has thousands of NSG mice ready to receive tumor tissue. JAX staff take a tumor sample no larger than the tip of a ballpoint pen and engraft it onto a mouse. The tumor fragment, now a “patient-derived xenotransplant,” or PDX, grows to 30 times its original mass, allowing for grafts in 30 more mice from this first generation. Within weeks, the lab can generate thousands of NSG mice engrafted with one type of tumor. Each mouse is a ready subject for testing different drugs against the patient’s potentially unique cancer.

JAX-West already has engrafted 200 NSG PDX tumors, representing 200 cancer patient specimens. The consortium’s goal is for half of the specimens to be from drug-resistant tumors to accelerate research on the most resilient cancers, says Neal Goodwin, program director of the JAX-West Cancer Services.

Some cancers lie dormant for 15 years before their unexpected and unwelcome return, deVere White says. Many researchers now suspect that such recurrences often result from stem cells that have lurked in tissue undetected or have evolved a resistance to the cancer treatment.

“We want to be able to expand these stem cells in the mice,” he explains. “We hope the mice will preferentially grow a greater number of stem cells than we can find in patients. We can search these cells for molecular differences between them and the rest of the tumor, and then develop therapies against both the stem cells and the rest of the tumor.

“We have developed a powerful research and clinical alliance here,” he continues. “This focus on patient-derived tumors and our growing library of live patient tumors should speed discovery of drugs and drug combinations. That’s where progress will come to improve our patients’ lives.”
A 32-year-old husband and father of two young children is nearing the end of his battle with gastric cancer when he develops a bowel obstruction. If he were healthy, his doctor would not hesitate to recommend immediate surgery to relieve the blockage. The fact is, however, that his disease makes surgery more risky. The man not only risks death, but complications that could reduce the quality of the time he has left to spend with family.
But, just how much riskier is this kind of surgery for late-stage cancer patients than for otherwise healthy ones? Until now, doctors caring for cancer patients with fewer than six months to live could not say. A new decision-making tool developed by a team led by UC Davis Cancer Center surgical oncologist Robert Canter allows physicians to calculate patient-specific risk of dying due to complications from the surgery, based on variables associated with their disease.

“We assume that these patients are at higher risk, but no one has ever defined how risky some of these common surgical procedures are for the individual late-stage cancer patient,” says Canter.

To address this need, Canter and his colleagues developed the first comprehensive tool to guide physicians and their patients in deciding whether surgery to treat an acute problem is the best option, based on the risk of complications or death within 30 days after the proposed operation.

In June, they published a paper in the Annals of Surgery describing the tool, called a “nomogram.” The tool allows physicians to input patient information, such as clinical diagnoses, symptoms and laboratory test values, to determine an individual patient’s risk of surgical complications, or death.

“If you knew more precisely what their risks were, it would affect a physician’s discussion with the family and ultimately the decision of whether or not to opt for surgery,” Canter says.

Risk calculator
The new nomogram offers physicians and others on the patient’s health-care team solid numbers they can use in making their decisions or recommendations. Patients and families may or may not see or hear these exact numbers, but doctors will now be able to tell them with more certainty whether a surgery poses low, medium or high risk.

A nomogram is like a calculator physicians can use to come up with a patient- and surgery-specific number that describes the risk of dying within 30 days.

To construct the nomogram, Canter and colleagues at UC Davis Cancer Center identified 7,447 patients with widespread cancer from data collected between 2005 and 2007 by the American College of Surgeons’ National Surgical Quality Improvement Program. They focused on those patients who had experienced a complication and on their post-surgery outcomes.

Researchers created a statistical formula, or risk calculator, that
utilizes 53 variables describing the patients’ pre-operative condition to determine the rates of complications and mortality for individual patients.

In the published paper, the researchers cite the hypothetical example of a 70-year-old with metastatic lung cancer admitted to the hospital with an obstructed intestine. In this case, the patient has lost more than 10 percent of his weight within the past six months, has difficulty breathing with moderate exertion, has poor kidney function and advanced malnutrition. After entering that information into the risk calculator, doctors determine that the patient has a 30 percent risk of dying and 40 percent chance of other complications within 30 days of the surgery.

Shifting care goals
Armed with these kinds of numbers, a physician can have a well-informed discussion with everyone who is caring for the patient before approaching the family to have a conversation about the patients’ options, says Frederick Meyers, executive associate dean for the UC Davis School of Medicine and a co-author on the nomogram paper.

“This is about improving the quality of care for patients with cancer,” he says.

Meyers has been treating cancer patients for 28 years. He says he has seen a shift in the way both physicians...

The new nomogram offers physicians and others on the patient’s health care team solid numbers they can use in making their decisions or recommendations.
and patients approach interventions toward the end of life.

“In the old days, doctors would have said, ‘Let’s just do it because there’s nothing else I can do.’ These days, more and more doctors and patients understand that supportive, or palliative care, is an important option compared to an ill-advised intervention such as surgery.”

Still, advising someone against surgery is not easy for a physician, or a patient. “This is not about abandoning our patients,” Meyers says. “It’s about understanding their needs. We don’t want to do anything that is dangerous for them.”

Improving the quality of care for late-stage cancer patients means helping them through one of the most difficult transitions they will face: a change in their health-care goals.

“The question is how do we help patients make an important transition in their course of care from disease-directed treatment and palliative care to palliative care alone?” Meyers says.

The nomogram will help physicians explain to patients with high-risk scores that the time may have come to make that transition and explore non-surgical options to relieve their acute situation.

In the hypothetical case of the young father with gastric cancer, the man chooses to have a stent placed in his intestine to allow passage of food – instead of the complicated surgery. He gains little time past the six months he had been expected to live, but a week before he dies he enjoys a visit from an old high school friend who notes later that his friend had seemed happy. He soon suffers a stroke, and four days later he dies. Canter says surgery might have meant painful complications or untimely death, and that the less invasive care allowed the man a more graceful end of his life.

Spreading the word

Now that the nomogram has been created, the researchers who created it are working to establish methods for teaching their colleagues both at UC Davis Health System and beyond to use it.

“It’s up to us to take the next step and develop education programs and use technology to help people really understand how to use our nomogram,” Meyers says.

Canter, who already uses the nomogram when caring for his patients, says he will continue to refine it by using other large sources of patient data.

“We want to make sure it’s as accurate as it can be and actually helps people make these difficult decisions.”

Canter and his colleagues also will be conducting additional studies to evaluate how surgery, when it is chosen and does not result in death, impacts quality of life.

“If a patient has complications, it could make their last few months with cancer worse,” he says. “That’s not what we want.”

“It’s up to us to take the next step and develop education programs and use technology to help people really understand how to use our nomogram.”

~ Frederick Meyers
Whether stress contributes to the onset or progression of cancer is a question many eminent cancer researchers have dismissed, pointing to a body of epidemiological studies as proof of its invalidity.

For Colleen Sweeney, co-director of the Breast Cancer Research Program at UC Davis Cancer Center, the stress-cancer link lingers on her radar. In 1998, two years into her career as a breast cancer researcher, the biochemist and molecular biologist witnessed how the drug Herceptin revolutionized the treatment for a virulent variant of the disease, affecting about one in four patients. This subtype is caused by multiple copies of the HER2 gene, which make excessive HER2 protein facilitating breast cancer’s growth and spread. Herceptin, widely considered as one of the first forms of personalized medicine, works by binding to the HER2 protein and intercepting the signal that prompts cancer cells to divide.
“The prognosis for the HER2-positive breast cancer patient is considerably more optimistic than it was 13 years ago, but the outcome for Herceptin candidates is not always positive,” says Sweeney, who reviews grant applications for the National Institutes of Health’s Tumor Progression and Metastasis Study Section.

Sweeney’s research has centered on those 30 to 50 percent of HER2 breast cancer patients who fail to durably respond to the drug. Her published studies have focused on the roles of a gene called MET, which could be activated at the same time as HER2, making tumor cells more invasive; and the regulator Lig-1, which when suppressed leads to HER2 over-expression, promoting the growth of cancer cells. Both findings may eventually lead to novel therapies that complement or substitute for Herceptin.

But mindful that many patients insist that a divorce, bereavement or job loss played a role in their disease, Sweeney ventured to new territory. She was intrigued by a 2004 study at the University of Chicago that revealed about 25 percent fewer breast cancer cells studied in vitro were killed by chemo drugs when they were pretreated with a synthetic stress steroid hormone called...
dexamethasone. This hormone, a glucocorticoid, is commonly given to breast cancer patients to reduce nausea and other side effects.

Adding ammunition to the stress-causes-cancer camp were studies on rodents that found that social isolation affected both tumor biology and the hypothalamic-pituitary-adrenal (HPA) axis, which stimulates the release of stress hormones glucocorticoids and epinephrine.

Together with co-investigator Brian Trainor, associate professor of psychology at UC Davis, Sweeney was awarded funding from the Department of Defense in 2009 to study the impact of stress on mice that had been genetically modified to produce the gene ErbB 2, which corresponds to HER2 breast cancer in women.

The mice are largely inbred and subjected to the same husbandry, and all developed tumors of the mammary glands. The researchers found variations in the latency and size of tumor, recurrence and metastasis. They are correlating these findings to the levels of the stress hormone corticosterone – a practice not undertaken in the human epidemiological studies.

Corticosterone is measured after exposing mice to stressors, such as placement in a restraint tube “equivalent to being squeezed in a crowded London underground train for an hour,” says Trainor. Those same stressful situations are replicated, with one important intervention: the enzyme that controls corticosterone production is blocked, enabling the researchers to isolate the effect of the hormone in tumor development.

“We have 900 mammary glands that need to be quantified, and it's too early to draw any conclusions about the role of stress in the development of breast cancer,” says Trainor. But if the results affirm stress is implicated, it may pave the way to more studies looking at how glucocorticoids promote the growth of tumor and metastasis, he says.

This may lead eventually to a revision of the dexamethasone-chemotherapy protocol, but more significantly perhaps, it could mean that breast cancer patients have to confront a burdensome dilemma: How to better control stress when they are dealing with a life-threatening diagnosis.

Sweeney says that such a mandate would not be tenable for many patients, nor is it necessarily desirable. But new research on an old drug might provide a more feasible solution.

“I was struck by recent publications that have reported beta blocker use, which is usually prescribed for high blood pressure, is associated with a better outcome for women with breast cancer.”

~ Colleen Sweeney
publications that have reported beta blocker use, which is usually prescribed for high blood pressure, is associated with a better outcome for women with breast cancer,” says Sweeney.

One such study on women with operable breast cancer, treated with beta blockers and tracked for 10 years, demonstrated a 71 percent reduction in mortality and 57 percent drop in metastasis, in comparison to the non-beta blocker control group. This followed lab research that indicated beta blockers can inhibit breast cancer cell migration, triggered by the stress hormone norepinephrine. “This is encouraging,” says Sweeney. “Beta blockers are easily tolerated, and they may prove to be a viable adjunctive therapy for breast cancer patients.”

The researchers found variations in the latency and size of tumor, recurrence and metastasis. They are correlating these findings to the levels of the stress hormone corticosterone – a practice not undertaken in the human epidemiological studies.
Ask Ralph deVer White what he does for a living, and he’ll offer a prompt – and perhaps surprising – reply: “I run a cancer center, and I try to raise money.”
The dual roles are a modern necessity for deVere White, director of the UC Davis Cancer Center. With federal funding tight and the UC Davis Health System budget strained by innumerable demands in an ailing economy, he constantly courts donors to fund research, endowments and other needs. His most critical mission at the moment: raising money to complete the 46,000-square-foot Cancer Center expansion.

“We understand that these are difficult financial times, but the UC Davis Cancer Center is one of the region’s world-class amenities, and it needs to be supported by the community,” deVere White says. “We have earned this support through our record of research and patient care, and we want to make sure we continue earning it every day.”

Connected to the original center on X Street by a second-floor bridge, the long-awaited addition will create much-needed clinical and research space and help the center keep pace with its rapidly growing patient load. Patient volume has jumped 55 percent since 2002, and the center has been forced to operate a satellite clinic to deal with the growth, says Jeanine Stiles, the center’s chief administrative officer.

“This new building will allow us to accommodate everyone in one location, reducing patient stress overall and bringing pediatric oncology together with adult oncology,” Stiles says.

As of September of this year, through a combination of UC Davis Health System and philanthropic funds, the cancer center had secured $18.5 million for the expansion. An impressive cadre of benefactors have given to the building campaign, contributing from $5 to the $5 million donated by the Wayne and Gladys Valley Foundation.

Among those who have responded generously to the center’s needs is Barbara Fingerut, who gave $30,000 on behalf of her late husband to finance the addition’s two infusion rooms, in addition to $335,000 for student scholarships and a $1.5 million bequest for cancer research. Stanley Fingerut died 10 years ago after a battle with multiple myeloma, and his wife continues to heap praise on the cancer center for the treatment he received there.

“I think it’s outstanding,” says Fingerut, a breast cancer survivor with a long history of philanthropic support for the center. “People think the government pays for everything, but they can only do so much. We in the community need to come forward and contribute if we want this excellent care to continue.”

Despite the progress, the Cancer Center needs $9 million more to cover construction costs of the addition, scheduled to open in July of 2012.

Kelly Ciotti, the cancer center’s development officer, is optimistic because prospective donors know that the new building means much more than just extra square footage.

“One key value of the new space is that by bringing everyone under one roof, it will allow for heightened collaboration among our cancer specialists,” Ciotti says. “That will expedite the translation of scientific breakthroughs into the most effective patient care and ultimately help give us what everyone wants – more cancer survivors.”

In these days of falling stock prices, eroded property values and persistent economic jitters, raising money has become increasingly challenging for health-care organizations and other nonprofit causes. The Cancer Center is no exception.

The UC Davis Cancer Center is one of just 65 centers nationally to receive designation by the National Cancer Institute.
That’s why benefactors are turning to creative – and financially feasible – means of supporting the expansion project, all of which carry tax benefits. Naming opportunities, which can be achieved in numerous ways, are one example.

Naming opportunities commemorate a donor’s generosity, tying their name in perpetuity to an institution they hold in esteem. Naming gifts also inspire others to donate and help with recruitment and retention of world-class faculty who recognize that the institution has gained community support. They also lend prestige to an institution. The most acclaimed cancer centers in the country are named by their most philanthropic donors.

For the Cancer Center expansion, naming opportunities range from the donor wall ($5,000, or $83.33 a month for five years) to an exam room ($25,000) and the pediatric floor ($5 million), and beyond.

Donors can enjoy a naming opportunity or simply make a gift to leave a legacy through:

- **Multi-year pledges** that enable more generous gifts than might be possible through a single contribution. These pledges may be paid over five years in annual, semiannual or quarterly installments, with payments to begin at the donor’s convenience.
- **Tribute and memorial gifts.** These are a meaningful and lasting way to pay tribute to a loved one or a health-care provider.
- **Real estate donations.** Property can be donated outright, or placed in a trust or given through a will. Such contributions enable donors to enjoy personal financial benefits while supporting the Cancer Center’s work in a meaningful way.

- **Gifts of securities** – stocks, mutual funds or bonds.

- **Naming the UC Davis Cancer Center as a beneficiary** in a life insurance policy. This avenue of giving is practical, simple, and a powerful vehicle for helping the center.

- **Matching corporate gifts.** Many companies sponsor matching gift programs that amplify the impact of their employees’ personal contributions without increasing the obligation of the individual donor.

The UC Davis Cancer Center is one of just 65 centers nationally to receive designation by the National Cancer Institute. Since first winning that honor in 2001, the center’s research funding has more than doubled – from $45 million to $107 million – and it now treats more than 9,000 adult and pediatric patients annually. In a recent ranking of 900 cancer programs across the country, *U.S. News & World Report*
recognized the UC Davis Cancer Center as 39th in the nation.

Success has brought an onslaught of new patients, who travel to the center from as far south as Fresno and as far north as the Oregon border. Outpatient visits to the center have increased steadily, by about 6 percent a year, and the need for cancer treatment is increasing as the region’s population grows and ages, and as new methods of cancer diagnosis and treatment become available.

The existing Cancer Center was built in 1991 and originally spanned 56,000 square feet. In 2005, a $10-million expansion added another 7,000 square feet to the radiation oncology clinic on the ground floor. Various projects and partnerships outside Sacramento, in Roseville and Marysville, for example, have also helped ease space demands. But it has not been nearly enough.

Locating young and old patients together will boost the emotional well-being of both age groups, and enhance the team approach that is so beneficial to cancer treatment.

The expansion will particularly benefit pediatric and adolescent patients. Locating young and old patients together will boost the emotional well-being of both age groups, and enhance the team approach that is so beneficial to cancer treatment.

“Children tend to go through their cancer treatment very bravely, and having that positive spirit around can provide hope and a valuable perspective to older patients,” deVere White says.

On the research front, the new space will enable UC Davis to more easily host clinical trials that can boost access for patients to new, potentially life-saving cancer drugs. The Cancer Center currently lacks needed dedicated space for clinical trials work.

The expansion also includes the remodeling of 9,000 square feet of the existing center, bringing new carpeting and paint to the building and refurbishing clinical laboratories as well as the waiting room and registration areas.

While $9 million is a sizeable number, those in the fundraising trenches remain hopeful because they have a product whose value is indisputable.

“The Cancer Center’s accomplishments speak for themselves, and I frequently meet cancer survivors who want to express their thanks by donating,” says Ciotti. “We are confident that our grateful patients, their families and those who simply want to help advance cancer care will step forward to help make our vision a reality.”
When Marlene von Friederichs-Fitzwater was diagnosed with cervical cancer as a young adult, she felt afraid about how the illness might affect her life. But there was more. “Probably the worst part of the experience was that I felt completely alone,” says von Friederichs-Fitzwater. “I didn’t know anyone my age with cancer and felt totally isolated from my peers.”

Remembering those days more than 25 years ago, von Friederichs-Fitzwater, director of outreach research and education and assistant adjunct professor at the UC Davis Cancer Center in the Division of Hematology and Oncology, is particularly mindful of the special needs of teens and young adults as she develops, tests and implements new programs for patients with cancer.

The age group of 15- to 39-year-olds is unique in many ways among cancer patients. Most do not feel they have much in common with other patients in either pediatric or adult clinic waiting rooms, hospital wards.

Young adults may be less likely than older adults – or children with parents to watch over them – to monitor their illness carefully or comply with their treatment regimen.
or cancer support groups. Groping with issues such as independence, sexuality, fertility, new careers and young children, they have much on their minds beyond prognosis and treatment questions.

Young adults may be less likely than older adults – or children with parents to watch over them – to monitor their illness carefully or comply with their treatment regimen. And as von Friederichs-Fitzwater well remembers, they do not often reach out for support.

“We need to be more creative in giving this age group full access to the resources they need,” says von Friederichs-Fitzwater. “There’s a lot of technology that kids and young adults are already using, and we can exploit it for more than playing games.”

Conferring with an online coach
Von Friederichs-Fitzwater, along with Frederick Meyers, executive associate dean of the UC Davis School of Medicine, recently developed and tested a novel Web-based educational intervention called I-COPE to coach young adults with cancer in problem-solving and coping skills. The patient sits in front of a computer screen and has a conversation with a life-like person who has been programmed with a personality and knowledge bases.

Although many people of older generations may squirm at the thought of having a conversation with a computer-programmed human-looking character, von Friederichs-Fitzwater points out that the system actually offers many advantages over receiving health education from a real person.

“This guarantees that a consistent and complete message is delivered to every patient,” she says. “And
unlike a real person, our character never has an ‘off-day’ and always interacts positively.”

Meyers agrees that the system offers many advantages. “The beauty of this technology is that it can be tailored to each patient’s needs,” he says. “And it can be used by patients who are isolated – both physically, such as those living in rural areas, and emotionally, such as those who have a hard time reaching out to another person.”

The demonstration program proved so popular with the young testers that more than three-quarters said they would prefer to receive information from such a system than from print media or even face-to-face encounters with a real person.

“...A cell phone application that would link to the Web-based program. “What if we could use cellphone technology to help patients monitor their condition more effectively and at the same time provide information to their doctors?” she wondered.

The team of students, Meric Ozturk, Steven Pham, Phillip Schaecher and James Tan, jumped at the idea and took off running. Under the tutelage of their advisor, Anthony

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~ Marlene von Friederichs-Fitzwater

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“It’s amazing how well this technology is received,” says von Friederichs-Fitzwater. “In hospitals where they use similar technology for giving discharge instructions, patients actually have called the hospital some days later and asked to speak to the virtual ‘person’ for more advice.”

Getting connected with a phone app
When a group of UC Davis biomedical engineering students were looking for a senior design project, von Friederichs-Fitzwater was ready with an idea especially aimed at young cancer patients – a cell phone application that would link to the Web-based program. “What if we could use cellphone technology to help patients monitor their condition more effectively and at the same time provide information to their doctors?” she wondered.

The team of students, Meric Ozturk, Steven Pham, Phillip Schaecher and James Tan, jumped at the idea and took off running. Under the tutelage of their advisor, Anthony
Passerini, assistant professor in the Department of Biomedical Engineering, they created a device that can take data from a patient’s “point of care testing” device, such as a home glucose monitor, and transfer the information through a cell phone to a web application, which in turn sends it to an electronic medical record system.

At that point, the information can be used in a variety of ways: the physician can receive live updates on how a patient is faring; the data can be graphed over time so that a physician and patient can monitor progress; and the patient can be contacted with additional information or instructions.

Most importantly for many young people, the non-medical information can be shared via the phone app with friends, family members and other patients on the network who also have cancer.

“We’re all addicted to Twitter, Facebook and texting,” says Pham, who along with the other students would be graduating in only a few weeks with a Bachelor of Science degree at the time of the interview. “This cell phone app is a natural extension of those social networking capabilities – a way for cancer patients to have their own support group that is informed and there to help.”

Enthusiastic about their prospects, the research team considered founding a Silicon Valley startup with their technology. But the students realize that many steps are needed before making their project available to cancer patients, including ensuring confidentiality and testing the application with actual patients.

Their professor, Passerini, is clearly impressed. “Most importantly, there is plenty of opportunity to expand the technology they developed,” he says. “They are designing for an emerging reality.”

For von Friederichs-Fitzwater, the emerging reality cannot arrive soon enough.

“I would have loved to have had such capability when I was struggling with cancer,” says von Friederichs-Fitzwater. “If I had been given the opportunity to share the experience with friends, family and, most importantly, other young adults with cancer, it would have made all the difference.”

“The beauty of this technology is that it can be tailored to each patient’s needs. And it can be used by patients who are isolated – both physically, such as those living in rural areas, and emotionally, such as those who have a hard time reaching out to another person.”

~ Frederick Meyers
UC Davis Cancer Center patient represents California for Children’s Miracle Network Hospitals’ Champions program

Parmina Valentine, an 11-year-old patient of the UC Davis Cancer Center and the UC Davis Children’s Hospital, was chosen to represent the state of California for Children’s Miracle Network Hospitals’ Champions Across America program.

Parmina was treated for a rare form of cancer, called mediastinal embryonal germ cell tumor. She was selected for the honor because of her spirit and courage, and was the focus of media events sponsored by WalMart and Ace Hardware in Sacramento.

The Champions program brings together children from across the United States who have tackled severe medical challenges. They represent the 17 million children treated at 170 Children’s Miracle Network Hospitals every year. Through the Champions program, Parmina will support fundraising campaigns for UC Davis Children’s Hospital throughout the year.

In October, Parmina traveled to Washington, D.C., where she visited the White House and Capitol Hill, and met with California representatives to share her story. Following her trip to the nation’s capital, Parmina and the other Champions and their families took part in Children’s Miracle Network Hospitals’ annual “Celebration” at Disney World in Orlando, Fla. The event unites hospitals, sponsors and celebrities to celebrate achievements, share best practices and honor the children who benefit from Children’s Miracle Network Hospitals’ fundraising efforts.

“These Champions are the heart and soul of what we do,” said John Lauck, president and CEO of Children’s Miracle Network Hospitals. “Their inspirational stories are proof that the $236 million we raise each year for children’s hospitals makes a difference. However, our hospitals give away billions of dollars in charity care each year, so these children also serve as a reminder that the need to support children’s hospitals is still great.”

Children’s Miracle Network Hospitals was established in 1983 by Marie Osmond and her family, along with John Schneider, Mick Shannon and Joe Lake, to raise awareness of the vital work taking place in children’s hospitals in North America. As of 2011, the charity has raised more than $4.3 billion – most of which is donated a dollar or two at a time.

A member of the network, UC Davis Children’s Hospital is a world-class pediatric hospital devoted to the health of babies, children and adolescents. With more than 120 physicians in 33 pediatric subspecialties, it is the most comprehensive pediatric hospital in the Sacramento region, offering compassionate, family-centered care in a healing environment.

Young pediatric cancer investigator receives surprise major donation

UC Davis research into ways to better target therapy to childhood cancers has received a major boost, thanks to a $100,000 surprise gift from the Keaton Raphael Memorial.

Noriko Satake, assistant professor and pediatric oncologist, was handed the check without notice earlier this fall by Robyn Raphael, CEO of Keaton Raphael Memorial, a Roseville-based philanthropy that has raised millions for cancer research and support for families affected by childhood cancer.

Raphael said her organization chose Satake’s research because neuroblastoma is a serious childhood cancer that would benefit greatly from new discoveries.

“My son, Keaton, was diagnosed with stage IV neuroblastoma, which is a very aggressive and sneaky cancer. Treatments remain very toxic and often destroy healthy cells along the way. A targeted therapy would allow drugs to be delivered to the neuroblastoma cells specifically, and be much less invasive.”

The physician-scientist said she had no idea she was to receive the grant when she was invited to a fundraising luncheon recently.

“I almost cried,” she said. “Research funding in these last few years is extremely tight. It is very difficult for young investigators like me to obtain research funding from the National Institutes of Health (NIH). The Keaton Raphael Memorial funding will allow me to work on the project immediately so that I can obtain adequate data to compete for a research grant from NIH in a year or so from now.”

For more news stories, visit cancer.ucdavis.edu, click on “newsroom.”
Satake’s work utilizes technology developed by one of her mentors, Kit Lam, professor and chair of the Department of Biochemistry and Molecular Medicine. Lam developed novel methods to use nanoparticles to deliver drugs directly to tumors.

“These nanoparticles can deliver high doses of drugs to the cancer cells,” she said. “I am creating a model to test such new treatment in neuroblastoma. If everything goes well, in three to five years, we may be able to start a clinical trial with the new nanoparticle drug that we develop here at UC Davis.”

The St. Baldrick’s Foundation awards $100,000 to UC Davis stem cell researcher

Paul Knoepfler, an associate professor of cell biology and human anatomy at the School of Medicine, received a $100,000 grant from the St. Baldrick’s Foundation to investigate the molecular causes of brain tumors in children.

The foundation, perhaps best known for its signature head-shaving fundraising events, is a volunteer-driven charity committed to funding the most promising research to find cures for childhood cancers and give survivors long and healthy lives.

Knoepfler is exploring the hypothesis that a certain factor – the oncogene N-Myc – causes a deadly brain cancer as well as other childhood tumors by locking in the abnormal development of certain neural stem cells. His research is focusing on a possible aberrant mechanism that leads to medulloblastomas, the most common form of malignant brain tumors in children. The tumors are more prevalent in children under the age of 5, and are found more often in males than females.

“The problem in medulloblastomas is that for some reason the neural stem cells appear to have an accelerator, but no brake,” said Knoepfler, who also holds a position at the Institute for Pediatric Regenerative Medicine at Shriners Hospital for Children-Northern California. “Once a normal stem cell mutates into a cancer stem cell, it continues to rapidly grow and develop in its cancerous form. Our preliminary data point to N-Myc doing double duty as a ‘molecular villain,’ punching the accelerator and releasing the brakes in these cells, thus driving the formation of tumors. I’m hoping to come up with new treatments by identifying a way to harness these troubling cellular activities.”

According to the National Cancer Institute, medulloblastomas, although rare, are a common brain tumor in children and responsible for up to 25 percent of all pediatric brain cancers. Nationally, about 800 new patients were referred last year.

News from the UC Davis Cancer Care Network

Fremont-Rideout Cancer Center

Construction of the 15,141-square-foot expansion of the Fremont-Rideout Cancer Cancer began in August. The expansion will add 12 additional transfusion bays, six exam rooms, a second linear accelerator and an ultrasound machine. The cancer center has experienced tremendous growth, with more than 800 new patients referred last year. The additional space means more physicians, more exam rooms, more state-of-the-art equipment and more treatment stations. It means more time, more hope and more life for our patients and their families.

ValleyCare Health System

The Women’s Imaging Center at ValleyCare has added an innovative tool to its arsenal of equipment to detect breast cancer at its earliest stages. The Acuson S2000 Automated Breast Volume Scanner is a dedicated imaging system that provides automated 3D ultrasounds of the entire breast in 10-15 minutes. The technology gives physicians a more comprehensive, three-dimensional view than conventional ultrasound of the entire breast and its physical structures, and allows for detection of some cancers that are not visible by mammography, especially among women with dense breast tissue.

Tahoe Forest Cancer Center

Recognizing the need for quality cancer care close to home, Tahoe Forest Cancer Center in Truckee has an expansion underway. With guidance from local community groups, employees and physicians of the Tahoe Forest Health System, the new cancer center will be 34,000 square feet and include state-of-the-art care, including medical oncology, hematology, radiation oncology, PET CT, a physics lab, expanded psycho-social programs, and new patient and support areas. The new facility will open in 2012.
500 cases are diagnosed annually. They usually occur in children before the age of 10. The tumors arise in the part of the brain (cerebellum) that controls balance and other complex motor functions.

Knoepfler, a cancer survivor himself, specializes in regenerative medicine and cancer-related research. Some of his work focuses on understanding how stem cells are programmed and how that programming can go awry, thereby causing birth defects or cancer. He specifically has analyzed the epigenetic changes in stem cells – the mechanisms, apart from mutations, by which the environment influences gene expression and may lead to tumors or birth defects.

Grant will fuel young cancer researchers

UC Davis Cancer Center has received a $3.5 million grant to help foster development of the next generation of cancer physician-scientists.

The five-year grant, from the National Institutes of Health (NIH) and the National Cancer Institute, will provide training to junior UC Davis faculty members dedicated to patient-oriented cancer research.

While the School of Medicine has received other NIH-mentored training funds, the new grant is the first such award for UC Davis solely focused on cancer.

Primo “Lucky” Lara, a medical oncologist and professor of medicine, who is principal investigator of the grant, will lead more than two dozen senior UC Davis faculty and mentors in the grant implementation. Lara said the new Clinical Oncology Research Career Development Program will facilitate the translation of advances being made in the laboratory into treatments that will improve outcomes for cancer patients.

“This is seed money that will blossom,” said Lara. “By investing in these young, talented researchers, we are advancing patient care through development of new drugs, imaging techniques and therapeutic targets. The research data generated from this grant also will most likely foster additional research funding opportunities.”

Scholars selected for the program will benefit from an interdisciplinary and collaborative training program that will include experiences in cancer molecular biology, clinical pharmacology, bioethics, clinical trial design, developmental therapeutics, biostatistics and other relevant topics. With clinical, basic and translational research mentors, each scholar will then develop a patient-oriented research project in some aspect of cancer therapeutics. The program will be open to physicians, nurses, pharmacists and clinical scientists interested in advancing patient-oriented cancer research. Six scholars will take part in the program at any one time.

Lara said the first group of scholars will be selected by the spring of 2012 and begin work in July of 2012.

With this grant — officially called the Paul Calabresi K12 Clinical Oncology Award — UC Davis Cancer Center is now part of a select group of approximately 20 cancer centers in the nation, including MD Anderson, Memorial Sloan Kettering, City of Hope and Duke University.

“The cancer center is a major contributor to the UC Davis Health System, the university and the health of people in Northern California,” said Ralph deVere White, Cancer Center director. “This grant ensures that we can train the next generation of doctors, researchers and clinicians who will make sure this growth continues.”

Cancer center honored in the top 50 nationally

The UC Davis Cancer Center was ranked 39th in the nation in U.S. News & World Report’s 2011–2012 best hospitals survey, which evaluated 900 cancer centers.

“We are proud of the hard work and commitment to excellence that has resulted in this recognition from U.S. News & World Report,” said cancer center director Ralph deVere White.

“As a national leader in innovative cancer research, compassionate care and outreach to address health disparities, we are breaking barriers to beat cancer.”

The U.S. News ranking summarizes the quality of inpatient care examining the balance of nurses to patients; mortality statistics; patient safety; reputation; the numbers of procedures conducted; and other care-related measures such as technology and patient services. Hospitals that appear on the list often pioneer new treatments, conduct translational research and exploit the latest advances in imaging, surgical devices and other technologies that advance health.

UC Davis is one of only 65 hospitals nationwide with a National Cancer Institute-designated cancer center. At the UC Davis Cancer Center, top specialists provide care each year for more than 9,000 adults and children, and offer access to more than 150 clinical trials. Through the Cancer Care Network, UC Davis collaborates with community hospitals and clinics to offer the latest cancer services to patients throughout the Central Valley and Northern California.
UC DAVIS CANCER CENTER

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