

Challenge accepted

The University of Kentucky Markey Cancer Center
is taking on Kentucky and Appalachia's cancer challenge

2015 Annual Report

UKHealthCare®
Markey Cancer Center

An NCI-Designated
Cancer Center

Table of Contents

Introduction by B. Mark Evers, MD	1
From bench to bedside	2
Audrey's story	4
Bringing research close to home	6
A targeted approach	8
Emily's story	10
Art and food as medicine	12
Improving our standing	14
Beyond standard therapy	16
Reaching the unreachable	18
Markey by the numbers	15, 20

Markey by the numbers

\$43M in funded research

\$3.7M in philanthropic support from **1,398** donors

over **90K** outpatient visits

3,306 new patients **841** from outside Kentucky

143 physicians & researchers

28 departments

15 affiliates

8 colleges across the UK campus

1 NCI-designated center

We are meeting Appalachia's cancer challenge head-on

The Appalachian region faces an enormous challenge. Kentucky, and specifically the Appalachian area of the state, has both the highest incidence of cancer and the highest cancer mortality rate in the country. Factors such as obesity, smoking and poor access to health care in rural regions have made the challenge of combatting cancer even more daunting.

challenge accepted

Although our challenges are significant, so too are our efforts to fight this disease.

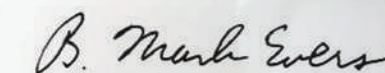
As Kentucky's only National Cancer Institute-designated facility, the University of Kentucky Markey Cancer Center has a tremendous responsibility to the people of the Commonwealth and the Appalachian region. It is our goal to significantly reduce cancer mortality in the Commonwealth.

Advancements in precision medicine are helping us make remarkable progress. Just 20 years ago, treatment protocols for patients with a particular type of cancer were startlingly similar, regardless of the patient's age or sex. In the last 10 years, however, there has been an explosion of techniques that enable us to identify specific biomarkers in a patient's DNA, allowing us to offer the most precise, personalized treatment possible. Furthering the development of these treatment approaches and phase I clinical trials is a major initiative for us in the coming years.

Research, education and screening play a key role not only in cancer treatment, but also in prevention. In the past 10 years, Kentucky has gone from leading the nation in colorectal cancer incidence and having the second-lowest screening rate in the country to decreasing the death rate and incidence rate of the disease by 28 and 25 percent, respectively. Our cancer prevention and control program has also helped to double the number of Kentuckians who get screened for the disease. No other state has experienced such a dramatic shift in such a short period of time. It is truly life-saving work.

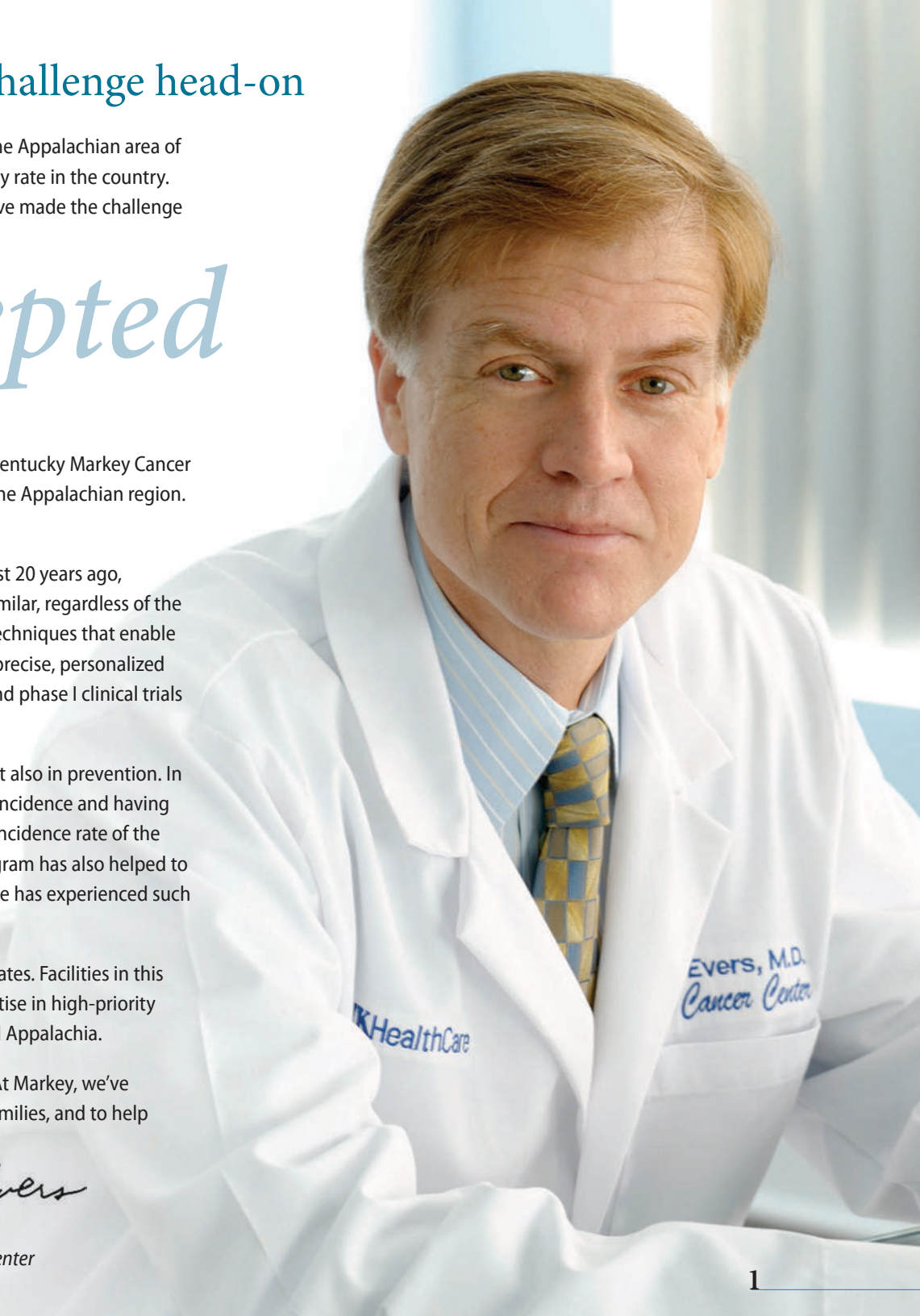
This year, we launched the Markey Cancer Center Research Network with four affiliates. Facilities in this network deliver the highest caliber of cancer care and demonstrate superior expertise in high-priority clinical research. We are bringing clinical trials to the communities of Kentucky and Appalachia.

The value of health care ultimately lies in the difference it makes in people's lives. At Markey, we've accepted the challenge to help lessen the toll cancer takes on patients and their families, and to help Kentuckians live longer, fuller, healthier lives.



B. Mark Evers, MD

Director, Markey Cancer Center



from bench to bedside

With an increased focus on clinical trials, Markey aims to bring innovation and research to patient care

When the UK Markey Cancer Center received National Cancer Institute (NCI) designation in 2013, it joined an elite group of just 69 cancer centers in the United States — and became the only such center in Kentucky. The designation recognizes Markey as an industry leader in cancer research, advancing new methods to detect, treat and prevent a wide array of cancers.

At the heart of this endeavor is Markey's expanding clinical trials program, which includes three types of trials vital to cancer research and treatment innovation. The first, industry-sponsored trials, originate outside of Markey, often by pharmaceutical companies that partner with Markey researchers and clinicians to administer the trial.

In the second type of clinical trial at Markey — cooperative group trials — several cancer centers partner to provide patients access to new and novel cancer therapies, allowing researchers to glean information from a larger number of patients.

The third type of clinical trial, investigator-initiated trials, are those that originate at Markey and are led by Markey researchers. These types of trials, which are a pillar of NCI-designated cancer centers, help hone

Markey's research program and provide patients with leading-edge, bench-to-bedside medicine.

Markey's Rachel W. Miller, MD, is leading two such studies in gynecologic oncology. In the first trial, patients with advanced ovarian, primary peritoneal and fallopian tube cancers receive chemotherapy prior to aggressive surgery, which is followed by more chemotherapy. This method is thought to result in a lower rate of complications from surgery, while maintaining outcomes and survival.

The second trial evaluates interventions for patients who experience chemotherapy-related cognitive changes, such as memory loss or difficulty multitasking. It uses neurocognitive testing before and after six cycles of chemotherapy and incorporates functional MRI and EEGs. A central goal for each trial is lessening and managing the impact of treatment for ovarian cancer, which Miller said can help patients better cope with the illness itself.

Markey is set to increase the number of investigator-initiated clinical trials it is doing through the development of a Phase I Clinical Trial Unit. Phase I clinical trials bridge the gap between basic research and

clinical care, where new and novel cancer therapies are piloted in humans for the first time.

"Having a standalone unit will help us with first-in-human drug studies," Markey Director B. Mark Evers, MD, FACS, said. "Those sort of novel, leading-edge clinical trials are expected of NCI-designated cancer centers."

"NCI-designated cancer centers, such as Markey, are leading the way in terms of precision medicine initiatives."

– B. Mark Evers, MD

The Phase I Clinical Trial Unit will also provide companies manufacturing new cancer therapies with an industry-leading partner.

"Drug companies are looking for sites to partner with in first-in-human types of drugs," Evers said. "We will be much more competitive for those types of trials with this unit."

One particular area the Phase I Clinical Trial Unit will seek to advance is precision medicine, an avenue of cancer therapies that are tailored to the specific patient.

"NCI-designated cancer centers are leading the way in terms of precision medicine initiatives," Evers said. "What we're finding is that everybody's an individual and their tumors are individuals as well."

With a wide range of research already underway, Markey is currently recruiting to find the ideal physician scientist to lead the expansion of precision medicine and direct the Phase I Clinical Trial Unit — efforts Evers feels will ultimately translate to better patient care.

"Markey Cancer Center investigators are doing some great work. We have some wonderful studies ongoing," he said. "Now, getting it to the bedside is going to be critical for us going forward."

To learn more about available clinical trials, visit the Clinical Trials page at markey.uky.edu.

Rachel W. Miller, MD, is one of the many physician scientists at Markey developing investigator-initiated clinical trials that will benefit cancer patients in Kentucky and beyond.



compassionate care, every step of the way

Despite a challenging cancer diagnosis, Audrey finds hope and support at Markey

Ten years ago, Audrey Robinson went into a local hospital for an appendectomy. But when she woke up, she learned her problem was not her appendix at all. She had colon cancer.

Audrey and her husband, Don, initially considered leaving Kentucky for her treatment. But a friend from Pennsylvania told them they had a premier cancer center – the UK Markey Cancer Center – right in their own backyard.

In the 10 years since her treatment began, Audrey, now 80, has undergone a number of procedures, including multiple rounds of chemotherapy and radiation and several surgeries. Doctors have found cancer in her lungs, colon and liver, but she doesn't let it stop her from living her life.

There have been no easy answers for Audrey's cancer, but Philip DeSimone, MD, and the multidisciplinary team at Markey have been

with her each step of the way. Markey's expertise in treating complex cases gave Audrey the confidence that her care team's personalized treatment recommendations were the best course of action.

"Audrey's journey has been challenging, but she has maintained a positive outlook and trusted her care team at Markey to provide the best treatment possible," DeSimone said.

Audrey agrees.

"Having a trusting, caring relationship with your doctor is really important," she said. "If there's not always an answer, it's even more important that you have faith in the care you're receiving. That trust is the best thing that's happened with our relationship with Markey."

To learn more about Audrey's story, visit ukhealthcare.uky.edu/Audrey.

There have been no easy answers for Audrey Robinson's complex cancer diagnosis, but her care team at the Markey Cancer Center, led by Philip DeSimone, MD, has been with her every step of the way.

"Having a trusting, caring relationship with your doctor is really important."

– Audrey Robinson



bringing research close to home

Following success of Markey's outreach efforts, the new Research Network expands clinical trials access across Appalachia

Cancer is the leading cause of death in Kentucky and Appalachia, but for some patients with cancer in these areas, finding successful treatment options can be difficult.

To help solve this problem, the UK Markey Cancer Center created its new Research Network.

When conventional cancer therapies are not successful, patients may benefit from new novel therapies available only through clinical trials. The goal of the Research Network is to bring these clinical research studies focused on the prevention, early detection and treatment of cancers to community hospitals in Kentucky and Appalachia.

By offering this research locally, Markey is making it easier for patients to obtain leading-edge therapies and treatments while being cared for by their local doctors and supported by their communities.

The Research Network includes four cancer treatment centers in Kentucky and Appalachia:

- Hardin Memorial Health, Elizabethtown, Ky.
- King's Daughters Medical Center, Ashland, Ky.
- St. Claire Regional Medical Center, Morehead, Ky.
- St. Mary's Regional Cancer Center, Huntington, W.Va.

The Research Network conducts investigations initiated by Markey doctors and scientists as well as national studies available through Markey's membership in the National Cancer Institute's National Clinical Trials Network.

"It is our mission to decrease the cancer burden in Kentucky, and we want to make sure patients have access to the latest therapies," said Tim Mullett, MD, director of the Research Network.

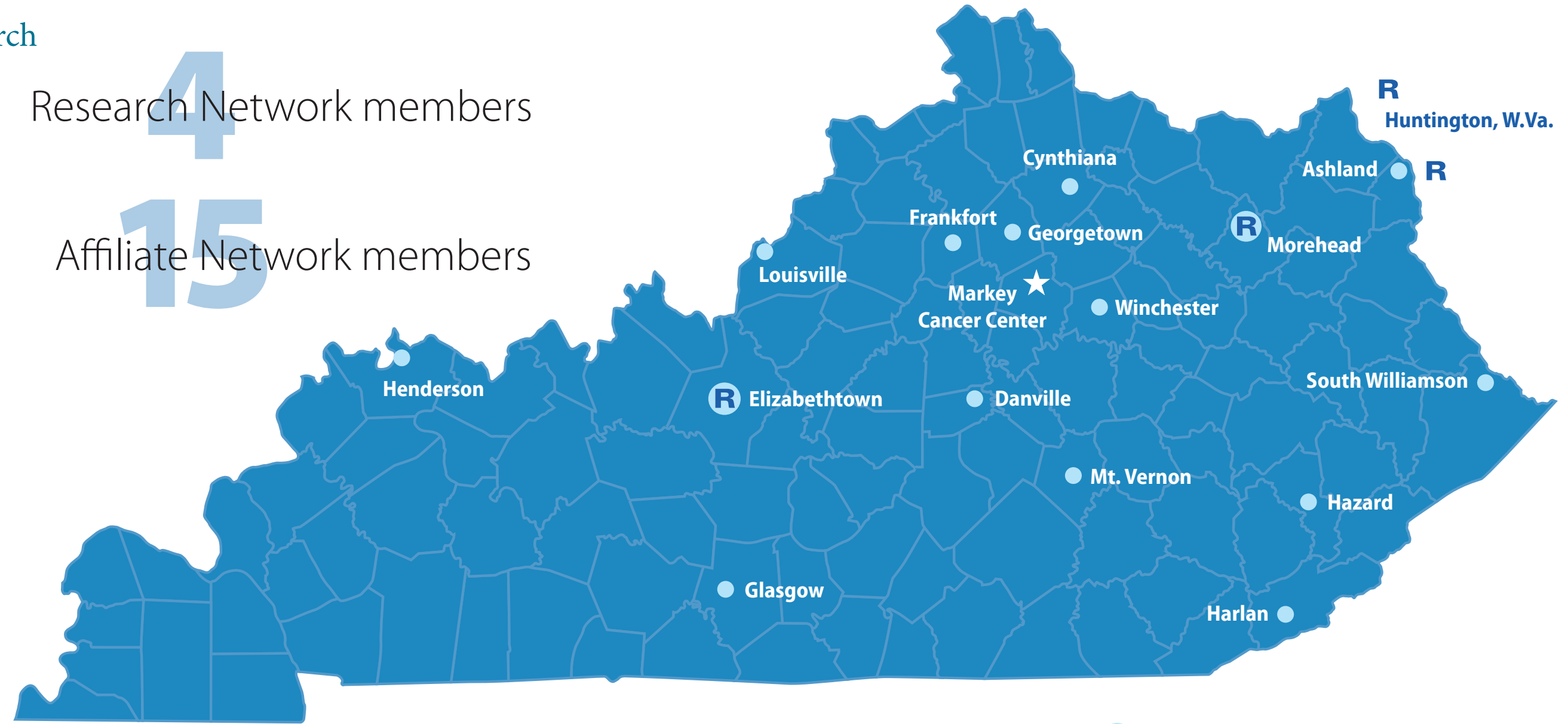
"As a hub for clinical research in this region, we provide powerful, evidence-based clinical trials for patients needing more than standard therapies."

- Tim Mullett, MD

The Research Network follows the growth of the Markey Affiliate Network, a group of 15 health care facilities across Kentucky. These facilities provide high-quality cancer services and programs in their communities with the support and guidance of Markey. The Affiliate Network's vision is for all Kentuckians to have access to excellent cancer care.

4
Research Network members

15
Affiliate Network members



● - Affiliate Network member R - Research Network member R - Affiliate & Research Network member

a targeted approach

Radiation medicine researcher identifies molecule that helps kill cancer and could limit metastasis

A new discovery from UK Markey Cancer Center researchers could improve the way cancer treatment is delivered to patients by precisely targeting cancerous cells and limiting damage to nearby healthy cells. The discovery might also have the potential to limit metastasis.

Researchers have identified a novel small molecule called Arylquin 1 that causes normal cells to secrete the tumor-suppressing protein Par-4. This protein kills cancer cells but is not harmful to healthy cells.

Arylquin 1 might also have benefits related to the spread of cancerous cells, the researchers found. The Par-4 protein is bound to a protein called vimentin, which contributes to tumor metastasis. However, when Arylquin 1 binds to vimentin, Par-4 is displaced from vimentin for secretion, potentially preventing the spread of cancer.

“We are excited by this discovery because Arylquin 1 has a novel three-pronged effect against cancer,” said Vivek Rangnekar, PhD, associate director at Markey and Alfred Cohen Chair in Oncology Research in the Department of Radiation Medicine.

“It releases Par-4 for secretion from normal cells to kill cancer cells, it also directly kills cancer cells but not normal cells, and

importantly, it binds to vimentin and may potentially prevent metastasis. Arylquin 1 and Par-4 are unique because they kill only cancer cells and do not cause harm to normal cells.”

The research was funded from grants from the National Cancer Institute, the National Center for Research Resources, Markey Cancer Center and UK Center for Clinical & Translational Science, and was published in *Nature Chemical Biology*. The results could have a significant impact on future cancer research and treatments, as scientists are already at work formulating Arylquin 1 into a drug to both inhibit primary and metastatic tumors.

Rangnekar initially discovered the Par-4 gene in 1994, and Arylquin 1 was synthesized recently by UK medicinal chemist David Watt, PhD. Along with Watt, Ravshan Burikhanov, PhD, and a team of colleagues, Rangnekar is currently working on the development of a medicine that can cause elevated secretion of Par-4 and might inhibit primary and metastatic tumors.

“Arylquin 1 and Par-4 are unique because they kill only cancer cells and do not cause harm to normal cells.”

– Vivek Rangnekar, PhD



Vivek Rangnekar, PhD, left, and Ravshan Burikhanov, PhD, discuss the results of the Par-4, Arylquin 1 research.

treatable and beatable



Team approach helps teen take down her complex cancer diagnosis

When an MRI revealed that 15-year-old Emily Dawson had a broken leg, she was shocked.

She couldn't remember falling or hurting her leg, so how could it be broken?

The answer was something much worse than a broken bone.

Her doctor suspected Emily had osteosarcoma, an extremely rare form of cancer that affects the bone. He knew exactly whom to call: Patrick O'Donnell, MD, a surgeon at the UK Markey Cancer Center who specializes in orthopaedic oncology.

O'Donnell confirmed the diagnosis and recommended Emily start chemotherapy immediately to combat the aggressive cancer.

But he also gave the Dawson family a piece of good news, a hope to hang onto. "I told them, 'The big thing I want you to remember is that Emily's cancer is treatable and beatable.'"

From late December 2013 to August 2014, Emily would spend a total of 82 nights at UK's Kentucky Children's Hospital (KCH) as she underwent rounds of chemotherapy as well as limb salvage surgery.

Emily's comprehensive treatment took a team effort across multiple departments at KCH and Markey. From a preventative fertility preservation plan implemented prior to starting chemotherapy, to intense rounds of chemotherapy at KCH's pediatric hematology and oncology clinic, to a nine-hour limb-salvage surgery with O'Donnell, Emily's care team worked to ensure her health for the immediate future and the rest of her life.

Although she missed a year of school, Emily's treatment was successful. She returned to school following her care and is expected to graduate on time. She is on her school's archery team and recently organized a team service project to benefit KCH.

Emily will always have follow-up appointments with O'Donnell, but he expects the visits to remain positive.

"Emily has every reason to believe that the cancer will not come back," he said.

To make an appointment with a Markey Cancer Center physician, contact us at **866-340-4488 (toll free)**.

Thanks to a multidisciplinary team approach from the experts at Markey, 15-year-old Emily Dawson was able to beat her osteosarcoma diagnosis and get back to doing the things she loves.

art and food as medicine

“Through integrative medicine, we feel there’s something in each patient that can be healed. And that’s where we want to focus.”

– Connie Jennings, MD



As part of the University of Kentucky’s Integrative Medicine & Health program, patients engage in art therapy as a way to find strength and comfort during difficult treatments. The program’s radiation mask workshops allow patients who have undergone radiation to transform their plastic mesh masks into works of art once treatment is complete.

Integrative Medicine at Markey brings together more than a dozen programs to treat mind, body and spirit

There’s a difference between being cured and being healed, says Connie Jennings, MD.

“We meet patients every day who have problems that can’t be cured,” she said. “But through integrative medicine, we feel there’s something in each patient that can be healed. And that’s where we want to focus.”

As part of the UK Markey Cancer Center’s commitment to exceptional patient care, it has made significant strides to establish and expand the University of Kentucky’s Integrative Medicine & Health program. Jennings serves as the medical director of the program.

With more than a dozen programs, including narrative medicine, music therapy, art therapy, Jin Shin Jyutsu, nutrition and more, Integrative Medicine & Health offers patients an array of services that might speak to them and help them feel in control when they are at their most vulnerable, Jennings said.

Several Markey patients have found this sense of comfort through the radiation mask art therapy workshops, where patients who wear plastic mesh masks for treatment transform the masks into pieces of art once their radiation course is over.

Jennings recalled one patient who bedecked her mask with bows, blonde hair, big eyelashes, oversized earrings and a huge smile.

“The mask kind of became her totem,” Jennings said.

Participating in Integrative Medicine & Health services such as this will soon become easier for Markey patients, as the division, which provides services across UK HealthCare, consolidates at Markey’s Marylou Whitney and John Hendrickson Cancer Facility for Women. It is also expanding through a new partnership with the state’s local food resource, Kentucky Proud, and will include on-site cooking demonstrations and recipes for Markey patients — resources aimed at improving life-long health.

“We’re hoping we can provide education and practical ways of eating for our patients, and when they go home, they will share this information with their families,” Jennings said.

Kristen Branscum of the Kentucky Department of Agriculture, which oversees Kentucky Proud, sees the partnership as an effective way to help Kentuckians engage with healthy food grown close to home.

“We want people to grow up with the mentality that local eating has health benefits,” she said.

To learn more about UK’s Integrative Medicine & Health program offerings, visit ukhealthcare.uky.edu/IM.



Nutrition plays an important role in the cancer treatment process. Connie Jennings, MD, the medical director of Integrative Medicine & Health, left, and Rachel C. Miller, a registered dietitian at Markey, host healthy cooking and nutrition demonstrations aimed at improving patients’ health long term.



improving our standing

Kentucky LEADS program aims to lessen the burden of lung cancer in the Commonwealth

Lung cancer is the most common form of cancer worldwide, and Kentucky leads the nation in lung cancer incidence and mortality, making the state's lung cancer burden both substantial and devastating.

While lung cancer is associated primarily with tobacco use, there actually are a number of factors that can cause the disease. Health care providers across the state agree that the cause of the disease should not impede efforts to provide optimal care and compassion for those individuals and families affected by it.

The Kentucky LEADS (Lung Cancer Education, Awareness, Detection and Survivorship) Collaborative is an effort among the University of Louisville, the Lung Cancer Alliance and the UK Markey Cancer Center aimed at changing the face of lung cancer in Kentucky.

The program's three-pronged approach focuses on the education of primary care providers to improve lung cancer care and control efforts across the state; a survivorship program to promote the quality of life and well-being for lung cancer patients and their caregivers; and an intervention to create and improve high-quality lung cancer screening programs throughout the Commonwealth.

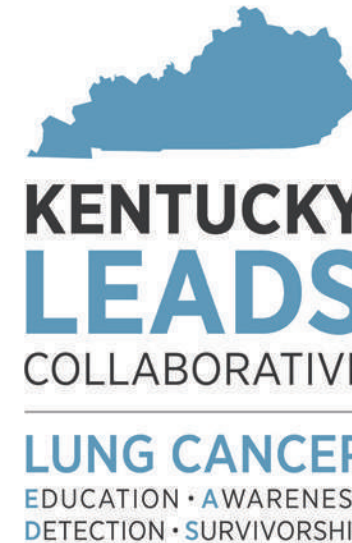
Kentucky ranks number

"The Kentucky LEADS Collaborative brings together an interdisciplinary team of lung cancer clinicians, researchers and advocates to develop and evaluate unique interventions that address different aspects of the lung cancer burden in Kentucky," said Jamie Studts, PhD, associate professor of behavioral science at the University of Kentucky and principal investigator for the Kentucky LEADS Collaborative. "The combined expertise of the three institutions allows us the opportunity to work with providers, patients and health care systems to implement optimal lung cancer care and control throughout Kentucky."

Funded in large part by a grant from the Bristol-Myers Squibb Foundation, the projected \$8.5-million initiative aims to facilitate new approaches to identifying lung cancer early to improve survival and to develop new interventions to improve quality of life for individuals diagnosed with lung cancer, as well as their caregivers.

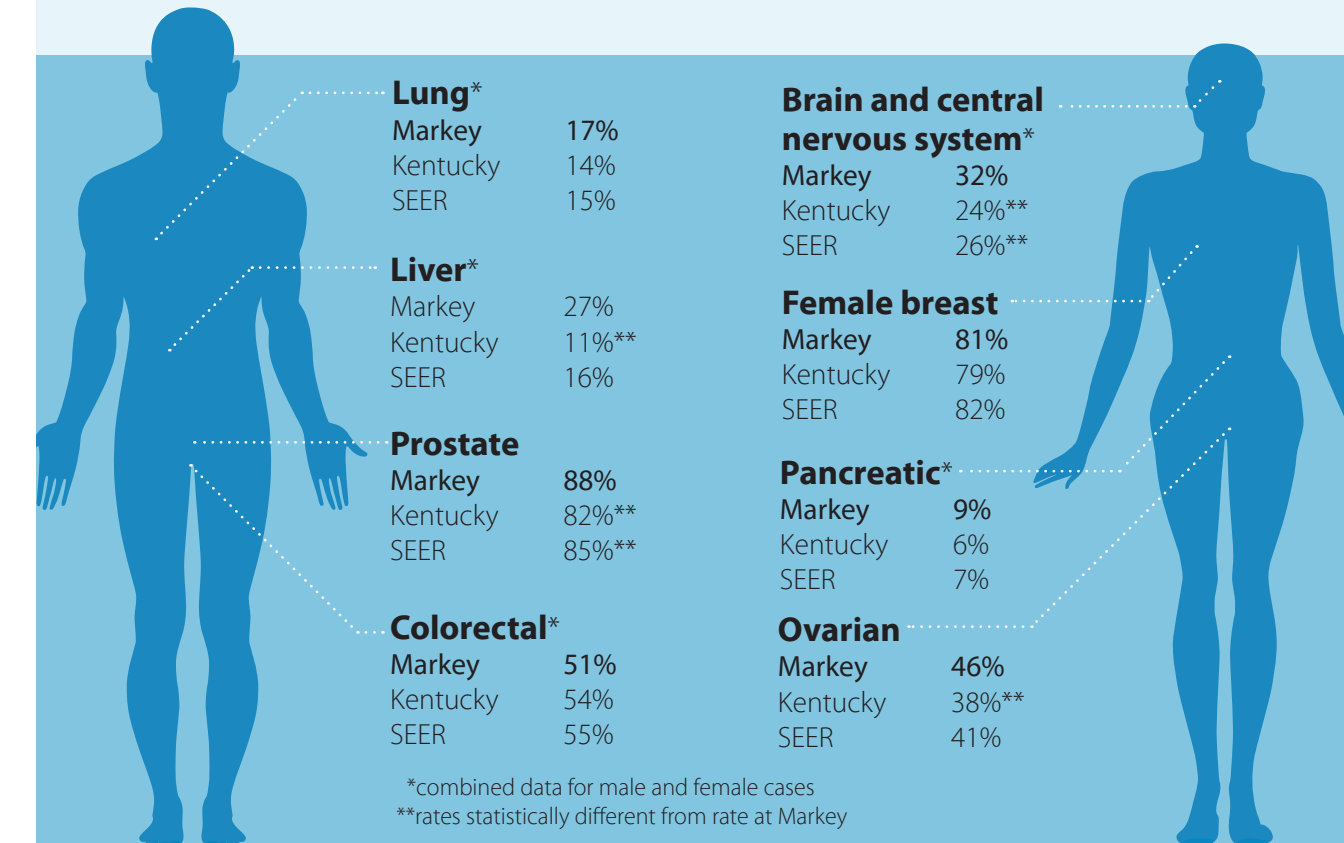
"The first year of this grant provided an opportunity to develop these interventions," Studts said. "We are very excited to move these interventions into the community with an extensive network of community partners that are similarly dedicated to reducing the burden of lung cancer in Kentucky."

in lung cancer incidence and mortality



Markey by the numbers

Five-year survival data



The graphic above shows, for each cancer type, the estimated five-year survival rates of patients treated at the UK Markey Cancer Center for the time periods 2005-2012 (Markey and Kentucky data) and 2004-2011 (SEER data). Markey's rates are compared to figures for patients from Kentucky who had the same cancer type and patients in the national SEER database who had the same cancer type.

The SEER database includes 18 cancer registries with high-quality population-based tumor data from states around the U.S. The SEER registries cover approximately 28 percent of the U.S. population, and statistics based on the SEER data have been widely used to represent statistics from the U.S.

beyond standard therapy

Markey adds top recruit to lead Hematology and Blood & Marrow Transplantation Program

When Gerhard Hildebrandt, MD, FACP, arrived at the UK Markey Cancer Center in early 2015, he hit the ground running.

Previously the director of the Blood and Marrow Transplant program at the University of Utah's Huntsman Cancer Institute, Hildebrandt brought with him expertise – and an expectation for Markey to expand its already-impressive blood and marrow transplant efforts.

As the chief of Markey's Hematology and Blood & Marrow Transplantation division, Hildebrandt set a goal of 100 transplants in 2015, with plans to grow in the future to accommodate the needs of people in Kentucky and neighboring states.

As the larger of only two such programs in the state, Markey is in a position to provide leading-edge care for Kentuckians, Hildebrandt said. That mission is further underpinned by the center's accreditation by the Foundation for the Accreditation of Cellular Therapy (FACT) as well as Markey's status as a National Marrow Donor Program (NMDP) Be the Match® transplant center, which provides patients with the world's largest and most diverse registry for bone marrow transplant.

Hildebrandt has a vision for Markey that goes beyond providing standard autologous and allogeneic transplants, including developing cellular and immune therapy treatment options for patients.

"Using the immune system to battle cancers of the blood and lymph system instead of relying only on chemotherapy-based approaches often provides a more robust anti-cancer effect with higher chance for duration of response and possible cure," Hildebrandt said.

"We want to develop a state-of-the-art immunotherapy-focused program where we have transplant as a cell-based treatment modality, which will serve as a backbone for more advanced interventions and novel strategies, and where we have other non-transplant immunotherapy approaches and precision medicine options available for our patients."

To learn more about the Hematology and Blood & Marrow Transplantation Program at Markey, visit ukhealthcare.uky.edu/blood.

Gerhard Hildebrandt, MD, FACP, middle left, works with his team to provide innovative therapies for patients with cancers of the blood and lymph system. Hildebrandt arrived at Markey in early 2015 and serves as the chief of the Hematology and Blood & Marrow Transplantation division.

"We want to develop a state-of-the-art immunotherapy-focused program."

– Gerhard Hildebrandt, MD, FACP



Markey's community outreach program helps improve access to cancer screening throughout Kentucky

Lung, colorectal, breast and cervical cancer combined represent 42 percent of all cancer cases that occur in Kentucky, and 52 percent of cancer deaths.

While cancer-screening methods such as mammograms and colonoscopies can help detect some of these cancers in early stages, when they are most treatable, many Kentuckians do not seek out these screenings.

That hesitancy is something Melissa Hounshell is trying to change. As community outreach director for the UK Markey Cancer Center, Hounshell spent much of 2015 traveling across the state, forming 20 new partnerships with community hospitals and health centers.

Hounshell organized numerous mammogram screening events, which led to five women being called back for additional diagnostics. At these events, she also made a point to spread the word about FIT kits — at-home tests that are then mailed to a lab, that screen for blood in the stool, a potential marker of colorectal cancer.

"There wasn't a place I went last year that I didn't talk about FIT kits and the importance of getting some type of screening," Hounshell said.

In 2001, Kentucky had the highest colorectal incidence rate in the United States, and was ranked 49 of the 50 states for colorectal cancer screening, said Tom Tucker, PhD, MPH, associate director for cancer prevention and control at Markey.

This startling statistic spurred several major cancer groups in the state into action, leading to the launch of a program encouraging primary care physicians to recommend and schedule colorectal screening. In rural areas of the state where primary care physician care is less common, individuals from the community were recruited for screening and asked to encourage their age-eligible friends to also be screened. By 2008, the results of these efforts were clear.

"In seven years, we went from just over one-third of the population age 50 and older ever having had a sigmoidoscopy or colonoscopy to nearly two-thirds," Tucker said, noting that the state also went from No. 49 in colorectal screening to No. 25, while colorectal cancer incidence rates dropped by 25 percent and mortality rates dropped by 30 percent.

But in spite of the progress, there is still much to do: A third of age-eligible Kentuckians are still not screened for colorectal cancer. So in 2016, Hounshell will focus her efforts on distributing FIT kits in the population centers where individuals are least likely to pursue screening.

"Markey is committed more than ever to leading a comprehensive cancer screening education and prevention program," she said. "It's about reaching some of those people who have been unreachable and really embedding ourselves in the community."

To learn more about Markey's cancer screening programs, call **859-323-2034**.

reaching the unreachable

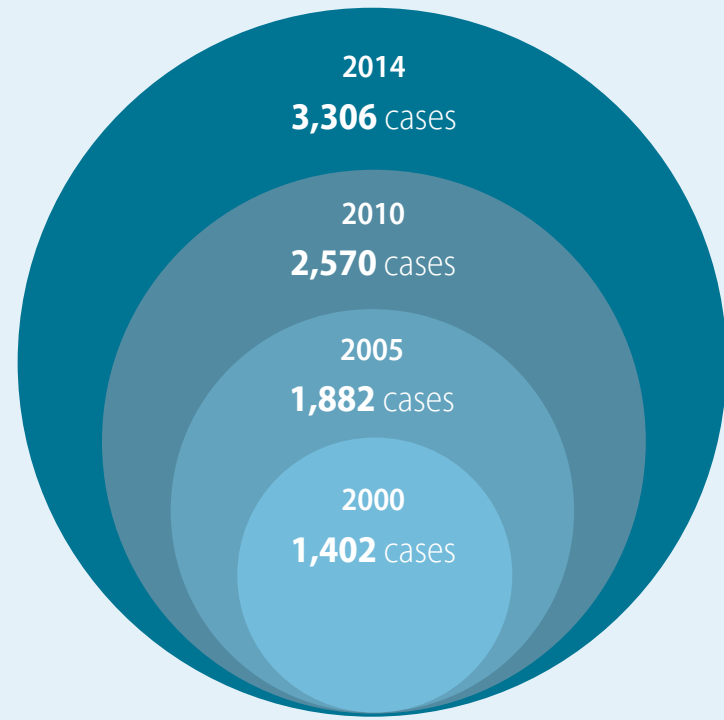
"It's about reaching some of those people who have been unreachable and really embedding ourselves in the community."

– Melissa Hounshell



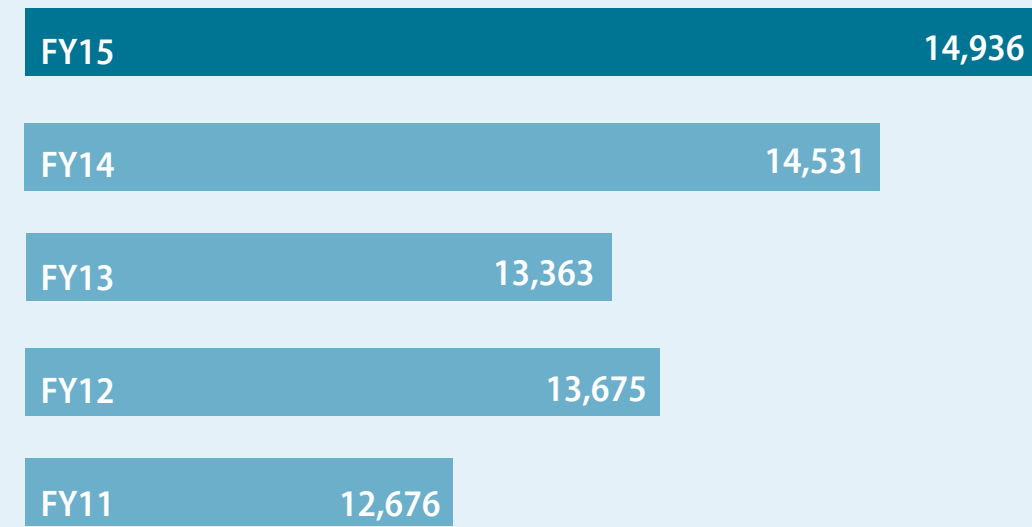
Markey Community Outreach Director Melissa Hounshell, left, and Carla Washnock, right, patient navigator at Kentucky Cancer Link, discuss the at-home colorectal screening with patient Butch Davis. The FIT test, which screens for blood in the stool, is a potential marker of colorectal disease.

Markey by the numbers

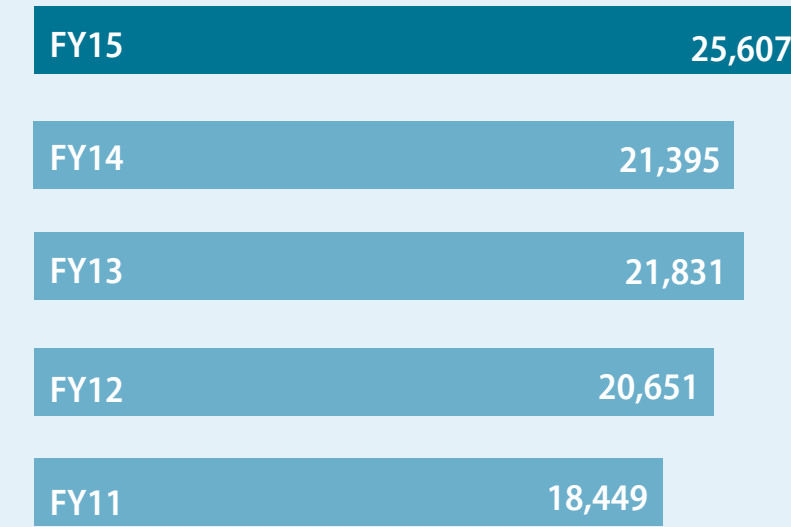


Growth in new cancer cases by calendar year

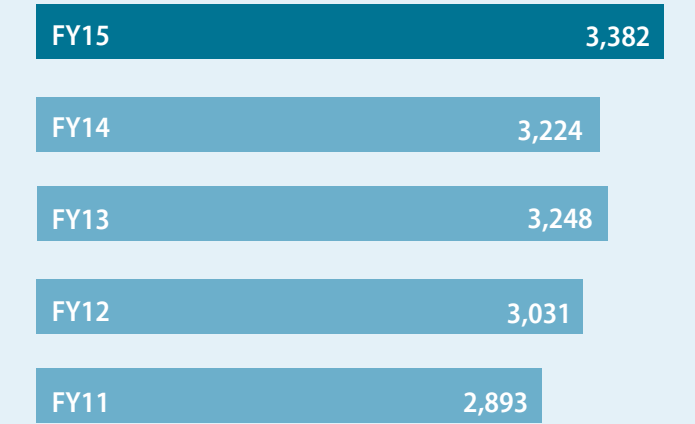
Chemotherapy visits



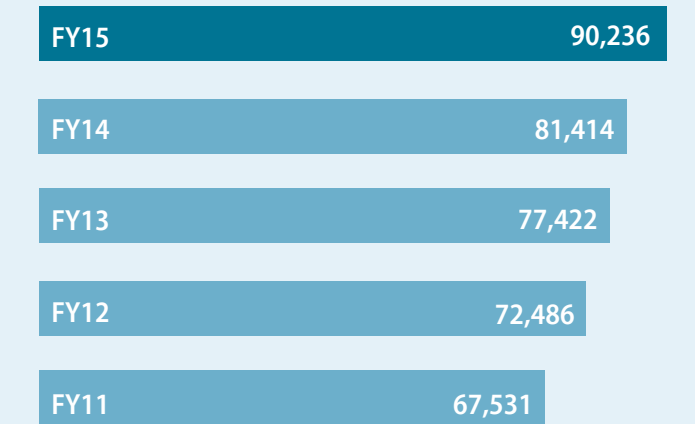
Radiation Medicine visits



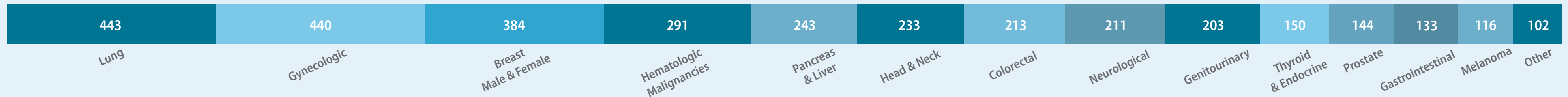
Inpatient Neoplasms & Hematology visits



Outpatient Neoplasms & Hematology visits



Cancer cases by site in 2014 (total 3,306)



Markey Cancer Center Mission

To reduce cancer mortality in our region through a comprehensive program of cancer research, treatment, education and community engagement with a particular focus on the underserved population of Kentucky and Appalachia

markey.uky.edu

 facebook.com/UKMarkey  [@UKMarkey](https://twitter.com/UKMarkey)

UK HealthCare® | An NCI-Designated
Markey Cancer Center | Cancer Center