

# The David H. Koch Institute for Integrative Cancer Research at MIT

## Goals, Objectives, and Priorities

The [David H. Koch Institute for Integrative Cancer Research](#), a National Cancer Institute (NCI)–designated cancer center, provides a state-of-the-art research facility and collaborative environment for cancer research on the MIT campus. Completed in 2010, the Koch Institute (KI) building allows for the physical co-localization of faculty members from the Department of Biology (formerly in the MIT Center for Cancer Research) and faculty drawn from a variety of departments in the MIT School of Engineering. This multi-disciplinary group of investigators is at the core of the Koch Institute’s mission: to combine cancer science and cancer-oriented engineering to develop new insights into cancer as well as new tools and technologies to better treat, diagnose, and prevent the disease.

As a group, our goal is to make the Koch Institute the gold standard in interdisciplinary disease-focused research. The organization is continually expanding a highly effective [relationship network](#) that involves other academic and clinical oncology centers, industrial partners, and cancer-focused individuals and foundations. As part of an institution of higher education, we are also deeply committed to [training](#) the next generation of cancer researchers. Many of our efforts this past year have been focused on further strengthening internal and external communications and collaborations.

## Accomplishments

In 2013, KI ran a series of workshops and other activities aimed at community building, with the goal of strengthening integration and furthering interactions between scientists and engineers, as well as exposing researchers to the clinical, patient-based side of cancer work.

*Oncology Seminar Series:* This first cancer-specific seminar series at MIT invites top-level cancer researchers and clinicians to present their work and meet with faculty and researchers at the Koch Institute. The seminars have been well attended and received very favorable reviews.

*Yearly Fall Retreat:* The purpose of this retreat is to provide an off-campus opportunity for sharing lab research and highlighting new research areas through formal presentations, poster sessions, and casual events.

*Friday Focus:* This internal weekly seminar series has broken down language barriers and become a very successful cross-disciplinary educational/training platform for presenting recent data from each of the KI labs.

*Crossfire:* This in-house lecture series is designed to bring our two major constituencies closer together. Biology lectures cover the basics of key areas of cancer biology, while engineers present lectures on trends in materials, tissue engineering, and nanoparticles. Graduate students and postdoctoral fellows present broad-scope lectures explicitly designed to reach across disciplines.

*The Doctor Is IN:* Presented by MDs, this event exposes researchers in the building to real clinical issues, including patient case studies and new treatments being tested in the clinic.

*Core Facility Open Houses:* Koch Institute core facilities open their doors to KI and MIT researchers to give a glimpse at services provided and to allow opportunities to ask questions and discuss projects.

*Committee for Community Life:* KI volunteers (trainees, staff, researchers, and administrators) organize community-building events and the seminars/lectures listed above. They also discuss other issues of importance to postdocs and graduate students.

*Cancer Community Newsletter:* This electronic newsletter, *Changing the Course of Cancer*, published since 2009, sends news and highlights of KI members' achievements, awards, and publications to current and past KI members.

KI also focused on outreach beyond our research community. The following are some examples.

*KI Cancer Solutions Newsletter:* This electronic newsletter sends highlights of newsworthy achievements, awards, and publications of KI members to over 2,500 readers with an interest in the Koch Institute.

*Koch Institute Public Galleries:* The galleries were established to connect the community in Kendall Square and beyond with work being done at the cutting edge of cancer research and, more generally, with life sciences work at MIT. Within the galleries, visitors can explore current cancer research projects, examine striking biomedical images, hear personal reflections on cancer and cancer research, and investigate the historical, geographical, and scientific contexts from which the Koch Institute emerged. New exhibits are unveiled regularly, including the annual exhibition of winning biomedical images from the Koch Institute Image Awards. The galleries are free and open to the public from 8 am to 6 pm weekdays.

*With/In/Sight Lecture Series:* Initiated in September 2011, this public lecture series features the insights that emerge when science meets engineering, clinical practice meets urgent patient needs, entrepreneurial drive meets venture capital, and imaging technology meets artistic vision. Five With/In/Sight events were held over the past year with a total attendance of more than 650. One program was recorded by the BBC and aired on January 26, reaching an audience of approximately 40 million listeners worldwide.

*Annual Symposium:* The 12th annual Summer Symposium, "Cancer Immunology and Immunotherapy," was held on June 14, 2013. Approximately 1,000 individuals attended the event.

*School Group Programs:* The Koch Institute is committed to fostering an interest in science and engineering in young people. As part of this mission, we invite groups of middle and high school students (grades 7–12) to visit our facilities, meet researchers who work every day to solve cancer problems, and learn interactively about the science and technology of cancer research. Over the past year, we hosted 17 school groups (544 students), presenting hands-on demonstrations of work in the building and making full use of the teaching

resources in the Koch Institute Public Galleries. These events are offered free of charge and can optionally be paired with other activities at MIT, including the [LEGO DNA workshops](#) developed by the MIT Center for Environmental Health Sciences.

*Cambridge Science Festival Activities:* The Koch Institute hosted three Cambridge Science Festival programs that engaged local community members: the “Human DNA Strand” (200 participants), an evening program at the MIT Museum (271 visitors), and cancer research–related challenges for the 45 teams participating in the MIT Campus Quest scavenger hunt.

## Administrative Initiatives

The Koch Institute’s administrative goal is to support and facilitate the work of Koch Institute researchers. This year several initiatives have been implemented or improved on.

Work continues on the KI intranet system that provides key administrative, event, and scientific information to members of the Koch Institute. The intranet serves as a repository for calendars, handbooks, guides, forms, and videos of past seminars.

The Scientific Advisory Board provides key scientific input to KI as a National Cancer Institute–designated cancer center. The board’s input played a critical role in the significant increase in NCI funding we received during the last competitive renewal of our cancer center grant. We are beginning the process of our next grant renewal, due in May 2014.

The Koch Institute Leadership Council is a group of friends and benefactors—primarily individuals from the biotechnology, pharmaceutical, entrepreneurship, and philanthropy communities—who generously contribute their time, energy, and personal resources to advancing the work of the Koch Institute. Many of the members have strong connections to MIT, and nearly all have been touched by cancer. Combining professional expertise and personal commitment, members provide valuable advice and support to KI leadership as they seek to strategically expand the scope of research, education, public outreach, communications, and fundraising programs.

The *SBC Focus Newsletter*, which provides accessible, in-depth profiles of research conducted at the Swanson Biotechnology Center, is a vehicle for showcasing donors who support the center.

## Finances and Funding

Funding for research performed within the KI building comes from several sources, including federal grants, philanthropic donations, and industrial contracts. The total was approximately \$70 million in AY2013. This figure is based on intramural faculty expenditures and includes total sponsored research volume, philanthropic funding, funding for five Howard Hughes Medical Institute faculty members, corporate funds, faculty discretionary account spending (typically chair accounts), postdoctoral and graduate fellowship funding through MIT mechanisms, core facility chargeback

accounts, and MIT general budget allocations to KI. Also included are funds managed by KI for specific cancer research efforts across MIT.

Given the interdisciplinary nature of the research conducted at the Koch Institute, several faculty members participate in multi-investigator collaborative projects, many of which are funded by grants from NCI. This work is performed through the Physical Science and Oncology Center, the Center of Cancer Nanotechnology Excellence, the Tumor Cell Network Center (formerly the Integrated Cancer Biology Program), the Tumor Microenvironment Network, as well as at the centers and companies highlighted below.

The Ludwig Center for Molecular Oncology, established in 2006 with a gift from the Ludwig Trust, continues to support several investigators working in the area of metastasis research.

The Bridge Project provides additional opportunities for faculty members to develop research toward clinical and commercial applications through collaborations with clinical partners. The project—a collaboration with the Dana-Farber/Harvard Cancer Center (DF/HCC)—is designed to foster and support inter-institutional cancer research efforts between faculty at MIT and Harvard. Now in its third year of funding, the Bridge Project has supported 10 teams of investigators from the two institutions in developing new treatment and diagnostic methods for a variety of cancers. This year's call for proposals focused on critical problems associated with five types of cancer: melanoma, pancreatic, glioblastoma, lung, and ovarian. The Bridge Project is funded solely by philanthropic funds, which have been raised in a collaborative fashion between the development organizations of DF/HCC and KI. There are also several Bridge Project events each year, including workshops and donor events.

In addition to several smaller-scale sponsored research relationships with companies, KI has established a larger-scale partnership with the pharmaceutical division of Johnson & Johnson. TRANSCEND is a five-year partnership that includes a minimum of \$25 million of research support from the company. The program is in its fourth funding cycle and currently 15 MIT faculty members are receiving support; two additional faculty members will receive funds in July 2013 for a total of 20 projects (including faculty who are not KI members). The program offers the opportunity for visiting scientists from Johnson & Johnson to work in MIT laboratories as well as for regular consultations with company scientists. Trainees are invited to two yearly scientific exchange events, one at KI and one at Johnson & Johnson.

### **Personnel Information**

The Koch Institute includes 14 faculty members from the Department of Biology (with 12 active research programs), 12 faculty members from the School of Engineering, and two clinical investigators (Dr. Scott Floyd started in July 2012). Nancy Hopkins retired from the faculty at the end of the 2013 academic year.

In conjunction with the Department of Biology, KI conducted a search for a new faculty member. An offer is under way, and details will be provided in next year's report.

The Swanson Biotechnology Center, which includes the core facilities of KI, is available not only to the KI faculty but also to the whole of MIT. At full capacity, the center will employ approximately 70 full-time staff scientists working within 13 distinct core facilities.

KI includes 25 MIT faculty who are “extramural members,” including the directors of the Whitehead Institute (David Page) and the Broad Institute (Eric Lander). Through their involvement in research on cancer or cancer-related subjects, these individuals participate in a variety of ways in the research activities of the Koch Institute.

At the end of the December 2012, 168 graduate students and 155 postdoctoral fellows or associates had active appointments in KI building faculty laboratories. KI’s total personnel count exceeds 700.

### **Faculty Honors and Awards**

Angelika Amon won the Ernst Jung Prize for Medicine. Angela M. Belcher received the Lemelson-MIT Prize. Paula T. Hammond received the Department of Defense Teal Innovator Award and was named a member of the National Academy of Sciences. Michael Hemann was awarded tenure in the MIT Department of Biology. Tyler Jacks and Phillip A. Sharp were appointed as American Association for Cancer Research fellows. Robert S. Langer was presented the Wolf Prize and the National Medal of Technology and Innovation.

### **Publications, Patents, and Companies**

Over the past six years, 16 companies have been started by KI faculty as a mechanism for discoveries in new technologies to be brought to the marketplace. For example, BIND Therapeutics, a nanomedicine technology endeavor launched in 2007, treated phase I clinical trial patients last year.

KI intramural researchers produced more than 200 publications in AY2013, 20% of which have multiple KI faculty members as authors. A solid indicator of cross-disciplinary collaborations was the increased number of publications resulting from biology-engineering collaborations; about one third of publications involving multiple KI faculty members include both biologists and engineers. This number is expected to rise rapidly and significantly over the coming years.

With an intense focus on developing new solutions to the complex challenges of cancer, the Koch Institute at MIT assembles world-class interdisciplinary researchers in an institute dedicated entirely to cancer research. As a state-of-the-art cancer research and technology facility, the Koch Institute is clearly—and quickly—changing the landscape of cancer research.

**Tyler Jacks**  
**Director**  
**David H. Koch Professor of Biology**