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National Cancer Moonshot Initiative Report of Recommendations

IH+SI INTERDISCIPLINARY HEALTH SCIENCES INITIATIVE AT ILLINOIS

Cancer Community @ Illinois
FROM BENCH TO LIFE:
Better prevention, detection, diagnosis, and treatment

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Background

The Cancer Community @ Illinois (CC@IL) is a group of scientists, researchers, clinicians, survivors, and advocates that provide resources to access cancer-related activities across the University of Illinois at Urbana-Champaign campus. We nucleate new programs and activities to advance cancer research. Illinois researchers are making strides to improve cancer detection, prevention, diagnosis, therapy, and quality of life. With growing strength in cancer-related sciences and recent progress in basic research and technology, the University of Illinois at Urbana-Champaign is poised to play an important and unique role in addressing the cancer burden in the nation. Our areas of expertise include:

- **Molecular Mechanisms:** Molecular expression, signal transduction, and cell proliferation by hormones and growth factors; mechanisms of hormone and anti-hormone action in normal and cancer cells
- **Diagnostic Technologies and Imaging:** Imaging, including ultrasound, MRI and optical, automated histopathology, microenvironment, and contrast agents
- **Social and Behavioral Sciences:** Population health research
- **Computational and Precision Medicine:** Medical imaging, point-of-care sensing, bioinformatics, genomics, and computational biology

Carle Cancer Center is the premier cancer treatment and support center in east central Illinois, offering more resources to help patients in the fight against cancer. With the area's largest and most specialized team of fellowship trained oncologists, surgeons and staff, patients get in for diagnosis and start treatment as soon as possible. Carle provide a high performing network of care. The Carle team offers the latest technology and highly specialized multidisciplinary clinics disease site specializations, including breast, prostate, gynecologic, head and neck, gastrointestinal, lung, and skin. Carle cares for the whole patient, offering many resources such as, but not limited to, eight support groups, genetic and nutrition counseling, and nurse navigator services. Involved in national research for more than 30 years, Carle Cancer Center offers its patients access to innovative ways to fight cancer through clinical trials. In 2014, Carle received the designation of a NCI Clinical Oncology Program (NCOP) – one of only 34 standalone sites in the country. One of Carle's strength is in seeing many cancers that are unique to the rural areas.

Community-wide Collaboration

Facilitating cancer breakthroughs at the Urbana-Champaign campus for our community, the CC@IL leverages campus research, education, outreach, and economic development resources for collective success. This is often done in partnership with the Carle Cancer center, and local nonprofit organizations such as the American Cancer Society. This allows for the collective use of our strengths in science and technology to make cancer care accessible. We are able to cater to socially and economically underserved populations and address cancer research and care disparities. We are also able to contribute to social and economic development in cancer-related areas. Being able to work with cancer-specific external companies or agencies and develop a culture among undergraduate and graduate students to think of innovative solutions. As this work cannot be one independently or by one entity, we focus on being multidisciplinary and transdisciplinary. These multidisciplinary/transdisciplinary ties

impact both research and education while forming needed alliances with external partners. The most visible outcome of our collaborations is the innovative Engineering-based College of Medicine. This new types of CoM seeks to bring modern engineering and technology to bear of problems such as cancer.

On June 17, the CC@IL held a National Cancer Moonshot Town Hall meeting bringing together the community of researchers, scientists, philanthropists, advocates, students, data scientists, survivors, and members of the public. The research, clinical, and community input is represented in this report of recommendations. We focused on requests for comments provided by the NCI as:

Clearing A Path: *What would we like the Vice President to clear the way for?*

- **Increase funding rates to rapidly enable efficient use of researcher time.** Current success rates imply long cycles and undue time expended in applying for and obtaining funding. A success rate between 20-25% would be very beneficial to spark focused activity.
- **Reduction of time to award to accelerate research.** Reduce the time needed to write and administer grants so that more time could be dedicated to research. We recommend a "fast track" that would lead to funding (or rejection) in 3 months and allow resubmission in 6 months, as opposed to the 6-12 month cycle at present.
- **Rapid Moonshot project launch.** Our recommendation is to have a Moonshot RFA with a 3-month turnaround with special funding devoted to young investigators.

Reducing the Impediments: *Where is the federal government and impediment?*

- **Long review and award cycles could be shortened.** The time to receive an award could be 1.4 years with a resubmission. We would recommend that the process be sped up especially for junior faculty. It would be great to have a "fast track moonshot mechanism" where award decisions can be made within 3 months. This would mean that the fast track review cycle would be 3 months. Streamline the process and get cut some of the bureaucracy.
- **Encourage closer cooperation between development and deployment of devices, especially those with low risk.** There is a 10-year FDA approval timeframe for diagnostic tool review. Due to the time and expense for new technology, there is a preference to fund drugs over diagnostic tools (which could be developed in a faster and cheaper way). Recommendation: streamline the timeline so that costs and time are reduced. Having the FDA be to expedite approvals for drugs and devices
- **We propose that NIH launch a program for "Device Translation Centers of Excellence".** Expertise from such diverse fields as engineering, management, policy and ethics will be brought together to formulate guidelines and provide comprehensive analysis of the efficacy and impact of devices that can fast track translation to patient use. The centers would then assist others across US with their submissions.
- **Going beyond the SBIR program.** In addition to scientifically encouraging devices and technologies for detection, diagnosis, therapy and survivors, the government can encourage public-private partnerships in the Centers above to enable faster translation and encourage economic activity. It would also be beneficial for the government could give a favored tax treatment for cancer drug and device development.

Making Accommodations: *Where is the government not being accommodating in what is needed?*

- **Further encourage data sharing and access.** It should be noted that more can be done in the area of data sharing. Currently, there is very little and poor guidance and infrastructure on how this can be done.

- **Reception to bold new ideas.** While there are several programs that encourage innovative approaches (e.g. Directors transformative R01), these are insufficient and do not allow researchers to take intellectual risks. The moonshot presents a great opportunity to develop and test innovative new programs that are receptive to bold ideas. We propose that the NCI develop a moonshot program along the lines of the Directors' Transformative R01 program.
- **Provide new mid-career researcher programs that encourage innovative new directions.** While there are many programs geared to early stage researchers and well-established researchers, a program to encourage mid-career researchers to embark on new directions or re-invent their programs with new technologies or approaches can rejuvenate careers and encourage fresh thinking from energetic people who are free of the burdens of early career setup concerns. We propose that the NCI launch a program for mid-career researchers to embark on high-risk research.

Exploring New Opportunities: *Where are the opportunities?*

- **Expand the cancer centers program to centers that are focused on science and technology.** The cancer centers program of the NCI is very successful but there are no centers that focus heavily on physical sciences or engineering. With collaborations and interactions easily possible among all cancer centers, success of the physical sciences in oncology program and tremendous technological advances, the time has come for NCI to focus on a new type of cancer center. This type of "cancer technology center" would focus on engineering and intervention developments, while collaborating with medical centers to serve a wide audience across the nation rapidly. They will especially focus on underserved rural and disadvantaged populations. We propose that the NCI expand the Cancer Centers program to develop this unique type of cancer center.
- **Education to bring in a pipeline of accomplished cancer researchers.** We propose that the NCI invest in cancer education at both earlier stages and in traditionally underrepresented fields in oncology. For example, the University of Illinois has developed a "Cancer Scholars Program" to encourage undergraduate engineering students to explore and, ultimately go into, cancer-related careers. These bright students not only bring a new talent pool to oncology but also bring fresh perspectives and ideas.
- **Increased focus on survivorship and survivor issues.** More and more people are cancer survivors and their needs should be considered and incorporated as this number will continue to increase. We propose that the NCI launch special programs that focus on lifestyle and healthy living, aided by technologies and new resources, for survivors. The effort should include development, deployments and evaluations of these approaches.
- **Expand the focus on pediatric cancers to include lifestyles and healthy living that can impact cancer at this life stage and in the future.** As examples of potential programs, the University of Illinois has **STRONG Kids** and **I-Kids** programs. The STRONG (*Synergistic Theory and Research on Obesity and Nutrition*) Kids program is cross-disciplinary project is to examine how genetic, family, community, child care provider, cultural, and media factors contribute to the development of childhood weight imbalance, obesity, health behaviors, and health beliefs. Findings will serve as the basis for obesity prevention and intervention programs. The I-Kids program is based within the Children's Environmental Health Research Center at Illinois. The goal of this research center is to study the effects of exposure to bisphenol A (BPA), phthalates and other chemicals found in plastics and personal care products on neurological and reproductive development and function. Center research is also addressing whether obesity or a diet high in saturated fats interacts with exposures to these chemicals to increase risk, and whether oxidative stress and/or inflammation play a role in mediating the effects of these

chemicals. Exposures during two critical developmental windows – the prenatal period and the adolescent/pubertal period – are being studied in human populations and in parallel animal models. An important goal of the center is to communicate research findings to parents, childcare providers, healthcare providers and policy makers. The extension of such efforts to cancer can potentially have high impact.

- **Tremendous opportunities lie in harnessing new technologies.** We propose that the NCi considerably expand the NCI IMAT program.
- **Comprehensive multi-PI, multidisciplinary projects.** Often, cancer research focuses on a narrow scientific questions. We propose a program to focus on cross-disciplinary programs. For example, a PI focused on technology can team up with those from nutrition sciences and social sciences to devise methods that can aid patients in exercise and diet. Such a program, we recommend, should lead to Interdisciplinary Centers that focus on cross-disciplinary problems in detection, diagnosis, therapies or survivorship.
- **Focus on rural health to bridge the resources and access gap compared to urban health.** Our recommendation is for the NCI to make investments in technology dedicated to rural care. For example, there are emerging opportunities in rural cancer care technologies (e.g. hand held imaging, blood testing at home) and well as those technologies that enable access to timely care (i.e., virtual presence technology). It is now timely, with maturation of the technologies, to focus on translating them to use and developing solutions that can bridge the urban-rural gap. We propose that the NCI support a "Center of Excellence for Cancer Rural Health Technology" that focuses on providing portable, affordable, reliable technology. Rural patients present with a different types of cancer and have a lack of access to treatment/care. There are more challenges with rural cancer patient care than those proximal to a hospital and there are different incidences of specific cancers in rural communities – maybe due to chemicals used, lifestyle, etc.

Making the Most of Resources - *What resources are needed?*

- **Supercomputing, mobile and distributed computing are an enormous untapped resource.** The nation has invested heavily in supercomputers, a majority of citizens have powerful computers in their phones and cloud computing capacity is often not utilized. We propose that the NCIl launch a special program in computation for cancer. The power of modern computing to make advances in science and help patients needs to be utilized with innovative solutions.

Our suggestions are respectfully submitted on behalf of the CC@IL and Champaign-Urbana community,

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