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News & Views

The US comprehensive cancer centers in perspective

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The United States began its “war on cancer” with the National Cancer Act of 1971, which authorized the creation of a new kind of facility that would combine research, clinical work, community outreach, prevention strategies, and population studies. Today, there are 41 institutions across the country which have been designated Comprehensive Cancer Centers by the National Cancer Institute (NCI).

The centers are estimated to treat between 15 and 20 percent of newly diagnosed cancer patients, but that is only part of their mission, which has a broad mandate for both basic and applied research. The focus goes beyond the traditional medical aspects of the disease to encompass a multi-disciplinary approach that takes into account demography, socio-economic factors, race, and geography, among others.

It is the interdisciplinary nature of the cancer centers that make them unique, said Linda K. Weiss the Chief of the Cancer Centers Branch of the NCI. “When the centers were created, the idea was that by forming them, you would have a central structure which would house diverse investigators that would focus on one problem and they would work together to advance treatment, prevention, and research,” she said.

The NCI’s total budget for the program is \$270 million for 65 centers (which includes some centers that are doing just basic laboratory research but have no clinical component and others that have some combination of both basic research and clinical work, but without the population-based programs). The grants from NCI range from \$1.5 million for year for new centers to the biggest, which are \$12 million a year. The bigger the research portfolio, the bigger the budget.

“The standard therapies of today are the clinical trials of yesterday, and most of those therapies are developed at cancer centers,” said Barbara Duffy Stewart, MPH, Executive Director of the Association of American Cancer Institutes (Photo 1). The center’s interlinking networks are “viewed widely as the jewel in the crown” of the U.S. National Institutes of Health, she said.

The NCI certification process itself ensures that, made up of leading scientists and the directors of other centers, review a 2000 page application and perform a several-day-long site visit. This rigorous peer-review process is unique, ensuring a high level of research and care that is itself “the most important reason to have comprehensive cancer centers,” said Dr. Michael A. Caligiuri, the Director of the Ohio State University Comprehensive Cancer Center (Photo 2).

Nearly all comprehensive cancer centers are part of or affiliated with universities, which is a key to their success, said Dr. Frank M. Torti, the Director of the Comprehensive Cancer Center of Wake Forest University in Winston Salem, North Carolina. “The field is moving from a field that was driven simply by biology and molecular biology to a field that is also driven by physics, mathematics, chemistry and material science,” he said. “The institutions that are closely connected to universities have strengths in those areas that will have an important and unique role to play in the future of cancer diagnosis and therapy.”

The NCI-designation itself is perhaps even more important than the federal funds that centers receive. Not only does the NCI stamp of approval attract private donors, foundations, and university funds to the institution, this badge of quality drives the recruitment of top flight researchers and clinicians and scientists. That means the overall quality of clinical care goes up, said Dr. Frank M. Torti, Director of the Comprehensive Cancer Center of Wake Forest University (Photo 3). Earning the NCI stamp of approval allows one to bring “the best and brightest people to your institution,” he said.

Yet while the American system is both innovative and fast-moving, it is also expensive, said Dr. Guy Storme, a professor of oncology at the University of Brussels and the executive secretary of the Organization of European Cancer Institutes, who has been doing an assessment of American comprehensive cancer centers. For example, he said, “in diagnosis and treatment the imaging technology [in the U.S.] is revolutionary.” At the same time, radiation treatments cost three times in the U.S. what they do in Belgium. “Professionally Americans

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Photo 1 – Barbara Duffy Stewart, MPH, Executive Director of the Association of American Cancer Institutes.

are always better organized than Europeans, but they also cost a bit more money,” said Dr. Storme.

Still, the gains are impressive. American cancer centers are leaders in diagnostic technology and translational research, said Storme. However, he cautioned, it is always uncertain whether those innovations will lead to significant improvements in outcomes. He noted that despite all of the technological advances in cancer therapy, in a number of cases cancer morbidity has stayed the same or even increased. He also pointed out that expensive equipment gives cancer centers a monetary motivation to use their equipment, even though it may not really be more helpful to patients.

One of the lessons Dr. Storme has taken with him, as Europeans build up their cancer centers in the coming years, is that geographical distribution plays a key role in treatment outcomes. If you live more than 40 miles from a cancer center, you have half the chance of receiving radiation treatment in the U.S., said Dr. Storme. Most of the cancer centers are centered in high population cities, many of them on the coast, meaning large swathes of the country do not benefit. He notes much the same dynamic can be seen in certain EU countries, like Italy and France.

In fact many of the U.S. cancer centers pride themselves on the fact that their treatment areas stretch well beyond their immediate geographical location. The Ohio State center, for instance, attracts patients from all 50 states in the U.S., as well as thirty countries from around the globe.

The comprehensive centers have a strong mandate to engage with their communities: for the Comprehensive Cancer Center of Wake Forest University in Winston Salem, North Carolina, that means it has projects not only in its home state but in the neighboring six state region as well. Each of the many communities in those states have their own unique problems from an oncology perspective. The factors

Photo 2 – Michael A. Caligiuri, Director of the Ohio State University Comprehensive Cancer Center.

Photo 3 – Frank M. Torti, Director of the Comprehensive Cancer Center of Wake Forest University.

the center is studying go beyond just biology to include economics, race, education, geography, and other social variations. Among the populations in Wake Forest’s treatment area are immigrants from Mexico and Central America, poor rural communities in the Appalachian mountains, inner city poor, impoverished African-American communities, and the largest Native American population East of the Mississippi.

“What we recognized from the very first day was that this was a very heterogeneous and complicated group of communities from a cancer delivery and care standpoint,” said Dr. Torti, the center’s director.

In order to meet that challenge, Wake Forest, which was designated a comprehensive cancer center in 1974, making it one of the nation’s oldest, reaches out to the communities through a variety of methods, including clinical trials for new therapies, working with churches on screening for prostate and breast cancer, and by engaging with culturally specific issues in Indian reservations. Because many of the communities are poor and geographically isolated, Wake Forest has worked to “bring the cancer center to the patients,” said Dr. Torti.

One of Wake Forest’s projects has been focused on the Lumbee Indians, who live in the Eastern reaches of the state. The tribe is afflicted with high rates of oral cancer, which is traceable to their cultural custom of using chewing tobacco. The cancer problems even affect children, said Dr. Torti.

On the more traditional research front, Wake Forest is a leader in genetic epidemiology, with researchers investigating the intersection between genetic predisposition and environmental and nutritional exposures that lead to cancer. The center is also studying the tumor micro-environment, trying to understand how cancer stem cells interact with normal cells. Nano-technology is another area for cutting edge work, with Wake Forest’s scientists studying novel nano-materials that can change properties and so might lead to innovative cancer therapies. The Center currently has one drug in clinical trials, an antiangiogenic compound, Ang1-7, which attacks cancer blood cells, starving tumors of their blood supply. The compound was initially developed by another department of the university as an anti-hypertensive, but when researchers realized it was also attacking cancer cells they brought it to the cancer center, where scientists discovered it could be a highly-potent anti-cancer compound.

“That’s the kind of achievement that occurs only a couple of times in the lifetime of a cancer center,” said Dr. Torti.

Wake Forest researchers are also studying cancer survivors, looking at how they adapt post-remission, their long-

term toxicities, the emotional factors in their lives, and their sexual and menstrual function.

One of the biggest challenges facing the centers, and cancer research in general, is adapting their work to an aging population. As the population as a whole lives longer, the proportion of elderly patients with cancer will increase. That presents some unique difficulties in terms of developing new treatments, said Weiss, because “as the population of cancer patients get larger, addressing the needs of the elderly becomes even more important.”

Because elderly patients often have multiple health issues at once, it is difficult to use them in clinical trials, she said.

Funding, as ever, is a major concern of center directors. The government’s health research budget for cancer and other diseases has been flat since 2003. Compounding the problem, the recent economic slump has meant that philanthropy has declined and the endowments of the centers themselves have lost significant value. “The funding is generally woefully less than what one needs to maintaining the infrastructure to produce the quality of science that the reviewers are looking for,” said Dr. Caligiuri, the incoming president of the Association of American Cancer Institutes.

It is very hard to convince a physician, whether an oncologist or PhD scientist that there is a secure future in cancer research, said Dr. Torti. They see older people stressed out younger investigators not able to get money for projects. “We now as a nation are confronted with a new kind of endangered species, and that is the academic clinician and scientist in cancer,” said Dr. Torti.

The federal input to the cancer centers is relatively small. For instance, Dr. Caligiuri’s Ohio facility receives about \$2.8 million in annual funding from the National Cancer Institute, out of a total budget of \$52 million. About \$11 million of that comes from donations, with the rest being provided by the university. The Ohio State institute has been a comprehensive cancer center since 1976. It is one of the nation’s largest, and has one of only ten free standing cancer hospitals in America. The center has a total of 280 researchers, another 250 support staff, and about 100 doctors who treat patients.

The center’s specialties include cutting edge research on micro-RNA, the newest class of gene that is associated with cancer. They are now working on a micro-RNA based therapy, said Dr. Caligiuri. The center also has two drugs now moving into clinical trials. The first is to prevent cancers expressing her2/neu – which is connected to breast, ovarian and pancreatic cancers; the second is a vaccine to prevent certain types of lymphoma.

Another recent breakthrough has occurred in the discovery that black raspberries appear to work as a strong preventative from every organ in the digestive tract, from the mouth through the colon. One immediate result of this finding has caused some local tobacco farmers to switch over to planting black raspberries, said Dr. Caligiuri.

The center is one of the few cancer centers in the country that also has a college of agriculture. In the program, called “Crops to Clinic,” they test both food and supplements for their cancer prevention qualities – currently the research is focusing on soy and tomato products.

The engagement of comprehensive cancer centers with their local communities is one of the thing of which Dr. Caligiuri is most proud. The Ohio center is doing a number of

studies in rural Appalachia, one of the poorest regions in America. The area has the highest incidence of infection from the human papilloma virus in the country, and correspondingly high incidences of cervical cancer. Researchers from the Ohio center are studying the behaviors, social, economic, and educational factors that have lead to the epidemic.

Some of their work in the community has already shown significant progress. A smoking cessation program, which combines pharmacological interventions and behavior modification therapy, has a five-fold higher success rate than normal. They also have a high-tech mobile mammogram unit that services the rural poor.

Such interventions “would be long forgotten had it not been for comprehensive cancer centers,” said Dr. Caligiuri. “If you’re not in a comprehensive cancer center, there’s no way you’re interested in this stuff. There is too much else to do,” he said.

Yet one of the contradictions in the U.S. cancer program is that while billions of dollars are spent each year on cancer research, the implementation of the findings in public policy are often poor. This is not an academic argument: more than five million cancer-related deaths worldwide could be prevented, according to the American Cancer Society.

The capacity is there, at least on the research side. The links between the NCI and the country’s comprehensive cancer centers is so strong, that, for instance, if officials at the NCI requested research on a particular subject, say smoking or obesity, many of the centers will immediately launch investigations.

But as a recent report from the directors of comprehensive cancer centers lamented that their findings often not acted upon. Smoking is the “greatest preventable cause of cancer deaths by far,” accounting for about 30 percent, according to the report, but public information on the dangers of smoking remains complicated and confusing, while smoking cessation treatments are hard to come by and have low success rates. The report was written by NCI cancer center directors.

The report notes:

“There are many factors known to reduce overall cancer incidence, such as minimizing exposure to carcinogens (e.g., avoiding tobacco), vaccination for some cancers, dietary modification, reducing body weight, increasing physical activity, or through medical intervention (e.g., surgery and/or chemoprevention). However, research on developing and implementing effective cancer prevention and control interventions lags in funding relative to its potential impact on reducing the cancer burden in the United States.”

Overall, prevention strategies could reduce the risk of several cancers by as much as 60 percent.

The directors recommended that Federal support of NCI-designated Cancer Centers should be increased to fund collaborations with the private sector to create and implement community-based programs in cancer prevention and early detection. They noted that currently the federal program targeted at underserved populations only reaches 15 percent of eligible women because of limited funding. A similar program is needed for colorectal screening, they say.

Much more could be done in public policy, said Dr. Caligiuri, to get people to alter their behavior in areas like smoking, healthy eating, and exercise, such as creating fiscal incentives. “There’s a breakdown between the centers and what we adopt of policy for healthy living as a society.”