

THE FUTURE OF CANCER CARE

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by Ethan Hamburg

According to data collected by the American Cancer Society, about 1.7 million new cancer cases are expected to be diagnosed by the end of 2018. About 609,640 Americans are expected to die of cancer this year alone, which translates to about 1,670 deaths per day. Despite recent advances in research and treatment, this disease is the second most common cause of death in the US, exceeded only by heart disease.

My father, Dr. Solomon Hamburg, a medical oncologist in Los Angeles, introduced me to three of the leading oncologists and oncological researchers in the country. They shared with me their visions of the future of cancer care in the next 20 years and beyond.



Dr. John Dipersio, M.D., Ph.D., is an international expert in bone marrow transplantation and leukemia at the Siteman Cancer Center on the campus of Washington University in St. Louis. He serves as a Deputy Director at the Siteman Cancer Center, as well as a Professor of Oncology, and as the Chief of Oncology at Washington University School of Medicine.

Q: Dr. Dipersio, what does the future of cancer care look like in the next five, ten, and 20 years?

A: The future of cancer care in the next five years is increasing personalized medicine with therapies that are directly geared towards targeting genomic changes. But that potential will not be realized for the next 10 or 15 years. So in 20 years we will actually see combinations of therapies based on genomic changes being used for the treatment of patients. Right now we think in terms of one mutation and one therapeutic intervention. In the future we will really see how these complex networks work, where multiple events intersect resulting in multiple targeted pathways and the use of multiple therapies.

Q: Do you believe that cancer can be cured in the future?

A: Cancer is an event which occurs in every patient at every minute of every day that they live. So as life expectancies rise, there is an increased risk of these

genetic events. There is no way to prevent this; there is only a way to control the disease. As we develop better therapies there will be less chemotherapy and more personalized treatments and we will turn these life-threatening diseases into chronic diseases like well controlled diabetes.

Q: Will cancer be preventable?

A: No, cancer will never be preventable because it is an inherent aspect of our DNA replication. There are certain events that simply cannot be repaired. Those events are very infrequent, but an environmental stimulus or risk actually results in increasing frequency of these genetic events. At some point our DNA repair machinery is always going to be overwhelmed. So the issue will be to always identify them early, to treat them early and turn them into chronic diseases.

Q: How has molecular biology changed the diagnoses of cancer?

A: Molecular biology has already changed the diagnoses of cancer.

Right now, the language of medicine is not whether someone has edema or heart failure or elevated glucose - it is what genetic mutation they have, and what treatment has been used and what are the resistant mutations. The whole aspect of care will change in the next 20 years. Medical rounds will discuss genetic changes and personalized treatments.

Q: Do you see all members of society having access to cancer care?

A: No. I think that this is our biggest challenge that we have as a society.

How can we provide decent, not necessarily the best, but decent care for everyone? We have to think about what our priorities are in our culture. Do we want to provide medicine and care for people in a uniform way, based on their right, as we do with education, or do we really want to divide the population into those who have resources and those who don't? All therapies, whether for rich or for poor, are going to be available. We just have to figure

out how to get these therapies to people that don't have resources. That is going to be the ultimate challenge of our society. If we do this right it will mean that the richest people in our society will not be so rich anymore and the poorest people in our society will not be so poor anymore.

Q: Will Artificial Intelligence have an important impact on cancer care in the future?

A: I think so. Artificial Intelligence will play an increasing role in the way we care for patients, from analyzing big data sets, to looking at risk factors, to predicting risk for certain diseases. In the future, physicians will not go to the NCCM guidelines or Google; they will just ask, "How do I best treat this patient with relapsed pancreatic cancer? What's the first line, second line, and third line? What are the clinical trials? Then we will get that answer."



Dr. Stephen J. Forman, M.D., is an international expert in leukemia, lymphoma, and bone marrow transplantation. He is the Francis & Kathleen McNamara Distinguished Chair in Hematology and Hematopoietic Cell Transplantation and leader of the Hematologic Malignancies and Stem Cell Transplantation Institute at City of Hope Hospital in Duarte, California.

Q: What role other than money do you see foundations playing?

A: The major thing foundations do is fund research into therapy, but they have a role to play in helping families face the challenges that a person undergoing therapy has with work, family, and transportation.

Q: Is technology keeping up with the pace of research?

A: Technology makes some research possible but

sometimes results get out in front of technology. For instance, some testing that was incredibly expensive years ago is very cheap now, and I think that reflects the fact that people develop new technologies to help reduce those costs, to make things more available to people.

Q: What are the barriers that you face in your research?

A: Certainly some of it is money to fund research. Some of it is having enough hours in the day to finish the work you to do. Sometimes it is that we haven't imagined boldly enough.

Sometimes the process of doing research and clinical trials has hurdles that are well-intentioned but slow the process down.

Q: What event led you into the field of cancer research?

A: I don't think there's been one single event, but it has been an observation about what the challenges are of having cancer for people and their families that I think brings all of us into the field. As we want to do better for them and for people who have yet to be diagnosed.



Dr. Phillip Koeffler, M.D., is a world-renowned researcher focusing on bone marrow transplantations, sarcomas, and leukemia. He is the Mark Goodson Chair of Oncology Research at Cedars-Sinai Medical Hospital in Los Angeles, CA, and Professor of Medicine at UCLA School of Medicine.

Q: What does the future of cancer care look like in the next five, ten, and 20 years?

A: For diagnoses it will be incremental increases in imaging, like X-Rays, Pet Scans, MRIs and CAT Scans. There will be more blood work done; some of it will be bio-markers. We are developing the ability to look for recurrences by sequencing the floating DNA in the plasma. At the time of diagnoses there is going to be more personalized medicine.

As time goes on, we won't just use one therapy, but several, because resistance is too easy to develop if you only give one therapy.

The second area would be immunotherapy. We now know that tumors can produce proteins that can inhibit our immune system. Our own T-lymphocytes can produce proteins that deaden our immune system, so now we are using antibodies against these proteins in order to unlock the immune systems against these tumors.

In addition, we are identifying antigens that may be tumor-specific and making vaccines to try to stimulate the immune system. Finally we are taking T-lymphocytes from the patient and arming them with monoclonal antibodies against

specific antigens present on the tumor cells. This has been shown to work nicely in B-Type acute lymphocytic leukemia. There are a number of ongoing experiments to see if this could be expanded into other tumors.

Q: What are the barriers that you face in your research?

A: Money and space.

Q: Do foundations like Tower play a major role in speeding up progress?

A: Sure. Without money we cannot do any research and these foundations provide money for research. However, in large foundations many grants get denied, so smaller foundations like Tower help tremendously because of their willingness to award grants with research that has not been completed fully.

"The future of cancer care is uncertain. But in speaking with these physicians and researchers at the forefront of the fight, some promising themes emerge. First, understanding the molecular genetics of cancer will lead to more personalized and less toxic treatments. In addition, harnessing the immune system for treatment will be important. Perhaps more difficult will be making sure every patient has equal access to state-of-the-art care. It will be a national and international challenge, and it will take money to move toward our common goal - but the future of cancer care looks bright."

- Ethan