



Comments on the Book “The Training of Future Cancer Researchers”

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World Scientific publishers, New York, will publish the book titled: “The Training of Future Cancer Researchers” in the spring of 2017. This book is written by Prof Jose Russo, MD, FACP and is the continuation of his previous book “*The Tools of Science*” published in 2011.

Professor Russo is a Senior Member, of the Fox Chase Cancer Center-Temple Health and he is also Director of the Irma H Russo, MD-Breast Research Laboratory, Director of the Breast Cancer and the Environment Research Center and Professor of Biochemistry Temple Medical School, Philadelphia, Pennsylvania, USA.

The Training of Future Cancer Researchers explores the human basis of the scientific endeavor as related to cancer research from a cultural and historical perspective. In the first chapter Professor Russo addresses the importance of the original Idea as the main driver in cancer research providing examples how pivotal discoveries were the results of research originated initiatives. He indicated that among the major challenges ahead of the new cadre of cancer researchers are to solve the problem of cancer metastasis, cancer metabolism, immune surveillance and cell reprogramming for citing a few. He emphasizes that the new cadre of cancer researchers must be trained considering a sense of history in the scientific discovery and they must learn to see the problems in non-conventional ways by performing cancer research endeavors in a societal framework.

In the chapter two it is discussed the trends in scientific discovery. In our life time we have seen science grow and expand and cancer research has had to answer increasingly difficult questions with methods that were unimaginable just a few years ago. However, there are still pivotal questions that need to be answered in cancer research, such as those related to the role of chromatin remodeling, the variations in the genome, the new frontiers for immunology and cancer, what we could expect from synthetic biology, and which will be new models to be used in cancer research.

In the chapter three Professor Russo discusses the communality of science in cancer research. He indicates that lay people today know more about cancer than at any other time in human history. This is mainly due to the open source of knowledge provided by the Internet, advances in communications technology, and the rapidly expanding global network. There is also significant effort to bring together scientists, educators, and lay people in national and international scientific meetings, creating a unique situation in which knowledge of the interaction between the environment and health is more treasured by the people around the world than ever before. This communality in knowledge and interest in innovations in cancer research has been also extended to other areas of endeavor. All of these easily accessible sources of knowledge are creating an unprecedented sense of communality in cancer research by generating a tighter network

of partnerships and interchange. Professor Russo is concerned that in this globalization process we have created big data that make it difficult to separate reliable information from ambiguous or incorrect data. He hopes that the new cadre of cancer researchers keeps working on these issues and develops shortcuts that allow us to stop the cascade effects of a failure in the interconnected networks. The best example is the metastatic spread of cancer making the disease global and stopping the process of interconnected networks as a major challenge that we have as cancer researchers.

In the chapter four it is discussed the economic basis of cancer research. A great concern is how the economic fluctuations affect the budget allocated to medical research and how those places or countries that are lagging behind the larger center are affected the most. It is also addressed the use of metrics to select how to distribute research funds and how looking for funding has been the main driving force in cancer research in the last four decades. Important points that are also discussed are the reward for the effort; why a healthy economy in cancer research is good for society; who should be funded in times of economic constraint? Does patenting improve the economy of scientific cancer research? And finally the role of scientists in the economy.

The role of politics as part of the cancer research affair is discussed in chapter five. Professor Russo addresses several important issues like diplomacy, how the democratic process influences scientific research, and mainly cancer research, and how the interaction between politicians is necessary for moving the agenda of cancer research ahead. He has dedicated a great portion of this chapter to the issue of inequality, making reference to publications that have extensively discussed this issue. The main conclusion is that although we as cancer researchers are extremely focused on our own endeavors and working toward a meaningful end, there are political issues which directly or indirectly affect our lives and therefore it is important that we are cognizant of them so that we might have a better grasp of our daily reality.

In the chapter six it is addressed the role of society in the training

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of cancer researchers. Professor Russo makes a brief historic review indicating that there is not a utopian place for performing cancer research and we as humans struggle continuously with old diseases as well as new complications of the diseases that we create because of our ignorance. He further elaborate that we have advanced enormously when compared with our humble beginnings, but social and economic conditions have created a difficult milieu for moving forward. We need to continue facing the present and the future of cancer research, integrating new factors into the equation with the hope that we can alleviate cancer suffering, like we as scientist have done in the past for other illnesses. He emphasizes the need for the future cancer researchers to develop certain social clues like developing trans-disciplinary sciences, make our communication as part of our social clues and making the scientists as storytellers as a more effective way to connect with society.

In the chapter seven it is discussed the perception of cancer research by the public. Professor Russo open this chapter by indicating that cancer research is one of the few areas of science in which the public, as activists, lobbyists, volunteers, and patients, have transmitted their opinions and views as well as their wisdom to the scientific and medical community. He cited that in the case of breast cancer, a major shift took place in 1980 when former First Ladies Betty Ford and Nancy Reagan, along with the founder of the Susan G. Komen Foundation, Nancy Brinker, began speaking publicly about the personal impact of the disease, which increased awareness of breast cancer and made it more acceptable to talk openly about the disease. The author brings important issues such as the role of women in cancer research; the use of patenting and its effect on the public; how the public can be integrated into the scientific arena and indicating the three main components are the scientist, the public, and the government to work together for developing a positive perception of cancer research. Lastly he address the education of the public and why the public is afraid of losing their privacy.

Measuring scientific innovation in cancer research is addressed in chapter eight. Professor Russo discusses how in the decades before and after 1900, health care was revolutionized by advances in disease prevention, surgery, and drug treatments that allowed management of chronic afflictions. One notable medical innovation was aspirin. But nothing captured the headlines like the extraction of insulin in 1921 by Frederick Banting and Charles Best, the development by Louis Pasteur of a rabies vaccine in the 1880s, and the 1895 discovery of X-rays by Wilhelm Röntgen. Remarkable advances in our knowledge of the chemistry of life and biotechnology achieved in the past century have created a tremendous task: We must understand biological networks in order to clarify, and in some cases redesign, our concept of cancer. The challenge understands how all the thousands of proteins in a living cell interact with each other. Of the approximately 21,000 distinct proteins encoded by the human genome we have a good knowledge of the function of less than half of them, and far less understanding of how they work in normal individual cells less still do we know about how they work in the cancer cells. In front

of this challenge is the opportunity for biologists, biochemists, mathematicians, computer scientists, and engineers to develop innovative research strategies that make sense of the enormously complicated network of molecular interactions found in even the least complex living cells. These advances are necessary if we want to understand and conquer cancer. Professor Russo discusses that the root of innovation is the use of creative science as a thinking path to innovation as well as the importance of motivation by leadership of the new generation of cancer researchers that leads to innovation. Finally he discusses the sustainability of the cancer researchers and the development of innovative science.

In the chapter nine Professor Russo addresses the past and present of academic research by indicating that in the early 1950s the concept of "publish or perish" was created and the number of publications has been a convenient metric to measure faculty productivity. However funding constraints make the present not bright for many academic places. Whereas it is not immediate solutions to the funding of research the author emphasize in four major points for the formation of our Cancer researchers and they are: Scientific writing, Scientific ethics; Emulation as a first step in scientific inquiry and the value of communications and conferences in the formation of cancer researchers. He finalize this chapter by discussing the optimal size of the cancer research laboratory and the creation of an adequate environment for academic cancer research.

In the last chapter what the future of cancer research will look like, Professor Russo call our attention that to understand the future requires to understand the past and mainly emphasize in the personal introspection of looking in ourselves and find a good mentor as path of innovation and success. He emphasizes the importance to work in a team, pursue original ideas and finally he discusses the search for greatness as the real future for cancer research. He ends the book by saying "Greatness is not associated with brashness or loudness and great cancer researchers are not afraid of the critics. There nobility is not about being nicer or better than anyone else, rather it is a feeling about the research endeavor that transcends gender, race, or social conditions".

In summary in this book it is discussed a number of topics that over the years have become increasingly relevant for the training of future cancer researchers to the entire scientific enterprise. Because of the wide variety of topics included in this book, each chapter focus on the salient points of the larger issue, and using his personal experience and observations as a guide, Professor Russo brings these questions to light in novel ways. While there are other books that address these admittedly huge scientific questions, this will be the first to bring them together from the perspective of training cancer researchers with the aim of re-instilling in the reader a sense of connection between our goals for the future, and the origins of our desire for truth. This book is targeted towards students of biomedical sciences, teachers, health related professionals, sociologists, economists and the general public that is interested to know how cancer research is conducted and what the future will be.