Health Informatics and Winning the War on Cancer

Edited by Paul H. King

Guide to Health Informatics, 3rd ed.

By Enrico Coiera, CRC Press, 2015. ISBN 978-1-4441-7049-8, xxvi + 683 pages, US$79.95.

Comprehensive. Timely. Readable. Interesting. Useful as a textbook and/or reference. Relevant. Highly recommended.

This 32-chapter, eight-section text can serve as a comprehensive introduction to the field of health informatics. With the accompanying e-book, the reader/user can easily access relevant, web-linked literature via the heavily web-based chapter references. The eight sections of the text cover 1) basic concepts, 2) informatics skills, 3) information systems in health care, 4) guideline- and protocol-based systems, 5) communication systems in health care, 6) language, coding, and classification, 7) clinical decision support and analytics, and 8) specialized applications for health informatics.

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Each chapter opens with relevant quotations, and each is logically structured and well diagrammed. Sidebar elaborations assist the novice reader in useful terminology, and "box" sections serve to give examples of items discussed (for example, the Therac-25 accidents as an example of modeling errors). Each chapter concludes with a listing of "discussion points" for the chapter (Instructors: read this as "potential homework") and a chapter summary. References (by chapter) are placed at the end of the text, preceded by a fairly comprehensive glossary.

Originally published in 2003, this third edition has multiple updates and elaborations from the first and second editions. As the field of medical informatics is no longer the domain of a select few in academia (and the business of health care), the topic is becoming a mainstream item. For example, the EMBS sponsored the IEEE International Conference on Biomedical and Health Informatics in February 2016. In January, the FDA recommended a recall of one company's salads because of one death and 11 hospitalizations due to listeria contamination. This recall was based on advanced molecular detection techniques and bioinformatics processes (topics in this text) implemented by the Centers for Disease Control and Prevention. The new classified Zika virus global emergency is similarly relevant to this field. This text is timely.

Dr. Coiera informs the reader in his introduction that the secret to informatics investigations is that one needs to ask,

1) What is the problem that we are trying to solve?
2) How will we know when we have succeeded?
3) Is technology the best solution, or are there simpler alternatives?

Making sure that the above questions are asked is the author's goal in this text. This is done in a very readable and interesting fashion.

It is this reviewer's opinion that this text is useful as a textbook and/or reference. It could easily serve the purpose as a textbook for an undergraduate biomedical engineering elective course, followed by, if possible, a course in database development. The text is highly relevant to engineers working in medicine, and is thus highly recommended.

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The Death of Cancer: After Fifty Years on the Front Lines of Medicine, a Pioneering Oncologist Reveals Why the War on Cancer Is Winnable—and How We Can Get There

By Vincent DeVita and Elizabeth DeVita-Raeburn, Farrar, Straus, and Giroux, 2015. ISBN-13: 978-0374135607, 336 pages, US$28.

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In this memoir of front-line action in the "war on cancer," Dr. Vincent DeVita combines a survey of cancer biology with a recipe for more effective and personalized treatment of the myriad forms of cancer. Presented in chronological order in a smoothly written volume coauthored with his daughter, Elizabeth DeVita-Raeburn, the book tracks Dr. DeVita from his early work as a clinical associate in the Division of Cancer Treatment (DCT) at the National Cancer Institute (NCI) through his pioneering treatment of Hodgkin's disease, and ultimately to his leadership of the NCI, and later of the Cancer Centers at Memorial Sloan Kettering in New York and at Yale in New Haven, Connecticut.

Although at times a polemic against the Food and Drug Administration (FDA) for restricting patient access to new drugs, the book provides a vigorous defense for the "success" of hard-won advances in cancer treatment, such as improved cure

rates and reduced mortality across the spectrum of all cancers, despite the huge allocation of effort and money (US$30 billion). In fact, it is the "boots on the ground" perspective of just how hard-won these advances have been that distinguishes this book from the other excellent book on this topic (*The Emperor of All Maladies*, by Siddhartha Mukherjee). Together, the two books provide a balanced perspective on the challenges that both patient and physician face when confronting cancer.

In the spirit of full disclosure, I must admit that I approached this book with more than scientific curiosity. I worked for three years as a postdoctoral student in the Laboratory of Chemical Pharmacology in the DCT of the NCI from 1976–1979, where I met my wife, Karen, who then worked in the Laboratory of Clinical Chemistry of the DCT. I also met Dr. DeVita in 1979 when he was head of the DCT. So, when I saw the photograph of Dr. DeVita's small laboratory for animal experimentation, it brought back memories of the early commitment of the NCI to "translational" medicine. There, newly minted Ph.D.s in biophysics worked daily with clinical associates and pharmacologists, using investigational drugs and new treatment protocols, seeking ways to enhance drug targeting and effectiveness. The descriptions of new drugs tried at this time by Dr. DeVita in the treatment of solid tumors—drugs such as Adriamycin, Arabinosyl Cytosine, and 1,3-bis(2-chloroethyl)-1-notrosourea, for example—map my published studies using focused microwave beams to treat human solid tumors implanted in immune-deficient mice. These experiments were all conducted jointly with clinical research associates who worked daily on both human and animal models of cancer.

The successes of combination chemotherapy and adjuvant chemotherapy outlined by Dr. DeVita in this book largely reflect the unique environment at the NCI, where ad hoc blackboard seminars (described humorously in the book as meetings of the Society of Jabbering Idiots) provided opportunities for quickly exploring ideas that were new, novel, and outside the box. This lent an atmosphere of immediacy to the work. I still remember a clinical research colleague, John Weinstein, coming to my lab around 4:30 p.m. one Thursday afternoon to "talk" about targeting anticancer drugs to solid tumors using heat-sensitive liposomes, a new drug carrier whose formulation was published that week in *Science.* It took John only about two minutes to reason that this was an approach that might work, but it took him another eight minutes to convince me that we had to begin the experiment that night, that is, inject tumor cells into mice, prepare heat-sensitive liposomes entrapping the anticancer drug methotrexate, and set up a four-channel microwave system so it would be ready when the tumors began to grow. Hence, within two weeks we had data for a successful follow-up *Science* paper confirming the technique.

The book provides a vigorous defense for the "success" of hard-won advances in cancer treatment.

In The Death of Cancer, Dr. DeVita provides many examples of innovation in the selection and application of new drugs (such as vincristine, vinblastine, and cis-platinum) and new targeting schemes (such as Gleevec, Herceptin, and Abiraterone) that select one or more of the hallmarks of cancer (proliferation, evasion of controls on growth, cell life cycle extension, avoiding the immune system, angiogenesis, disruption of cell metabolism, cellular immortality, and tissue invasion and metastases). This work provides the basis for the improved mortality figures he cites: breast cancer down 25%, colon cancer down 45%, and prostate cancer down 68%, with leukemias and lymphomas down even more. In fact, Dr. DeVita's enthusiasm for the success achieved in treating cancer is tempered only by his experiences with the FDA, which in case after case placed restrictions on cancer drug experimentation, insisting, for example, that new drugs be tested individually on advanced cancer patients who have failed all previous treatments. While erring on the side of safety, the FDA approach first overlooks the subtle changes in cancer cells (e.g., development of drug resistance) that natural selection invokes, and then places too high a burden (enhanced patient survival) for finding the subgroup of drugs, drug combinations, and drug treatment schedules that will work best for each patient subgroup—given the expected heterogeneity of cancer subtypes.

Another interesting feature of the book is the day-by-day description of the political and administrative hurdles that litter the road toward treatment success. Rarely do we get an insider's view of the difficulties that must be overcome to bring resources and facilities together so that new treatment techniques can be tried. In this vein, the cautionary tale he tells of the angiogenesis work of Judah Folkman, along with the misplaced allegiances of Nobel Prize winners like James Watson and a series of directors of the National Institutes of Health, all provide new background—for me—on the difficulties of matching treatment tools with patient necessity. It is at this intersection that each patient and physician must work, and the book closes with both a promising and a cautioning example: the diagnosis and treatment of Dr. DeVita's own prostate cancer. Here, the promises of new treatment agents must address the reality of access and availability. Hence, it is encouraging to read how improved knowledge of cancer biology has led to new drugs and treatment techniques but disappointing to realize how difficult it is to gain access to such treatments. If the former NCI director had such barriers to overcome, it does not bode well for treatment of the more typical patient.

However, despite this reservation, I found this book to be stimulating and informative. It is an easy read. Parts are written in the style of a Tom Wolfe exposé, while others provide the "You are there!" approach of Tracy Kidder. Each chapter has a short list of references to the primary sources and selected follow-up readings. There is also a complete index. If you have wondered about the status of the "war on cancer" or are curious about what works and what does not work to thwart the growth and metastasis of cancer, this is a good nonfiction addition to your list of books to read in 2016.

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