Book Review

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Creative Destruction of Medicine: How the Digital Revolution Will Create Better Health Care

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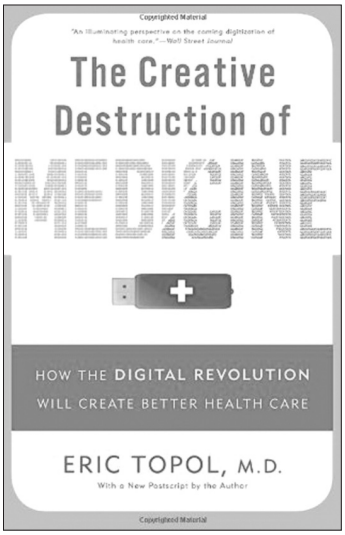

Author: Eric Topol
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This interesting and informative book was written by Eric Topol. Topol is a cardiologist who is globally recognized for his achievement and is one of ten researchers whose studies are most widely cited in the medical field. He is also the director of the Scripps Translational Science Institute and co-founder and vice-chairman of the West Wireless Health Institute in LA Jolla, California. He has been building up a worldwide reputation as a figure with extraordinary understanding of genomics and wireless health care as well as a figure leading the revolution of medicine. Therefore, it seems that the influence or insight Topol has in medicine does not have to be explained in particular.

In *the Creative Destruction of Medicine*, he presents the transformation of medical practice from the population-based approach to treating illness to individualized medicine while genome and digital technologies are the driving force to draw such transformation and the momentum to continue such transformation. This book uses examples that are easy to understand to illustrate the fact that digital technology and genetic knowledge would indeed fundamentally change the way that modern medicine deals with patients and diseases.

This book is composed of 3 parts and a total of 11 chapters which are summarized and discussed below.

Part I. Setting the Foundation

As the starting part of this book, Topol states that the medicine and the patients of the future will be much different from today due to the development of modern digital technology and the mobile devices that have appeared.

Chapter 1. The Digital Landscape: Cultivating a Data-Driven, Participatory Culture

Topol insists that a basis for the medical destruction phenomenon which digital technology may already be creating has been prepared as mobile phones and personal computers have converged with the Internet. Constant Connectivity, Collaboration and Crowdsourcing, Customized Consumption and Cloud Computing are creating a completely different life pattern from the past. While stating that new phenomena, such as Disruption and Destruction, Dealing with a Data Deluge, and Data-driven Culture have appeared as a result, he presents examples that are clear and easily understood for each of these phenomena. Also, he states that the informatization to come will regulate individuals with methods that did not exist in the past and that people will change medicine using information related to them.

Chapter 2. The Orientation of Medicine Today: Population versus Individual

Topol points out the fact that a considerable portion of the tests or prescriptions frequently used in medicine of the present day are unnecessary or insufficient. As he points out, the blind faith of evidence-based medicine based on large-scale randomized, double-blind, placebo-controlled clinical trials performed under the most rigorous condition or the creation of recommendations or guidelines by government experts greatly lacks any basis, he suggests that we can overcome such confusion by evidence-based medicine of true sense which is based on each individual instead of the medicine of present day pursuing the public good of the entire population group.

Chapter 3. To What Extent Are Consumers Empowered? Clicks and Tricks

In this chapter, Topol argues that improvements can be made when patients are able to decide which treatment to receive by having more information on the surgeries, treatments, or drugs they would have to receive, although the inappropriate use or overuse of medical procedures is a difficult problem to solve. Patients are now able to gain necessary information on the Internet and the social media related to health are also consolidating the choice of patients. He insists that information technologies of today are enabling so-called do-it-yourself (DIY) medicine.

Part II. Capturing the Data

Part II of this book is composed of 5 chapters while each chapter includes explanations and examples on the new method of obtaining and using data in modern medicine.

Chapter 4. Physiology: Wireless Sensors

Wireless remote sensors enable doctors in remote areas to monitor the condition of patients and to provide timely intervention by gathering information, such as blood glucose and blood pressure levels, electrocardiography data and heart rates, vital signs, use of inhaler by asthma patients, sleep apnea patterns, drug intake compliance rates, etc., in real-time to be transmitted to doctors.

Chapter 5. Biology: Sequencing the Genome

Since the Human Genomes Project, there have been continuous attempts to correct faulty genes, explain susceptibility toward diseases, or decide which drugs to use for treatment in various situations by sequencing the genome. Such analysis introduces cases in pharmacogenomics, carcinogenomics, and epigenomics by generalizing medical knowledge and providing more accurate information to each individual to predict that greater help will be provided to the patients. Topol predicts that molecular biological digitization of the human race will become daily routine in the near future.

Chapter 6. Anatomy: From Imaging to Printing Organs

Pocket-size high-resolution ultrasound which is one of the most significant advances in the field of medical imaging is replacing the stethoscope which has firmly kept its position in patient diagnosis since the first half of 1800s. In addition, Topol discussed the results of changes that have progressed or are in progress and the changes that will be about in the future as new technologies are applied to heart imaging, brain imaging, cancer imaging, and organ printing.

Chapter 7. Electronic Health Records and Health Information Technology

He explains how effective and useful Electronic Health Records (EHR) and health information technology are in eliminating medical errors created due to not being able to secure complete information on the patient condition. Such system can contribute to reducing various errors that may put patients in danger and can support the decision making of doctors related to patient treatment. Although there are problems to be solved, such as financial burden, privacy, and data security issues, lack of evidence of the effectiveness, or the resistance of healthcare professionals, etc., the ultimate acceptance of EHR is inevitable and securing complete compatibility of EHR's will be a key advance in future medicine.

Chapter 8. The Convergence of Human Data Capture

While the previous chapter introduced the operating systems and applications in medical innovation separately, this chap-

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ter discuss the remarkable changes that may take place when these are connected with each other, in other words, when digital medical convergence is accomplished. It presents the benefits that the combination of wireless sensors and genomics may bring in relation to heart attack, cancer, transplant rejection, type 1 diabetes, and asthma.

Part III. The Impact of Homo Digitus

Chapter 9. Doctors with Plasticity?

Topol states that doctors must evolve not to simply survive in the world of digital medicine, but for its active breakthrough. Although a crisis is clearly approaching at this time and many obstacles exist, he states that there are plenty of new opportunities that doctors are able to create within the new technology described above and the new medical environment in which such technology is applied. To make this possible, he insists that medical education must change, while doctors must assume a higher level of accountability toward medical consumers and that they must recognize the influence of e-mail, SNS, and mobile apps on modern society and patients to be able to properly use them. He also demonstrates the usefulness of remote medical treatment via video between patients and doctors.

Chapter 10. Rebooting the Life Science Industry

Topol describes the crisis faced by the pharmaceutical industry which takes up the greatest percentage of life science industries and states that a new approach using all assets of digital medicine is necessary to deal with this crisis. As the new approaches, he presents three types, including wiki-medicine, which represents the enablement of a collaborative brain trust and networking; the guaranteed-to-succeed model of clinical development; and the innovative digital marketing and tracking of new products.

Chapter 11. Homo Digitus and the Individual Afterword

In the final chapter, Topol points out that the medical circle has been a group guaranteed with special rights as almost an exclusive supplier or the source and repository of all related health care information until now. However, the horizontal and equal development of networks related to health along with the growth of the internet is eliminating the knowledge gap that had existed between medical experts and the public, while he insists that new mobile devices will also play the role of accelerating the elimination of this gap. He presents the change that would be created when the development of fast maturing digital and mobile devices of the non-medical field, cloud computing, social networking, etc., are combined with developments in the digital medical field, such as genomics, bio sensors, advanced imaging, etc.

Finally, he states that a human being digitalizing other human beings means changing the life of human beings despite the fact that many obstacles or concerns still exist while this could be called the essence of creative destruction beyond simple change. He also states that no parts of the field of health care can avoid such change, while all parties, including doctors, hospitals, life science enterprises, governments, and related institutions are the subjects of sudden revolution.

Topol reveals that the purpose of this book is 'not simply a techno-tour' but to depicting what the creative destruction of medicine might look like, on whether it can happen, and how information on the individual can be gained as a precise standard to the extent of being able to call it 'individual and science'. Naturally, this wonderful book is considered as faithfully accomplishing the purpose of writing the book. However, I must confess that I also experienced a truly interesting techno-tour while reading each chapter of this book.

After trying to contain everything, including detailed explanations of various topics, various actual examples to help explain certain points, as well as the expectations and outlook of Topol himself toward the future, this book is quite thick and contains quite a lot of substantial information. However, the feeling of it being a difficult read disappeared as I was reading chapter by chapter and began to develop respect for Topol, who possesses abundant and in-depth knowledge and insight on wide variety of subjects. Moreover, I felt yet again that Topol has strongly conveyed the message that patients, who had been placed in a more ignorant, weaker, and more incompetent position, must no longer be the sacrifice of such irrationality and inefficiency; he is a doctor who aims toward warm digital technology as he sharply points out the problem of irrationality and inefficiency that are prevalent in the field of clinical medicine.