

Personalized Medicine: Promises and Pitfalls

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Amazing advances have been made in science to improve medical care in the 21st century with the development of genomics, as well as pharmaceuticals that have been developed from proteomics and botanical products. Personalized medicine generally seeks to identify the genetic, phenotypic, or environmental factors that influence a person's health risks. This book is not an exhaustive analysis of personalized medicine or the complete science behind it but is colored by the author's personal experiences as a breast cancer survivor in a medical, educational, and research health-care center.

The book includes 11 chapters dealing with genetics, proteomics, epigenetics, integrative medicine, the placebo effect, stem cells, scientific studies and clinical trials, medical training for personalized medicine, health-care and drug costs, and ethics. Each chapter starts with a brief introduction to the terms, concepts, and essential facts needed to understand the topic. Many chapters include personal stories and individual medical cases. The references in each chapter are current. The 8 tables are helpful for understanding the subject. The glossary of scientific terms and the index are useful. There are only 44 figures.

With the basic knowledge of genes, DNA, and processes of DNA replication, transcription, and translation, we see how these biologic processes contribute to the genetics of each person and also to that person's family history. The author believes that we are far from achieving the goal of personalized medicine because of the complexity of each person's physiology and that scientists will forever continue to learn about the complex patterns of gene and protein expression that can lead to disease. Proteomics and proteins are important to personalized medicine because diseased and cancerous cells, as well as normal cells, express specific proteins on their surfaces and inside the cells that reflect their activities and health. Analysis of the proteins has shown promise that we can identify unique biomarkers early in the disease process. The DNA profile of our genes is further complicated by epigenetics, which are inherited changes in DNA expression that occur in the absence of a change in the primary DNA sequence. Nutrition affects every aspect of our lives and can influence the development and outcome of disease. Nutrition is a part of integrative medicine, and many of the topics in integrative medicine fall under the domain of complementary and alternative medicine. Physical activity is extremely important for reducing high blood pressure and preventing weight gain and can cause epigenetic modification to DNA. Integrative medicine therapy is effective for a particular medical condition. Combining allopathic medicine with evidence-based integrative medicine may be helpful to many people. A placebo effect in medicine can be defined as a substance or a

procedure that is administered to a person or animal that elicits an effect but does not have any specific pharmacologic activity for the condition being tested. It appears that the placebo effect is part of our normal physiology and needs to be considered as a component of medical treatment.

Advances in stem cell research have given new promise for personalizing cell or organ therapies for human diseases. The author feels that we need to rely on different types of scientific studies from cells, animals, and humans to understand the best treatments for patients. Personalizing medicine makes this process more difficult, because conclusions on best medical practice can be difficult to assess from studies on individuals or small groups of patients with the tools currently available. Medical education is lagging behind the rapid advances in the sciences of genomics, epigenetics, proteomics, integrative medicine, and others, on which personalized medicine is based. It is hoped that doctors in training are presented with the pitfalls in simply analyzing a patient's genes for mutations or for diseases. A promising trend in the medical world is that health-care costs have slowed substantially in every high-income nation. It is only logical to think that the development of drugs for small groups of patients or individual patients will increase costs. Reimbursement to physicians and hospitals is beginning to be tied to the outcomes of medical treatments. It appears that personalized medicine and health-care costs are on a collision course. Ethics are an important cornerstone of human civilization and are critical in medicine and research. Predictive tests for disease susceptibility in personalized medicine can negatively influence a patient's sense of well-being, and personalized therapeutic measures may also cause an ethical dilemma leading to unequal access to a particular therapy.

This book meets the author's goal of explaining the science behind personalized medicine, the impact it may have on specific diseases, and some of its repercussions on her medical institutions. By explaining broad topics in personalized medicine, the author helps the reader discover how personalized medicine makes a positive impact on an individual's health. The book is relatively easy to read and timely to today's medical practice. I highly recommend it to medical students, medical and surgical trainees, and practitioners.

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