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Chapter 13: Artificial Intelligence in Personalized Medicine

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Abstract: Personalized medicine is concerned with caring about the right patient and providing him with the right treatment based on his or her peculiarities. This thought has been just a dream over several years, but it is now a reality with the aid of artificial intelligence (AI). Machine learning and deep learning are just two examples of AI technologies that can examine data on a massive scale and identify trends that a person might overlook. To illustrate, medical imaging can be applied to AI to reveal diseases like cancer, heart conditions, or brain hemorrhage at its early stages. The AI is another useful tool in treatment planning. It is capable of examining the reaction of a patient towards particular therapies and recommending the most effective treatment, according to their genes and past medical record. Besides that, AI accelerates the drug discovery process, which allows researchers to determine whether the new drugs will be safe and effective, identify potential drug targets, and even to create clinical trials more efficiently. Nevertheless, there are not challenges. Such issues as data privacy and the necessity of the reliable systems to handle patient information should be discussed. Application of AI in healthcare is also very expensive as it involves construction of facilities, staff training, and educating the healthcare professionals on the proper use of these items. The alliance among physicians, researchers, IT specialists, and policy makers is required to ensure that the best use of AI in personalized medicine is achieved. In this way, AI can have a significant positive impact on the medical industry and assist the patients in leading healthier lives.

Keywords: Artificial intelligence (AI), Personalized medicine, machine learning, deep learning, treatment

13.1 Introduction

Personalized medicine—the practice of tailoring treatment to the unique characteristics of each patient—has long been a goal in healthcare. With recent advances in artificial intelligence (AI), this goal is becoming more achievable. AI is already reshaping healthcare by improving diagnosis, guiding treatment choices, supporting patient care, and speeding up drug discovery [1]. However, its growing role also raises important concerns around ethics, data security, and responsible use. One of the most exciting