The Role of Artificial Intelligence in Predictive Diagnostics and Early Disease Detection

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Abstract: Artificial intelligence (AI) is transforming healthcare by allowing for earlier and more precise detection of disease using predictive diagnostics. Using sophisticated methods like machine learning (ML), deep learning (DL), and natural language processing (NLP), AI platforms are able to examine large and complicated sets of data—such as electronic health records, imaging, genomic information, and real-time data from wearable devices—to recognize subtle patterns of disease risk. These abilities enable prior clinical intervention, especially in disciplines such as oncology, cardiology, endocrinology, and neurology, where timely detection is essential for positive outcomes. For instance, convolutional neural networks equaled or even surpassed human accuracy in detecting metastatic cancer in pathology images and arrhythmias in electrocardiograms 【1】 , 【2】 . NLP tools have also been shown to contribute in extracting early warning signs from unstructured clinical texts 【3】 In spite of its potential, AI integration is confronted with issues such as data quality, model interpretability, regulatory issues, and ethical considerations. This article discusses both the revolutionary potential and the constraints of AI in predictive diagnostics and supports interdisciplinary cooperation and ethical frameworks to responsibly leverage AI in personalized, preventive medicine.

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