عنوان مقاله:

Bioinformatics-Driven Approaches for Precision Oncology: Revolutionizing Cancer Treatment

محل انتشار:

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خلاصه مقاله:

In the ongoing battle against cancer, precision oncology has emerged as a revolutionary approach that customizes treatment plans according to the specific genomic characteristics of individual tumors. Leading this transformative revolution is the multidisciplinary field of bioinformatics, which combines biology, computer science, and statistics to analyze and interpret vast amounts of genomic data. Through the utilization of bioinformatics, researchers and clinicians are paving the way for personalized cancer care by unlocking novel opportunities. The aim of this study was to present the bioinformatics-driven approaches for precision oncology and exhibit some of the most impactful methodologies that are changing the future of cancer treatment. In the dynamic field of biomedical research, innovative techniques like genomic profiling, functional annotation, pharmacogenomics, single-cell analysis, network biology, and drug repurposing are propelling us into a new era of personalized medicine. Genomic profiling, by studying an individual's genes, unveils critical insights into disease mechanisms, while functional annotation deciphers the functions and interactions of genes. Pharmacogenomics aids in tailoring treatment plans based on genetic variations, thereby minimizing adverse reactions and optimizing treatment outcomes. Single-cell analysis reveals hidden cellular states and biomarkers, enhancing our understanding of disease progression. Network biology unravels complex biological processes, uncovering key drivers and therapeutic targets. Lastly, drug repurposing accelerates drug discovery by identifying new applications for existing medications. These innovative approaches are revolutionizing the field of medicine, instilling hope for more targeted and effective treatments across a multitude of conditions.

کلمات کلیدی:

Personalized medicine; Bioinformatics; Cancer; Precision oncology

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