Technological advances in clinical individualized medication for cancer therapy: from genes to whole organism

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Abstract

Nowadays, the clinical application of antitumor drugs tends towards precision and individualization. Numerous efforts have been put in exploiting technologies to precisely discern the features of tumors and discover the possible response of every cancer patient to antitumor drugs at multiple dimensions from genes, proteins, tissues to whole organism, including Genomic data, histological information, functional drug profiling and drug metabolism of cancer patients can be obtained through polymerase chain reaction, sanger sequencing, next-generation sequencing, fluorescence in situ hybridization, immunohistochemistry staining, patient-derived tumor xenograft models, patient-derived organoid models and therapeutic drug monitoring. The application of various detection technologies in clinical practice has enabled 'individualized treatment' to be realized, but the ideal accuracy effect has not yet been achieved. More novel technologies or technology combinations are needed to predict the correlation between detection information and therapeutic effect, and to put forward more accurate and effective therapeutic strategies for every patient. Here, we briefly summarize the conventional and state-of-the-art technologies contributing to the clinical individualized medication and their application in clinical practice, attempting to seek therapy options that may ultimately improve clinical outcomes.

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