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Opinion

An Over View On Molecular Targeted Therapy of Cancer

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ABSTRACT

Cancer has become a major public health problem worldwide. Researches focus on the modern approaches for cancer medications that involve the particular targets of the cancer disease. The premise of targeted therapy in oncology is the fundamental reliance of tumour cells on biological pathways to which drugs inhibiting those pathways can be applied. Tumour resistance to anticancer drugs is a well-known clinical phenomenon that is now yielding its secrets to investigation at the molecular level. Resistance of immunotherapeutic agents is a matter of concern that is believed to influence the effectiveness of anticancer therapies. The inherent or obtained drug resistance specifically impacts on the survival and the forecast of patients with cancer. This survey presents the application of molecule targeted therapy in cancer treatment. A specific focus is on the potential mechanism that can facilitate advance enhancement of anticancer.

Key words: Molecules; Targeted therapies; Cancer; Anti-cancer

MOLECULAR TARGETED THERAPY IN CANCER

Cancer is one of the most common diseases and a major public health problem in worldwide. Based on GLOBOCAN estimates, around 14.1 million modern cancer cases and 8.2 million deaths happened in 2012 around the world. Over the years, the burden has shifted to the developing countries, which currently account for about 57% of cases and 65% of cancer deaths worldwide. The high morbidity and mortality of cancer are related with the increasing prevalence of risk factors such as overweight, smoking, the increased aging and growth of the population [1].

There are many effective methods to treat the cancer disease. Surgery, radiation therapy and chemotherapy are the major methods in the treatments of cancer today. Primary tumours and large metastases often depend on surgery and radiation therapy. Some disseminated tumours such as breast, prostate and colorectal cancer are treated mainly by chemotherapy. Traditional anticancer chemotherapy agents block cell division and DNA replication [2]. Many of these agents could also target the microtubule dynamics of the mitotic spindle. These early anticancer drugs such as platinum derivatives, nucleoside analogues, topoisomerase inhibitors, taxanes and vinca alkaloids are widely used today. They have great curative effects and slightly prolong survival among patients with childhood leukaemia's and testicular carcinoma. However, they are not effective for all types of cancer. Regarding the background and disadvantage of chemotherapy, complementary treatment modalities are being widely explored in recent years. For example, molecular therapy, anti-angiogenesis therapy, immunotherapy, apoptosis regulation, signal-transduction therapy, differentiation therapy, targeted radionuclide therapy and nucleic-acid-based therapies have attracted more attention from the public. Researches are focusing on some new approaches for cancer treatments that involve the specific targets of the cancer disease. Multiple molecular targets and signaling pathways were related to the action of targeted treatment [3]. Targeted treatment exerted its anticancer effects through multiple mechanisms, including proliferation inhibition, apoptosis induction, metastasis suppression, immune function regulation and multidrug resistance reversal. Increased understanding of tumor immunology leads to the development of effective targeted therapies. The molecular diagnostic of cancer is also rapidly developed recently [4]. More and more targeted therapeutic agents across various cancer subtypes have been approved by the US Food and Drug Administration (FDA) in the recent years than in previous two decades. These drugs which are effective and safe provide new treatment opportunities to patients who could not receive suitable conventional chemotherapy. Drugs targeting signalling oncoproteins that have gained tumor-driving functions through mutations or overexpression are subsequently developed to increase specificity and thus reduced the side effects, but have limitations such as the formation and development of drug resistance [5]. Resistance of therapeutic agents is an important problem in the treatment of cancer disease that is believed to influence the effectiveness of targeted therapies and the prognosis of patients with cancer. Drug resistance in cancer definitely develops during treatment, especially with novel targeted therapies outlined to inhibit specific molecules. Although a patient initially was sensitive to some chemotherapeutic agents, he may

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also acquire cross resistance during treatment. The mechanisms of cross-resistance are complicated and maybe different from the single drug resistance [6]. According to incomplete statistics, above 80% of patients with metastatic cancer were acquired single or multiple drug resistance. Drug resistance directly causes treatment failure in cancer disease especially in metastatic tumour. Tumour resistance to anticancer drug is a major clinical phenomenon. Several mechanisms involve in anticancer resistance, including an increase in drug efflux, alteration or mutation of drug targets, drug detoxification and inactivation, impact on apoptosis, interference with DNA replication and other ways. Cancer cell resistance to chemotherapy might happen at a part of molecular levels. The overcome of drug resistance may affect on survival of patients with cancer. This survey shows the application of molecule targeted therapy in cancer treatment. A particular focus is on the mechanism of tumour resistance to anticancer drugs [7]. The premise of targeted therapy in oncology is inhibiting the biological pathways of tumour cells. Here, we also provide an overview of these potential resistance mechanisms that can facilitate further improvement of anticancer.

Molecular targeted therapy in anticancer

Researchers have developed anticancer drugs with a higher precision of molecular targeting. The cellular targets are genetically altered in cancer cells and are essential to tumour development and survival. Oncoprotein or oncogenes targets, which are mainly involved in various signalling pathways, are primarily products of gene fusions, obtained or functional mutations or overexpressed oncogenes.

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