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Combination Therapies of Artemisinin and its Derivatives as a Viable Approach for Future Cancer Treatment

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Abstract

Background: Many anticancer drugs have been developed for clinical usage till now, but the major problem is the development of drug-resistance over a period of time in the treatment of cancer. Anticancer drugs produce huge adverse effects, ultimately leading to death of the patient. Researchers have been focusing on the development of novel molecules with higher efficacy and lower toxicity; the anti-malarial drug artemisinin and its derivatives have exhibited cytotoxic effects.

Methods: We have done extensive literature search for artemisinin for its new role as anti-cancer agent for future treatment. Last two decades papers were referred for deep understanding to strengthen its role.

Result: Literature shows changes at 9, 10 position in the artemisinin structure produces anticancer activity. Artemisinin shows anticancer activity in leukemia, hepatocellular carcinoma, colorectal and breast cancer cell lines. Artemisinin and its derivatives have been studied as combination therapy with several synthetic compounds, RNA interfaces, recombinant proteins and antibodies etc., for synergizing the effect of these drugs. They produce an anticancer effect by causing cell cycle arrest, regulating signaling in apoptosis, angiogenesis and cytotoxicity activity on the steroid receptors. Many novel formulations of artemisinin are being developed in the form of carbon nanotubes, polymer-coated drug particles, etc., for delivering artemisinin, since it has poor water/ oil solubility and is chemically unstable.

Conclusion: We have summarize the combination therapies of artemisinin and its derivatives with other anticancer drugs and also focussed on recent developments of different drug delivery systems in the last 10 years. Various reports and clinical trials of artemisinin type drugs indicated selective cytotoxicity along with minimal toxicity thus projecting them as promising anti-cancer agents in future cancer therapies.

Keywords: Artemisinin; anticancer properties; combination therapy; formulations; reactive oxygen species; repurposing..

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