Conjugation Of The MCR1 Ligand with Cytotoxic Drugs For Targeted Melanoma Therapy

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Technology description

Invention:
This invention is a drug composition and a method of cancer treatment using chemotherapeutics linked to ligands selective for uptake by melanocortin 1 receptors (MC1R) in MC1R-overexpressing melanoma. This invention enables use of cytotoxic drugs that may be less likely to result in melanoma treatment resistance but would otherwise lack selectivity to melanoma cells. The invention specifically pertains to targeting melanoma to deliver a wide range of cytotoxic drugs. Cells naturally express specific kinds of receptors on their exterior membrane which bind to a specific molecule. By exploiting this and designing drugs to respond to a receptor, specific targeting of cells by a drug results, rather than affecting the entire body.
Background:
Melanoma is the most deadly form of skin cancer in the United States, with an estimated 87,110 new cases and 9,730 deaths in 2017. Once metastasized, the median overall survival for malignant melanoma patients is 5.3 months. Despite recent breakthroughs for developing BRAF-V600E and programmed cell death protein 1 (PD-1) inhibitors, current treatments can only improve survival, and tumor cells eventually become resistant to these treatments. The BRAF-V600E inhibitor vemurafenib was shown to prolong the median overall survival of patients with BRAF V600E mutant melanoma to 15.9 months. However, a mice study showed that 20% of melanoma tumors became resistant to vemurafenib treatment after 56 days. Similarly, 60% to 70% of metastatic melanoma patients are innately resistant to PD-1 inhibitor treatments. To increase response rate and avoid the resistance issue, there is a need for melanoma drugs that can target biological processes that are fundamental for cell proliferation or survival, so that the therapeutic effect cannot be easily bypassed through activation of a compensating signal pathway. Nevertheless, current anticancer agents that target cell proliferation or survival usually have poor selectivity to cancer cells and thus are also toxic to healthy non-cancer cells.

Application area

- Melanoma therapy

Advantages

• Higher selectivity
• Fewer side effects
• Circumvents drug resistance in tumor cells

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