

Radiation-activatable Platinum Complex, Its Preparation and Therapeutic Use



Biomedical and Genetic Engineering

Opportunity

Cancer is a life-threatening disease that imposes an immense burden on patients, families, healthcare systems and societies. The effectiveness of current treatments for cancer is impaired by the limited efficacy and significant side effects associated with traditional chemotherapy and radiation therapies. These methods often fail to selectively target cancer cells, leading to damage to healthy tissues and a range of adverse effects.

A non-invasive therapy for cancer, sonodynamic therapy (SDT), is attracting increasing attention due to advantages in tissue penetrative depth, remote spatiotemporal selectivity and non-invasiveness. However, its mechanism may be countered by the intrinsic antioxidant defense mechanism of cancer cells, giving SDT limited application in cancer treatment.

Thus, there remains a great need for new compounds with acceptable side effects that can be used as an alternative or alongside other types of anticancer drugs or drug carriers for effectively treating cancer, including cancer with intrinsic or acquired chemoresistance.

Technology

The technology described in the patent involves a novel radiation-activatable platinum complex designed for therapeutic use, particularly in treating cancer. This complex can be administered to a patient, targeting cancerous tissues, and subsequently activated using specific radiation modalities. The radiation can be ultrasound, with frequencies ranging from about 1 MHz to 3 MHz, or light, with frequencies between 350 THz to 500 THz. The application of this radiation generates reactive oxygen species, which induce apoptosis or necrosis in cancer cells. The platinum complex may also function as a prodrug, enhancing its therapeutic efficacy. It can be used to prepare a medicament for treating the target tissue by sonodynamic therapy, photodynamic therapy, chemotherapy and/or a combination thereof. The invention addresses the limitations of traditional chemotherapy by targeting tumors with intrinsic or acquired resistance to standard treatments, thereby offering a more effective and less invasive approach to cancer therapy.

Advantages

- By selectively targeting cancer cells and activating the drug only in the presence of radiation, the potential for systemic side effects commonly associated with traditional chemotherapy is significantly reduced.

IP Status
Patent filed



Technology Readiness
Level (TRL) ?

3

Inventor(s)

Prof. ZHU Guangyu

Mr. LIU Gongyuan

Enquiry: kto@cityu.edu.hk

Follow-on
Funding

Develop
Concept

Proof
Concept

Build Value

- The generation of reactive oxygen species upon activation can lead to enhanced therapeutic effects, potentially improving the efficacy of the treatment compared with single-modal therapies.
- The use of ultrasound or light for activation provides a non-invasive approach, which can improve patient comfort and compliance compared with more invasive treatment methods.
- The platinum complex is designed to be effective against cancer cells that exhibit intrinsic or acquired resistance to conventional platinum-based drugs like cisplatin, enhancing treatment options for resistant tumors.
- The complex can be activated specifically at the tumor site using radiation, allowing for localized treatment and minimizing damage to surrounding healthy tissues.

Applications

- The primary application is in the treatment of various types of cancer, particularly tumors that exhibit intrinsic or acquired resistance to conventional therapies. This includes cancers such as cervical, lung, ovarian, breast, and mammary cancers
- Specific applications include sonodynamic therapy, photodynamic therapy and their combinations with chemotherapy.

