Controllable activation of platinum anticancer prodrugs in vivo

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Despite the broad clinical applications of platinum-based anticancer drugs including cisplatin, their side effects and resistance issues have encouraged researchers to look for novel metal-based anticancer complexes. Non-traditional platinum compounds especially Pt(IV) complexes have been extensively studied and they hold great promise to be further developed as the next-generation platinum drugs.[1,2] Selective activation of prodrugs within a tumor is particularly attractive because of their low damage to normal tissue. In this presentation, I will introduce the design, photoactivation mechanism, and antitumor activity of visible light-activatable Pt(IV) prodrugs.[3-5] These small-molecule prodrugs have controllable activation properties: they are shown to be inert in the dark but under short-period irradiation with low intensity of visible light, and without the need for any external catalyst, the prodrugs are rapidly reduced. The prodrugs display superior antitumor activity both in vitro and in vivo in human carcinoma models. I will also introduce our recent progress in the delivery of platinum drugs and novel types of multifunctional platinum prodrugs.[6,7] The controllable activation property and superior antitumor activity of these prodrugs may suggest a novel strategy for the design of next-generation platinum prodrugs to reduce the adverse effects and conquer the drug resistance associated with traditional platinum chemotherapy.

References

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Prof. Guangyu Zhu obtained his B.Sc. in Chemistry from Peking University (2002) and obtained a Ph.D. in Biological Chemistry from the University of Pittsburgh (2007). He subsequently did his postdoc at the Massachusetts Institute of Technology (MIT). He joined the City University of Hong Kong in 2011 and now he is an Associate Professor. Prof. Zhu's research interest lies at the interface of chemistry and biology, focusing on anticancer drug development and mechanism. His current research projects include the synthesis and biological evaluation of novel metal-based anticancer agents and the development of anticancer prodrugs that can be controllably activated in vivo.