Hsien Ting Chiu et al., J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.044

Nano-bio-integration of albumin-gold nanorods laden macrophage for tumortropic drug delivery and controlled release in cancer therapy

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Nanotechnology in combined therapy with both physical and chemical approach has been commonly suggested in cancer therapy due to the synergistic effect which results better therapeutic efficacy than a single treatment. Unfortunately, few challenges including the limited drug penetration and distribution within tumors considerably weakens the potential impact of nanomedicines. Living cells with tumor-homing property have recently arisen as an exciting opportunity to overcome these difficulties. An optimal intratumoral delivery and distribution of nanotherapeutic agents is becoming increasingly realistic by cell-mediated delivery. In this study, a doxorubicin loaded gold nanorods/albumin core-shell nanoplatform (NR@DOX:SAs) was designed for macrophage-mediated delivery to achieve effective antitumor effects by combined photothermal and enhanced chemo-therapy. The albumin shell served as a drug reservoir to delay the intracellular DOX release as well as the drug-related toxicity to impair the host cell carriers. On-demand payload release was enabled by near infrared laser irradiation to destroy neighboring cancerous cells in the nearby vicinity. As compared to the free NR@DOX:SAs, the nano-engineered macrophage was capable to deliver the bearing nanodrugs throughout the tumor tissue, resulting in better therapeutic efficacy against prostate cancer by local administration. On the contrary, free DOX which could be spread out readily was quickly cleared at the tumor site showing no effect on tumor elimination. This result suggested that our developed cell-mediated delivery system was more practically expedited in clinical application for cancer therapy in the future.

Biography

Hsien Ting Chiu has completed his Bachelor's degree from National Tsing Hua University at the Department of Biomedical Engineering and Environmental Sciences in 2012. He is now a PhD student in National Tsing Hua University at the Department of Biomedical Engineering and Environmental Sciences. His research is focused on nanomaterial design for cancer application.

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