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Remote Control of Light-Triggered Virotherapy

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Clinical virotherapy has been successfully approved for use in cancer treatment by the U.S. Food and Drug Administration; however, a number of improvements are still sought to more broadly develop virotherapy. A particular challenge is to administer viral therapy systemically and overcome limitations in intratumoral injection, especially for complex tumors within sensitive organs. To achieve this, however, a technique is required that delivers the virus to the tumor before the body's natural self-defense eradicates the virus prematurely. Here we show that recombinant Adeno-Associated Virus Serotype 2 (AAV2) chemically conjugated with iron oxide nanoparticles (~5 nm) has a remarkable ability to be remotely guided under a magnetic field. Transduction is achieved with microscale precision. Furthermore, a gene for production of the photosensitive protein KillerRed was introduced into the AAV2 genome to enable Photodynamic Therapy (PDT), or light-triggered virotherapy. In vivo experiments revealed that magnetic guidance of "ironized" AAV2-KillerRed injected by tail vein in conjunction with PDT significantly decreases the tumor growth via apoptosis. This proof-of-principle demonstrates guided and highly localized microscale, light-triggered virotherap.

Biography

Zi Xian Liao received her Ph.D. (2013) degree in National Tsing Hua University (NTHU), Taiwan. She currently serves as a assistant professor of Institute of Medical Science and Technology at National Sun Yat-sen University (NSYSU), Taiwan. Her main research interests focus on biomaterials applied for drug/gene delivery particularly genetically engineered protein, DNA and RNAi, continuously at controlled rates for prolonged of time.

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