Nanomaterials based In Situ Vaccine against Tumours

*Yannan Yang**

Tumour Inflammation and Immunotherapy Program
South Australian immunoGENomics Cancer Institute
The University of Adelaide
Adelaide, South Australia, Australia
* *Corresponding Author, Email: yannan.yang@adelaide.edu.au*

Immunotherapy have revolutionized the landscape of cancer therapy, offering a potent therapeutic paradigm for treating various types of malignant tumours with remarkable success in clinic. However, the response rate and efficacy of immune are largely compromised in immune-suppressive tumours (i.e. cold tumours). Recent progresses in materials science have benefited the immunotherapeutic outcome by taking the advantage of the cargo delivery capability, immune-stimulatory activity and tumour-microenvironment-modulating property of engineered biomaterials. In this talk, I will introduce our recent progress in biomaterials based in situ vaccination for combating cold tumours.[1-8] We show that by finely engineering the structure and composition of bioactive nanoparticles, it is possible to induce immunogenic cell death while at the same time creating a favourable tumour immune microenvironment, which collectively results in a largely improved immunotherapeutic outcome with minimized adverse effect. We envision that these findings would provide new opportunities for developing novel biotechnologies that can be potentially applied for pre- and post-surgical tumour treatment.

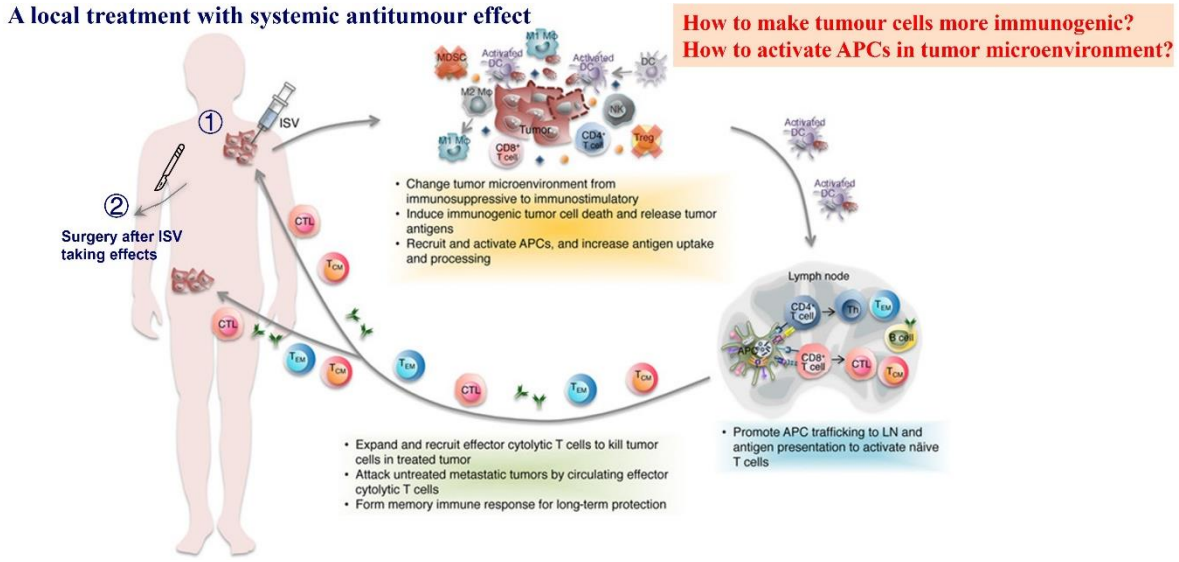

Figure 1: Schematic illustration of in situ vaccine for tumour immunotherapy.[9]

References:

[1]Y. Yang, et al., Nature Comm., Accepted.
[2]M. Zhang, Y. Yang* et al., Adv. Sci. 2023, 10, 2302250.
[3]F. Wang, Y. Yang* et al., Angew. Chem. Int. Ed. 2022, 61, e202209499
[4]Y. Yang, C. Yu, et al., Adv. Sci., 2021, 8, 2002667.
[5]Z. Dai, Y. Yang* et al., Nano Lett. 2021, 2020, 20, 9, 6246–6254.
[6]Y. Yang, C. Yu, et al., Angew. Chem. Int. Ed. 2018, 57, 11764.
[7]Y. Yang, C. Yu, et al., Angew. Chem. Int. Ed. 2017, 56, 8446
[8]Y. Lu, Y. Yang, C. Yu, et al., Biomaterials. 2018, 175, 82.
[9]M.R. Sheen, et al., WIREs Nanomed Nanobiotechnol.2019, 11, e1524