Deep tumor-penetrated nanocages improve accessibility to cancer stem cells for photothermal-chemotherapy of breast cancer metastasis

With the support by the National Natural Science Foundation of China and the Chinese Academy of Sciences (CAS), the research team led by Prof. Zhang ZhiWen (张志文) and Prof. Li YaPing at the State Key Laboratory of Drug Research and Center of Pharmaceutics, Shanghai Institute of Materia Medica, CAS, discovered that deep tumor-penetrated nanocages could effectively improve their accessibility to cancer stem cells (CSCs) to suppress breast cancer metastasis, which was published in *Advanced Science* (2018, 1801012).

Cancer stem cells (CSCs) have been proposed to account for the tumor origin, metastasis and relapse after therapy. However, CSCs are the only minor subset of cancer cells in the heterogeneous solid tumor, which are largely surrounded by multiple stromal cells and dense extracellular matrix components, forming an abominable barrier hampering their accessibility to CSCs.

Excitingly, Zhang's team developed deep tumor-penetrated biomimetic nanocages loading photothermal agent and chemotherapeutic epirubicin to improve their accessibility to CSCs for effective therapy of breast cancer metastasis. The biomimetic nanocages depicted superior tumor accumulation and flexible permeation throughout the tumor mass. Moreover, they could be largely internalized by cancer cells and preferentially accessed to $ALDH^{high}$ CSCs fractions, but less taken up by stromal cells of tumor-associated macrophages (TAM) and cancer-associated fibroblasts (CAF) in tumor regions. Of note, the CSCs-assessing nanocages produced considerable inhibition of primary tumor growth and incidence of lung metastasis. Thus, the deep tumor penetrated biomimetic nanocages can provide an encouraging nanoplatform to ameliorate their accessibility to CSCs for effective anti-metastasis therapy.

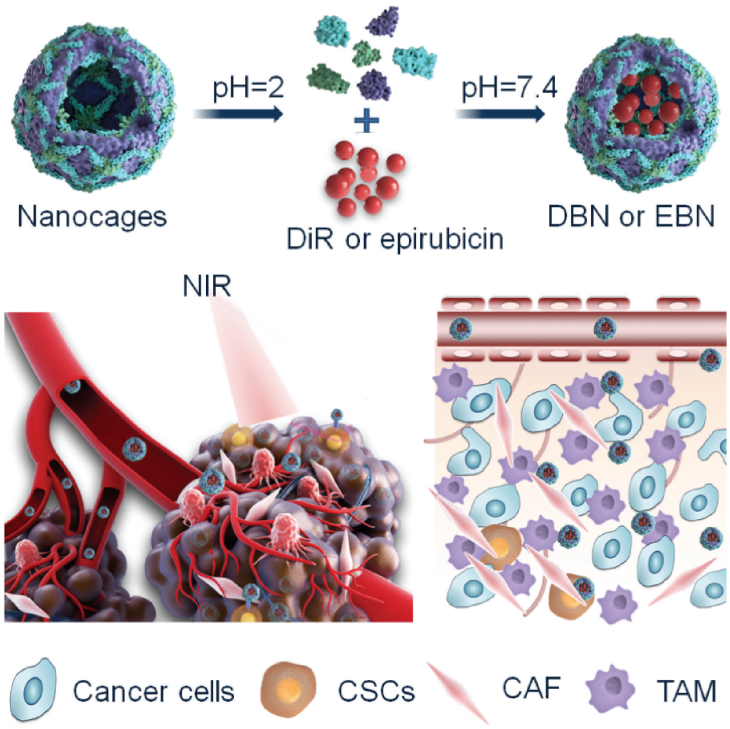

Figure Deep tumor penetrated biomimetic nanocages with preferential CSCs-accessibility for effective anti-metastasis therapy.