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Commentary

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Encapsulation of cancer signalling pathway inhibitors as a protective way for healthy cells

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Encapsulation of cancer drugs in a single carrier has become one of most interesting topic, especially for those drugs that have inhibitor effect on signaling pathways. Among many investigated cellular pathways, transforming growth factors (TGFβ) exhibit cellular efficiency in case of health and diseases due to their roles in differentiation, growth and cytoskeleton morphology [1]. However, in tumor cells TGF-β looses anti-proliferative response and become an oncogenic factor helping cancer cells to be more invasive and keen to metastasis [2]. Blocking of TGFβ signaling pathways belong to the most promising therapeutic concepts which are currently under development and mostly are in phase II clinical trials. Although these inhibitors are efficient, they are partially used because their inhibition can cause major complications on normal cells [3]. On other side, cellular structure of cancer cells exhibit drug resistance due to the plasma membrane P-glycoprotein which is capable of repel drugs from the cell, it causes a decreased sensitivity and intracellular drugs accumulation [4]. For all of these complications, there is an urgent need to develop new and innovative technologies that could help to overcome the limits of current chemotherapy. In recent work, the encapsulation of chemotherapy has emerged as the last development for modern bio-nanotechnology. The micro- and nano-encapsulation is a process that consists of the enveloping of cargo compounds inside layer-by-layer assembly [5], protecting them from the external environment or from the adverse conditions and enabling their controlled release. This will improve oral drug delivery usage. To block TGFβ1 signaling pathways, Activin like kinase (ALK1) [6], LY2157299 (LY) [7], siRNAs, shDNA, peptide 17 [8] were encapsulated, in addition to Bromopyruvic acid (3-BrPA) as glycolytic inhibitor [9,10].

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