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E-BABE-Using a microfluidics tumor-on-a chip method to investigate the nanomedicine therapy in cancer micro environment co-culture system

Zahra Mahmoudi

Sharif University of Technology, Tehran, Iran

A ccording to the International Agency for Research on Cancer (IARC), by 2030 the global cancer incidence rate will reach 22 million and the resulting death rate will reach 13 million annually. Understanding the cell-cell interaction in the tumor micro-environment can help us to manage the therapeutics more efficiently. For this aim, we need to recapitulate the tumor micro-environment in order to screen different dosage of therapeutics. Using tumor models can be a tremendous help in this field.In recent years, the capabilities of microfluidic technology have been widely used in tissue engineering research and pharmaceutical testing. This could be used in cancer research to simulate biological phenomena like tumor proliferation, angiogenesis, hypoxia, and tumor- stromal interaction. Microfluidic technology allows the gradient of nano-drugs and biochemical factors to be delivered to the tumor, allows the use of different compounds and doses of the nano-drugs in parallel, offering an important step in advancing personal medicine and nanomedicine. The droplet-based microfluidic system can generate encapsulated cells in droplets in uniform size and with a high rate. After production of multicellular spheroids, the spheroids' growth and development conditions, and the interaction between tumor spheroids with endothelial cells and extracellular matrix will be studied. The aim is to use microfluidic method to synthesize nanoparticles loaded with anti-cancer drugs. using PLGA polymer and to investigate the effect of administration of these nanoparticles on cancers spheroids survival.

laleh.mahmoodi@gmail.com

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