Hydrogel materials composed of agarose and hydroxypropyl methylcellulose (HMC) in different concentrations were established and compared to emulate brain tumor niches and CSC microenvironments within a label-free system. Human Glioblastoma cell line, U87 MG, was cultured on a series of HMC-agarose based culture system. Cell aggregation and spheroids formation were investigated after 4 days of culture, and 2.5% HMC-agarose based culture system demonstrated the largest spheroids number and size. Moreover, CD133 marker expression of Glioblastoma cells after 6 days of culture in 2.5% HMC-agarose based culture system was 60%, relatively higher than the control group at only 15%. Additionally, cells on 2.5% HMC-agarose based culture system show the highest chemoresistance, even at the high dose of 500 µM temozolomide for 72 h, the live cell ratio was still > 80%. Furthermore, the results also indicate that the expression of ABCG2 gene was up-regulated after culture in 2.5% HMC-agarose based culture system. Therefore, our results demonstrated that biomimetic brain tumor microenvironment may regulate Glioblastoma cells towards the CSC phenotype and expression of CSC characteristics. The microenvironment selection and spheroids formation in HMC-agarose based culture system may provide a label-free CSC selection strategy and drug testing model for future biomedical applications [1].

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Liu YC, Lee IC, Chen PY. Biomimetic brain tumor niche regulates glioblastoma cells towards a cancer stem cell phenotype. J Neurooncol. 2018 Jan 22. doi: 10.1007/s11060-018-2763-2. [Epub ahead of print] PubMed PMID: 29357090.