

Drug resistance is the reduction in effectiveness of a medication such as an antimicrobial or an antineoplastic in treating a disease or condition.

Incremental hypoxia inside the growing tumor mass drives epigenetic [drug resistance](#) by activating non-genetic repair of anti-apoptotic [DNA](#), which could be impaired by [drug](#) treatment. Hence, rescuing inter-tumor hypoxia by oxygen-generating microparticles may promote susceptibility to anti-tumor drugs. Moreover, a [tumor-on-a-chip](#) model enables user-specified alternation of clinic-derived samples. This study utilized patient-derived glioblastoma tissue to generate cell spheroids with size variations in a 3D microchannel network chip (Glioblastoma chip). As the spheroid size increased, epigenetic drug resistance was promoted with inward hypoxia severance, as supported by the spheroid size-proportional expression of hypoxia-inducible factor-1a in the chip. Loading anti-hypoxia microparticles onto the spheroid surface significantly reduced drug resistance by silencing the expression of critical epigenetic factor, resulting in significantly decreased cell invasiveness. The results were confirmed in vitro using cell line and patient samples in the chip as well as chip implantation into a hypoxic hindlimb ischemia model in mice, which is an unprecedented approach in the field ¹⁾.

¹⁾

Baek S, Yu SE, Deng YH, Lee YJ, Lee DG, Kim S, Yoon S, Kim HS, Park J, Lee CH, Lee JB, Kong HJ, Kang SG, Shin YM, Sung HJ. Quenching Epigenetic Drug Resistance Using Anti-hypoxic Microparticles in Glioblastoma Patient-derived Chips. Adv Healthc Mater. 2021 Dec 28:e2102226. doi: 10.1002/adhm.202102226. Epub ahead of print. PMID: 34963195.

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