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UQCRB and CaMKII: Emerging targets for glioblastoma stem cell therapy

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Glioblastoma stem cells (GSCs) have been proposed as central drivers of tumor progression, treatment resistance and tumor recurrence. Although several molecular markers such as Wnt, Hedgehog, Notch, TGF-β and EGFR, are known to be useful for targeted therapy in GSCs, exploring novel therapeutic targets and agents to eradicate GSCs can provide a promising treatment strategy that significantly improves glioblastoma patient survival and quality of life. We recently demonstrated that downregulation of mitochondrial ubiquinol–cytochrome c reductase binding protein (UQCRB) and Ca^{2+}/calmodulin-dependent protein kinase II (CaMKII) inhibits cancer stem cell-like properties in glioblastoma. The treatment with specific inhibitors and siRNAs against the molecular targets significantly inhibited not only the self-renewal capacity, such as cell growth and neurosphere formation, but also the metastasis-promoting ability, such as migration and invasion of GSCs. Notably, the inhibition of stem-like features of glioblastoma cells was associated with the downregulation of mitochondrial ROS/HIF-1α/c-Met and calmodulin/CaMKII/c-Met pathways, resulting in reduction of the expression levels of GSC markers, such as CD133, Nanog, Sox2 and Oct4. These findings suggest that UQCRB and CaMKII could be new therapeutic targets and thus their inhibitors might be utilized as lead compounds for eliminating cancer stem cells in glioblastoma.

Biography

Hye Jin Jung is an Associate Professor at the Department of Pharmaceutical Engineering and Biotechnology, Sun Moon University since 2014. She has received her PhD in Bioscience and Biotechnology from Sejong University in 2006. She started her Post-doctoral studies at Yonsei University in the area of Chemical Biology. In 2008, she was appointed as a Research Professor of Yonsei Biomolecule Research Initiative (YBRI). She was a Senior Fellow at the Institute for Refractory Cancer Research (IRCR), Samsung Medical Center from 2012 to 2014. She is currently working on discovering novel bioactive small molecules from natural products and deciphering their molecular action mechanisms.

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