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Review

mTOR Signaling and Potential Therapeutic Targeting in Meningioma

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Abstract: Meningiomas are the most frequent primary tumors arising in the central nervous system. They typically follow a benign course, with an excellent prognosis for grade I lesions through surgical intervention. Although radiotherapy is a good option for recurrent, progressive, or inoperable tumors, alternative treatments are very limited. mTOR is a protein complex with increasing therapeutical potential as a target in cancer. The current understanding of the mTOR pathway heavily involves it in the development of meningioma. Its activation is strongly dependent on PI3K/Akt signaling and the merlin protein. Both factors are commonly defective in meningioma cells, which indicates their likely function in tumor growth. Furthermore, regarding molecular tumorigenesis, the kinase activity of the mTORC1 complex inhibits many components of the autophagosome, such as the ULK1 or Beclin complexes. mTOR contributes to redox homeostasis, a vital component of neoplasia. Recent clinical trials have investigated novel chemotherapeutic agents for mTOR inhibition, showing promising results in resistant or recurrent meningiomas.

Keywords: meningioma; mTOR; redox homeostasis; macroautophagy; everolimus; vistusertib; lycopene