## ABSTRACT

Drugs. 2022 Feb 5. doi: 10.1007/s40265-021-01668-x. Online ahead of print.

Statins and Gliomas: A Systematic Review of the Preclinical Studies and Meta-Analysis of the Clinical Literature.

Rendon LF(1)(2), Tewarie IA(3)(4)(5), Cote DJ(3)(6), Gabriel A(7), Smith TR(3), Broekman MLD(3)(4)(5), Mekary RA(3)(7).

Author information:

(1)Department of Neurosurgery, Computational Neurosciences Outcomes Center, Brigham and Women's Hospital, Harvard Medical School, 75 Francis Street, Boston, MA, 02115, USA. Irendon@bu.edu.

(2)Department of Neurosurgery, Boston University School of Medicine, Boston, MA, 02118, USA. Irendon@bu.edu.

(3)Department of Neurosurgery, Computational Neurosciences Outcomes Center, Brigham and Women's Hospital, Harvard Medical School, 75 Francis Street, Boston, MA, 02115, USA.

(4)Department of Neurosurgery, Haaglanden Medical Center, The Hague, The Netherlands.

(5)Department of Neurosurgery, Leiden Medical Center, Leiden, The Netherlands.(6)Department of Neurosurgery, University of Southern California, Los Angeles, CA, 90033, USA.

(7)Department of Pharmaceutical business and administrative sciences, School of Pharmacy, MCPHS University, Boston, MA, 02120, USA.

BACKGROUND: Gliomas represent most common primary brain tumors. Glioblastoma (GBM) is the most common subtype and carries a poor prognosis. There is growing interest in the anti-glioma properties of statins. The aim of this study was to conduct a systematic review of the preclinical literature and to meta-analyze existing clinical studies to determine what benefit, if any, statins may confer in the context of glioma.

METHODS: The PubMed, Embase, Cochrane, and Web of Science libraries were queried in May 2021. Preclinical studies were included if they investigated the anti-cancer effects of statins in glioma in vitro and in vivo. Clinical studies were included if they reported incidence rates of glioma by statin use, or mortality outcomes among GBM patients by statin use. Pooled point estimates were calculated using a random-effects model.

RESULTS: In total, 64 publications, 51 preclinical and 13 clinical, were included. Preclinical studies indicated that statins inhibited glioma cell proliferation, migration, and invasion. These effects were time- and concentration-dependent. Synergistic anti-glioma effects were observed when statins were combined with other anti-cancer therapies. Clinical observational studies showed an inverse, albeit non-statistically significant, association between statin use and incidence rate of glioma (HR = 0.84, 95% CI 0.62-1.13, I2 = 72%, p-heterogeneity = 0.003, 6 studies). Statin use was not associated with better overall survival following GBM surgery (HR = 1.05, 95% CI 0.85-1.30, I2 = 30%, p-heterogeneity = 0.23, 4 studies).

CONCLUSION: Statins were potent anti-cancer drugs that suppressed glioma growth through various mechanisms in vitro; these effects have translated into the clinical realm, clinically but not statistically, in terms of glioma incidence but not GBM survival.

 $\ensuremath{\textcircled{O}}$  2022. The Author(s), under exclusive licence to Springer Nature Switzerland AG.

DOI: 10.1007/s40265-021-01668-x PMID: 35122635