Octreotide

Octreotide (brand name Sandostatin, Novartis Pharmaceuticals) somatostatin analog is an octapeptide that mimics natural somatostatin pharmacologically, though it is a more potent inhibitor of growth hormone, glucagon, and insulin than the natural hormone. It was first synthesized in 1979 by the chemist Wilfried Bauer.

Meningiomas express somatostatin receptor subtype 2 (SST2), which is targeted by the somatostatin analog octreotide.

The effects of octreotide were analyzed in a large series of 80 meningiomas in the Department of Neurosurgery, Hopital Nord, AP-HM, Marseille, France., including 31 World Health Organization (WHO) Grade II and 4 WHO Grade III tumors, using fresh primary cell cultures to study the impact on cell viability, apoptosis, and signal transduction pathways.

SST2 mRNA was detected in 100% of the tested meningiomas at levels similar to those observed in other SST2-expressing tumors, neuroendocrine tumors, or pituitary neuroendocrine tumors. Octreotide significantly decreased cell proliferation in 88% of meningiomas but did not induce cell death. On average, cell proliferation was more inhibited in the meningioma group expressing a high level of SST2 than in the low-SST2 group. Moreover, octreotide response was positively correlated to the level of merlin protein and inversely correlated to the level of phosphorylated p70-S6 kinase, a downstream effector of the PI3K/Akt/mammalian target of rapamycin (mTOR) pathway. Octreotide inhibited Akt phosphorylation and activated tyrosine phosphatase without impacting the extracellular regulated kinase (ERK) pathway.

Octreotide acts exclusively as an antiproliferative agent and does not promote apoptosis in meningioma in vitro. Therefore, in vivo, octreotide is likely to limit tumor growth rather than induce tumor shrinkage. A meta-analysis of the literature reveals an interest in octreotide for the treatment of WHO Grade I tumors, particularly those in the skull base for which the 6-month progression-free survival level reached 92%. Moreover, somatostatin analogs, which are well-tolerated drugs, could be of interest for use as co-targeting therapies for aggressive meningiomas [1)].

1)
Graillon T, Romano D, Defilles C, Saveanu A, Mohamed A, Figarella-Branger D, Roche PH, Fuentes S, Chinot O, Dufour H, Barlier A. Octreotide therapy in meningiomas: in vitro study, clinical correlation, and literature review. J Neurosurg. 2016 Dec 16:1-10. [Epub ahead of print] PubMed PMID: 27982767.