

Outer membrane protein OpcA

Outer membrane adhesin OpcA protein family consists of several *Neisseria* species-specific outer membrane proteins. *Neisseria meningitidis* causes meningococcal meningitis and sepsis. Opc (formerly called 5C) is one of the major outer membrane proteins and has been shown to play an important role in meningococcal adhesion and invasion of epithelial and endothelial cells, mediating attachment to host cells by binding proteoglycan cell-surface receptors.

OpcA forms a 10-stranded beta-barrel with five highly mobile extracellular loops that protrude above the surface of the membrane. These extracellular loops combine to form a crevice in the external surface that is lined by positively charged residues, which is predicted to be a binding site for proteoglycan polysaccharides involved in pathogenesis. Conformational changes in the extracellular loops modulate the surface of OpcA, which could affect the proteoglycan binding site. These conformational changes could also lead to pore opening.

[Neisseria meningitidis](#) is known to specifically enrich the central nervous system through the guidance of an outer membrane invasion [protein](#) named [OpcA](#). By loading chemotherapeutic drug [methotrexate](#) (MTX) in the hollow [manganese dioxide](#) (MnO₂) nanoparticles with surface modification of OpcA protein of *Neisseria meningitidis*, a bionic nanotherapeutic system (MTX@MnO₂-OpcA) is demonstrated to effectively overcome the BBB. The presence of OpcA protein enables the drug to cross the BBB and penetrate into tumor tissues. After accumulating in [glioblastoma](#), the nanotherapeutic system catalyzes the decomposition of excess [Hydrogen peroxide](#) (H₂O₂) in the tumor tissue and thereby generates O₂, which alleviates tumor hypoxia and enhances the effect of chemotherapy in the treatment of glioblastoma. This bionic nanotherapeutic system may exhibit great potential in the treatment of glioblastoma ¹⁾.

¹⁾

Dong CY, Huang QX, Cheng H, Zheng DW, Hong S, Yan Y, Niu MT, Xu JG, Zhang XZ. [Neisseria Meningitidis OpcA Protein/MnO₂ Hybrid Nanoparticles for Overcoming Blood Brain Barrier to Treat Glioblastoma](#). Adv Mater. 2022 Jan 7:e2109213. doi: 10.1002/adma.202109213. Epub ahead of print. PMID: 34995395.

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Last update: **2024/06/07 02:56**

