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The correlation between aquaporins and tumours

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Aquaporins (AQPs) also known as water channels are small, integral membrane proteins that help in transporting water molecules across the cell membrane by creating pores in the membrane of biological cells. They consist of thirteen unique members (AQP0-AQP12) that play a significant role in preserving the environment of the cell. These proteins are found to be expressed in many cancer types as their role is crucial in the development and progression of many cancers, such as lung, colorectal, liver, brain, breast cancers and so on. Studies reveal that, in tumour biology they are involved in altering cellular signalling and downstream protein expression patterns, encouraging tumour development, and mediating cell migration. The AQP expressed cells have been witnessed to enhance cell migration in tumour invasion, tumour cell extravasation, metastasis in vivo and in vitro. Particularly, AQP1 promotes tumour angiogenesis by its endothelial cell migration process. Moreover, it is proposed that AQP3 facilitates cell proliferation and growth by encouraging ATP formation by providing the necessary glycerol. Another aquaporin member, AQP5 has been found to perform more than simple water transport functions. In lung cancer, it is linked with activation of the EGFR/ERK/p38 MAPK signalling pathway. Therefore, by targeting these AQPs, better clinical anticancer therapy can be achieved. They can act as diagnostic and therapeutic biomarkers in identifying many types of cancers. Improvement of research towards AQPs-target inhibitors, AQPs-specific monoclonal antibodies and AQP gene transfer could provide a new therapeutic strategy in anticancer treatment.

Keywords: Aquaporins, Tumour growth, Tumorigenesis, Tumour invasion, AQP inhibition, Anticancer therapy, Therapeutic biomarkers

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