Basic science

14P  The effect of aquaporin-5 knockdown on HT29 colon cancer cell proliferation and migration

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Aim/Background: Colorectal cancer (CRC) poses a major cancer-related health burden. Aquaporins (AQPs) are a family of integral membrane proteins, known for their role in fluid homeostasis. Overexpression of AQP5 has been observed in various solid tumours including CRC and current literature suggests its correlation with clinicopathological staging of CRC. Here we report a functional study of AQP5 using a colon cancer cell line.

Methods: AQP5 involvement in enhanced cellular proliferation and migration in colon cancer was assessed by performing siRNA-induced in vitro knockdown of AQP5 in HT29 colon cancer cells and examining their proliferative and migratory properties. AQP5 expression was analysed using polymerase chain reaction (PCR) and western blot. Proliferation and circular wound healing migration assays were performed on the transfected cells. One-way ANOVA was used for the statistical analysis.

Results: 59% down-regulation of AQP5 mRNA levels was achieved from AQP5 siRNA transfection as compared to mock transfection (n = 3 for each group, p < 0.001). At the protein level, 24% down-regulation of AQP5 expression was observed (n = 1-2, no statistical comparison performed). The functional properties of the transfected cells were reduced by 16% for proliferation (n = 5 for each group, p < 0.001), and 19% for migration (n = 9 for each group, p < 0.01 at both 20 hours and 30 hours). AQP1 has been implicated in tumour angiogenesis and migration. PCR analysis revealed 77% increase in AQP1 mRNA levels in AQP5 knockdown cells as compared to mock transfected cells (n = 3 for each group, p < 0.01).

Conclusions: The findings support AQP5 involvement in enhanced colon cancer cellular proliferation and migration; however, the observed reduction in functional properties was modest. Lack of sufficient AQP5 knockdown was a possibility, or it may have been compensated for by an increase in AQP1 expression. Future studies examining the major oncogenic signalling pathways and role of AQP1 during AQP5 down-regulation are suggested. Simultaneous knockdown of both AQP1 and 5 may in fact be needed for improved inhibition of colon cancer cellular proliferation and migration.

Disclosure: All authors have declared no conflicts of interest.