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The metabolic and growth profile of glioma cells presenting with functional and non-functional p53

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Abstract

A key molecular feature of glioma is that the tumor suppressor protein, p53, is mutated. In addition to its tumor suppressor role, p53 is also involved in cell proliferation, apoptosis and DNA repair. The role of this protein on glioma metabolism and growth is however not well defined. To investigate this association, U87 cells were first cultured and treated with pifithrin in order to inhibit p53 function. U251 cells are known to be without p53 function and allowed for a comparative assessment to the treated U87 cells. High resolution magic angle spinning magnetic resonance spectroscopy was employed to detect p53-associated metabolic features of the U87 and U251 cell lines whilst colorimetric/fluorometric/luminescence-based assays were used to investigate the corresponding proliferation profile of these cells. Significant differences in phosphocholine, glutamine and glutathione levels were noted when cells presenting functional and non-functional p53 were compared. There was also a clear difference in the proliferation rate of these cells. The detected metabolites have a role in membrane synthesis, cell proliferation and DNA repair and therefore complimented the measured growth/proliferation profile. The results suggest that p53 molecular defects affect the metabolism of glioma, which is reflected in the growth behavior of the cells. Investigating molecular features in concert with metabolic changes informs on mechanisms of tumor progression and may prove useful in developing new therapeutic strategies for tumors. Specifically, metabolic events that are linked to a specific molecular change may be a valid target in addition to the altered molecule.

Biography

Aurelia Williams obtained her BSc from the Rand Afrikaans University in 2004. In 2008, she obtained her Ph.D from the University of Pretoria. Her research focused on the metabolomics of HIV and associated immune responses. Her current postdoctoral position at UCSF involves imaging and characterizing the metabolic profile of brain tumors. She has been awarded several prestigious bursaries/scholarships and awards including the National Research Foundation's Prestigious and Scarce skills bursaries as well as a monetary award by the IDSA for excellence in HIV research. Aurelia has presented her work at national and international conferences and is a member of the Golden Key Society.