Can the Metastatic Potential of Cancer Be Predicted?: A Study of the Differential Expression Levels of N-Cadherin (CDH2) and P-Cadherin (CDH3) as Potential Biomarkers for Aggressive Bladder Cancers using Arsenic (As3+) and Cadmium (Cd2+) Transformed UROtsa Cells and UROspheres

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Objective: Amplify N-Cadherin and P-Cadherin mRNA in cell monolayers and putative cancer stem cells by employing PCR to assess for gene regulation following heavy metal exposure. Prepare cells for confocal microscopy with immunofluorescent staining to qualitatively confirm relative gene expression. Hypothesis: N-Cadherin mRNA expression will increase and P-Cadherin mRNA expression will decrease in malignantly transformed cells. The relative differences in expression will be distinct enough to facilitate use of N-Cadherin and P-Cadherin as future potential biomarkers, thus promoting clinical diagnosis and estimation of malignant potential of epithelial cancers. Methods: Isolated RNA samples from pre-cultured cells underwent cDNA synthesis. Polymerase chain reaction was used to amplify and quantify the expression of the N-Cadherin and P-Cadherin genes. Quantification of expression in both the UROtsa cell lines and UROspheres occurred for controls, arsenic transformants and cadmium transformants. Immunofluorescent staining of UROtsa cell monolayers including controls, cadmium transformants and arsenic transformants occurred. Cells were qualitatively compared using confocal microscopy. Results: Statistically significant differences in mRNA levels of N-Cadherin and P-Cadherin were obtained in UROtsa cell lines and UROspheres when transformed by arsenic and cadmium. Conclusion: Gene expression was affected when UROtsa cell lines and UROspheres were transformed with arsenic and cadmium. N-Cadherin was up-regulated and P-Cadherin was down- regulated in both the arsenic and cadmium transformants when compared to the non-transformed samples. The UROtsa cell lines consistently show greater expression levels than the UROspheres.

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