Differential Induced Gene Expression in Platinum Based Chemotherapy

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Cisplatin and carboplatin are two platinum based chemotherapeutics. Carboplatin was devised to be more effective than cisplatin without the harmful side effects. However, the efficacy rates of cisplatin and carboplatin are not statistically different, but they do have different side effect profiles. Gene expression could help understand the difference between them. Three genes were chosen based on their function in relation to DNA damaged by platinum. CASP3, XAB2, and ERRC1 were measured in lung cancer cells treated separately by both drugs hypothesizing the induction of CASP3 after cisplatin treatment will be higher than carboplatin treatment, and XAB2 and ERCC1 will be more highly induced by carboplatin treatment than cisplatin treatment. Each gene's expression was measured at 0, 3, and 18 hours after treatment finding the induction of all three genes after cisplatin treatment was significantly (p-value less than or equal to 0.1) higher than carboplatin treatment at 18 hours. The carboplatin treatment was not significantly different from the vehicle at any time point. In order to confirm these results were not the result of ineffective carboplatin treatment, three additional experiments were performed. PARP1 expression was measured based on literature evidence of induction by carboplatin in the same cell line, but the results were inconclusive. LAMTOR3 was measured based on a separate project and showed significant carboplatin induction. COS7 cells were treated with increasing doses of carboplatin and confirmed the drug's effectiveness. Therefore, the conclusion that CASP3, XAB2, and ERRC1 were significantly induced by cisplatin only during this time course was valid. This project suggests that cisplatin's induction of DNA damage genes occurs earlier than carboplatin.

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