Understanding the effect of stress hormones on ovarian cancer cells

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Introduction and Background

- Ovarian cancer is the fifth most common cause of death in women.
- Understanding underlying mechanisms of ovarian cancer will help in developing better treatments.
- Recently, it has been found that ovarian cancer patients with poor prognosis have presented with elevated stress hormones.
- This study was designed to find out the metabolic changes in ovarian cancer cells (HeyA8) when treated with a stress hormone cortisol.
- To study this, NMR spectroscopy has been employed as an analytical tool.

Hypothesis: Ovarian cancer cells treated with stress hormones show altered metabolism.

Materials and Methods

- HeyA8 are high grade ovarian serous adenocarcinoma human cell lines used in this study.
- Metabolites are extracted from cancer cells using a methanol-water mixture, ceramic beads, three cycles of a mechanical homogenization and freeze-thawing process followed by centrifugation, rotary evaporation and lyophilization.
- The samples are prepared for nuclear magnetic resonance (NMR) spectroscopy by dissolving the sample in ²H2O containing the reference compound 4,4-dimethyl-4-silapentane-1-sulfonic acid-d6 (DSS).
- All the data was acquired on a Bruker NMR spectrometer operating at 500 MHz ¹H resonance equipped with a cryogenically cooled triple resonance (¹H, ¹³C, ¹⁵N) TXI probe.
- Identification of metabolite peaks was done through Chenomx and the Human Metabolomic Database (HMDB); finally, the peaks were integrated in Topspin and normalized to the reference compound (DSS). All 1D proton NMR spectra were normalized to the cell count before analysis.

Results and Discussions

Figure 1. Flowchart for NMR Spectroscopy Based Metabolomics

Figure 2: 1D ¹H NMR spectrum with assigned key metabolites

Figure 3: Metabolites altered significantly in cortisol treated cells are shown in the 1D ¹H NMR spectrum

Conclusions

- Initial studies showed a difference in metabolites glutamate, guanosine and uridine.
- However, more samples need to be analyzed to obtain statistical significance.

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References