Abstract #150195

Molecular physiology monitoring of ovarian cancer ex vivo.

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Background: Epithelial ovarian-cancer (EOC) is a heterogeneous disease which constitutes an area of unmet need. Continuous monitoring of molecular physiology of the disseminated tumour deposits would help to evaluate early tumour response to chemotherapy and profiling of spatial tumour heterogeneity in advanced stage disease. **Methods:** Surgically removed cancerous and non cancerous omentum is tested *ex vivo*. The omentum, cut into $1cm^3$ pieces, is placed in RPMI cell culture media. A liquid junction potential measuring system is used, consisting of a Ag/AgCl reference electrode, and a differential amplifier. After digestion with dispase extracted cells are stained with cell type specific markers and the proportion of cancerous cells are calculated. Statistical significance was calculated with the Mann Whitney U-test. **Results:** 12 EOC-patients were evaluated. On 12 pairs of cancerous and non-cancerous omentum samples the average biopotential of the non-cancerous and cancerous omentum was 1.43v and 1.07v, respectively, showing a statistically significant difference of 0.36v ($p = 0.05$). The biopotential of the non-cancerous omentum ranged between 1.20v and 1.73v, versus 0.63v to 1.48v in the cancerous omentum, showing an overlap between 1.20v and 1.48v. In all 12 samples, the biopotential of the non-cancerous omentum was always greater than the cancerous omentum. The biopotential difference between the cancerous and non-cancerous omentum ranged from 0.15v to 0.87v. 10 of the 12 (83.3%) cases had a difference < 0.6v, which correlated with good surgical & clinical patients´outcome in terms of residual disease, and surgical morbidity and 3-mo mortality. Patients with biopotential difference > 0,6v had poor surgical and clinical outcome. **Conclusions:** The characterisation of EOC parameters that are detectable by electronic sensors will facilitate the development of devices to better monitor the disease and predict treatment outcomes. It appears that the biopotential difference between the cancerous and non-cancerous omentum, above a specific cut-off of 0.6v may be associated with an adverse surgical and clinical outcome. Larger scale measurements are warranted to confirm this hypothesis into a proof of concept.