PO-086 AN EFFICIENT ION TORRENT NEXT GENERATION SEQUENCING WORKFLOW FOR LIQUID BIOPSY RESEARCH TO ASSESS CELL-FREE TOTAL NUCLEIC ACID

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Introduction Liquid biopsy research contributes to precision medicine initiatives and enables minimally invasive and inexpensive sampling compared to traditional tissue biopsy. However, the low amount of circulating tumour nucleic acid fragments in the blood presents significant challenges for accurate variant detection using NGS technology. Utilisation of both cell free (cf) DNA and cf RNA requires methods capable of interrogating both types of analytes to maximise the utility of each blood sample. We described here a two days sample-to-report workflow using Oncomine Pan-Cancer Cell-Free Assay that surveys oncology variants across multiple tumour types and simultaneously detects single nucleotide variants (SNVs) and structural variants such as copy number variations (CNVs), gene fusions as well as exon skipping.

Material and methods Cell Free Total Nucleic Acid (cTNA) was extracted using MagMAX Cell-Free TNA Isolation Kit. Internal 0.1% or 0.5% cfDNA reference materials were used to evaluate SNV sensitivity and specificity. For CNV sensitivity and specificity evaluation, cfDNA from CNV positive cell lines were titrated into normal donor plasma cTNA background. All controls were verified with orthogonal assays of dPCR. Libraries were manually prepared and sequenced with Ion Chef and S5 XL System. Data analysis was performed in Torrent SuiteTM 5.6 and Ion Reporter 5.6.

Results and discussions The Pan-Cancer Cell Free Research Assay utilised a single-pool multiplex assay to query more than 900 tumour driver and resistance hotspots. The broad content panel encompasses SNVs, CNVs, fusions, exon skipping as well as expanded coverage of TP53 exon regions for TP53 mutation analysis. The entire work flow (sample-to-report) could be as less as 30 hours and is compatible with Oncomine knowledgebase that allows customers easy access to internal 0.1% or 0.5% cfDNA reference materials. The entire workflow including sample processing and data analysis could be completed in two days.

Conclusion The Pan-Cancer Cell Free Research Assay provides an easy and quick NGS workflow that simultaneously analyses SNVs, CNVs, gene fusions and exon skipping across 52 genes associated multiple cancers. The 0.1% LOD enables accurate detection of low-abundance tumour variants for liquid biopsy research.

PO-087 THE WCRC/AICR THIRD EXPERT REPORT ON DIET, NUTRITION, PHYSICAL ACTIVITY AND CANCER: UPDATED RECOMMENDATIONS

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Introduction Cancer causes one in eight deaths worldwide and is rapidly becoming a global pandemic. Diet, nutrition and physical activity play a key role in the prevention of cancer and other non-communicable diseases (NCDs). Evidence-based recommendations are necessary to help people make informed lifestyle choices in their daily lives to reduce their cancer risk. This talk will present the main global findings from World Cancer Research Fund (WCRF)/American Institute for Cancer Research (AICR) Third Expert Report (2018) on Diet, Nutrition, Physical Activity and Cancer which was built upon the WCRF/AICR Second Expert Report (2007), including the updated Cancer Prevention Recommendations and will suggest future research directions.

Material and methods The Third Expert Report brings together the very latest research from the Continuous Update Project’s (CUP) rigorous systematic review of the accumulated best available, scientific and worldwide evidence on cancer prevention and survival related to diet, nutrition and physical activity. The Recommendations are derived from the evidence of 18 systematic literature reviews and a review of evidence on energy balance and body fatness, supported by expert reviews on the experimental evidence from human and animal studies that could plausibly explain a causal link between an exposure and cancer. A Panel of international experts assessed and judged the body of evidence, drew conclusions and made recommendations for a global audience, taking into account regional and special circumstances.

Results and discussions This talk will present the latest evidence on the links between body fatness, physical activity and cancer risk highlighting the updated relevant Recommendations. Additionally, associations of cancer risk with consumption of specific foods such as wholegrains, vegetables, processed foods, red meat, sugar sweetened drinks and alcohol will be also presented. Finally, this talk will touch upon the latest evidence linking cancer risk to lifestyle exposures and will suggest future research priorities.

Conclusion As evidence accrues, conclusions regarding the relation of diet, nutrition, physical activity to cancer are mostly strengthened to before, though with some change in emphasis. A number of future research directions have been identified including a better understanding of the mechanistic links of lifestyle factors to cancer and more global representative research on specific exposures in relation to cancer.
in high demand for successful diagnosis, treatment and improvement of survival rates. Micro and nano-fabricated electrochemical sensors are widely used as sensing devices due to their low-cost, high selectivity and sensitivity, and the possibility to be integrated into smart systems enabling sampling and fluidic handling. This work is aimed at developing a microelectrode sensor functionalized with anti-hCG antibody that enables rapid, selective and sensitive recognition of hCG biomarker.

**Material and methods** Screen printed carbon macroelectrode (400 μm diameter) was modified with a layer of 1-pyrenebutyric acid-N-hydroxysuccinimide ester (PANHS) to enhance the sensing performance of the fabricated sensor. Anti-hCG antibodies were immobilized onto the modified surface and then bovine serum albumin was dropped to minimize unspecific adsorption on the electrode surface. Functionality of the developed sensor was examined by measuring cyclic voltammetry (CV) and square wave voltammetry (SWV) after addition of hCG proteins at different concentrations.

**Results and discussions** In immuno-sensors, generation of an electrochemical signals is based on formation of a stable complex between an analyte and antibody that recognises the analyte specifically. When hCG protein was added at different concentrations to the developed sensor, SWV electrochemical signals were changed. The peak current reduced with higher hCG concentrations which is attributed to formation of an antigen-antibody complex onto the fabricated sensor. The limit of detection was approximately 1 pg/ml.

**Conclusion** In this work, an electrode with a micropatterning was used to enhance the sensitivity of the sensor since the surface area directly affects the sensing mechanism. The fabricated microelectrode exhibited a good detection limit. In the future, the proposed sensor will be modified using nanomaterials such as graphene and carbon nanotubes to enhance the sensitivity which can be further exploited in the diagnostic applications for early detection of different disease biomarkers.

**PO-091** DROPLET DIGITAL PCR BASED DETECTION OF ABBERRANTLY METHYLATED GENES IN BILE IDENTIFIES CHOLANGIOCARCINOMA IN PATIENTS WITH PRIMARY SCLEROSING CHOLANGITIS

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**Introduction** Patients with primary sclerosing cholangitis (PSC) have up to 20% lifetime risk of developing cholangiocarcinomas (CCAs). Identifying CCA in patients with PSC is, however, complicated and current strategies are suffering from low sensitivity. Consequently, the majority of patients are diagnosed at an advanced, incurable stage of disease, highlighting the need for novel detection methods, which could qualify more patients for curative treatment. In the current study, we aimed at establishing a robust DNA methylation biomarker panel in bile for improved detection of CCA.

**Material and methods** More than 300 bile samples (100 μl) from patients with PSC, CCA with and without PSC, and other non-malignant liver diseases were collected during endoscopic retrograde cholangiopancreatography or liver transplantation. All samples were analysed for promoter methylation of selected markers, using highly sensitive droplet digital PCR (ddPCR). In each reaction, an in-house 4-marker control assay was included for normalisation, and an algorithm for automated threshold determination, PoDCall, was applied for increased precision (Pharo et al, Clinical Epigenetics 2018).