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Abstracts

Proceedings of the fourth annual Queen's University Belfast Student Research Symposium

Wednesday 29th March 2017, Wellcome-Wolfson Institute for Experimental Medicine

OVERVIEW

QUB Scrubs hosted their first annual Student Research Symposium on 29th March 2017 at the Wellcome-Wolfson Institute for Experimental Medicine. Queen's University Academic Medicine Society (QUAMS) had previously hosted three Student Research Symposia, and QUB Scrubs were pleased to be able to pick up where they left off, sharing their goal of providing a forum for medical and dental students across all year groups to develop research experience.

Professor Stuart Elborn opened the symposium as the keynote speaker, using his career to illustrate the value of research and outlining emerging areas of note. This was followed by talks from academic leads and students alike on summer studentships, intercalated degrees, the INSPIRE mentoring programme and clinical academic training.

Ten students submitted abstracts from a variety of research centres, on topics ranging from the provision of HIV services in developing countries to the identification of molecular targets in colorectal cancer. Abstracts were screened by a senior medical student against predetermined eligibility criteria; all were deemed suitable and accepted for poster presentation. Posters were then independently double marked by a team of postgraduate research students, to award a first, second and third prize.

The symposium was organised in collaboration with staff from the School of Medicine, Dentistry and Biomedical Sciences and was made possible by the INSPIRE grant from the Academy of Medical Sciences, as well as donations from the Medical Defence Union and Blackwell's Bookshop. QUB Scrubs are extremely grateful for the support received and look forward to welcoming many more students for future events.

FIRST PRIZE

"Systematic evaluation of multiple breath washout quality in bronchiectasis."

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Background: Lung clearance index (LCI) is highly sensitive to early bronchiectasis compared to forced expiratory volume (FEV1). Quality checks are done for the accurate estimation of LCI, however very little evidence is available on the impact of over-reading on such multiple breath washout (MBW) variables. The aims of the study were to;

1. Determine the impact of over-reading on LCI, LCI coefficient of variation (LCICV) and tidal volume (VTCV)
2. Identify time taken to accomplish LCI training
3. Calculate costs involved in setting up a MBW study

Methods: MBW data from first 110 tests of the Bronch-UK study were analysed. P-value less than 0.05 was considered significant. Dates of training and testing were needed to determine training duration. Costs were calculated from purchase receipts and salary bandings.

Results: Of the 110 tests, 18% were excluded from LCI analysis. 55% of tests were rejected due to technical unacceptability and 20% were removed for not having relaxed breathing pattern. In the remaining tests, LCI and VTCV did not change significantly after over-reading (mean difference: LCI - 0.03, p = 0.97; VTCV - 0.29%, p = 0.21). Conversely, LCICV was significantly reduced after over-reading (mean difference: LCICV - 0.45%, p = 0.03). On average, operators took 6 months to complete training. Setting up an LCI trial costs around £40,719.35.

Conclusions: Following removal of tests for technical and qualitative reasons, LCI and VTCV scores did not change after over-reading. This finding highlights that some aspects of over-reading may not be required. LCICV reduced significantly after quality control, which could have implications on overall variability of LCI in the study. Setting up an LCI trial is expensive, thus trained personnel should perform these tests.

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SECOND PRIZE

"Investigating the expression of the A20 repressor DREAM in cystic fibrosis lung disease."

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Background: Cystic fibrosis (CF) is an autosomal recessive condition characterised by chronic inflammation. A defect in the gene encoding the cystic fibrosis transmembrane conductance regulator (CFTR) leads to dysfunctional ion transport across the epithelial cell membrane. The epithelial surface becomes dehydrated, airway secretions become highly viscous, leading to impaired mucociliary clearance, entrapment of bacteria, and chronic infection. Previous work demonstrated persistent activation of the transcription factor NF-ÎºB contributes to a pro-inflammatory state. The enzyme A20 has a central function in terminating NF-ÎºB signalling. CF primary nasal epithelial cells show reduced baseline expression of A20. Transcription of the A20 gene is normally repressed by the protein DREAM. Therefore, it is hypothesised that the reduction in A20 is due to the increased expression of DREAM.

Methods: Quantitative PCR and immunocytochemistry techniques to determine mRNA and protein levels of the A20 repressor DREAM in CFBE41o- and 16HBE14o- cell lines, basally and after stimulation by LPS.

Results: Basal expression of DREAM mRNA and protein is significantly higher in CFBE41o- cell lines compared to 16HBE14o-. Upon stimulation with LPS, the induction of DREAM mRNA is significantly enhanced in CFBE41o- cell lines. In CFBE41o- DREAM protein is located mostly within the cell nucleus, but in the cytoplasm in 16HBE14o-.

Conclusions: The objective of this project was to gain an understanding of the mechanisms behind the lack of A20 and the subsequent inflammation seen in CF. Subject to further experimentation; modulation of DREAM expression may prove to be a new therapeutic target in CF inflammatory airways disease.

THIRD PRIZE

"Preliminary analysis of plasma antioxidant status in patients with Alzheimer's disease: A meta-analysis."

Kathryn Mullan, Chris R. Cardwell, Bernadette McGuinness, Jayne V. Woodside, Gareth J. McKay

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Background: Serum antioxidants may afford neuroprotective effects against Alzheimer's disease (AD) via correction of the pro-oxidative imbalance. Observational studies have investigated plasma antioxidant status in AD patients, but to date, results have been inconsistent and findings have not been consistently replicated in trials of antioxidant supplements in AD populations. The objective was to determine the current best estimate of the mean difference in serum levels of ten dietary antioxidants between patients with AD and cognitively intact controls.

Methods: Electronic searches of four databases were conducted up to December 2016 according to PRISMA guidelines. Case-control studies in which plasma levels of dietary antioxidants were reported in individuals with AD and non-demented control participants were eligible for inclusion. Meta-analyses were performed and the pooled weighted mean difference (WMD) for each antioxidant was reported.

Results: We identified 51 studies, which collectively reported data on the ten antioxidants under investigation. Compared to control subjects, pooled effects found participants with AD had significantly lower plasma levels of alpha-carotene, beta-carotene, lycopene, vitamin A, C and E, and UA ($p < 0.05$). No significant difference was observed for plasma levels of beta-cryptoxanthin, lutein and zeaxanthin.

Conclusions: The lower serum levels of dietary antioxidants from the carotene and vitamin subclasses indicate that individuals with AD have impaired systemic availability of these subclasses. To our knowledge, these are the first meta-analyses showing lower blood lycopene levels and unaltered beta-cryptoxanthin, lutein and zeaxanthin levels in AD. We propose the evidence is used to inform trial design of novel dietary antioxidant therapies in a condition of major public health importance.