ORAL PRESENTATIONS 5B

MEDICAL STUDENT PRIZE

O125 MODULATING TOPOGRAPHY OF A POLYURETHANE-BASED POLYMER FOR OPTIMAL EPITHELIALISATION

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Introduction: There is a need for research into tissue-engineered implants to replace trachea in patients with head and neck cancer and congenital defects. Polyurethane-based polymers are of interest for tissue engineering applications, however, the degree of epithelialisation is yet to be optimised. Surface topography is recognised to be of great significance for optimal cell-material interactions, and therefore this study aims to exploit L-Arginine methyl ester (L-AME) as a porogen and its effect on topographical modulation of POSS-PCU, which is a polyurethane-based polymer to explore the degree of human bronchial epithelial cells (HBEC) interactions.

Method: A varying amount of L-AME was incorporated into POSS-PCU and L-AME was eluted in deionised water to produce porous scaffolds. Scaffolds were characterised by scanning electron microscopy (SEM), contact angle, fourier transform infrared spectroscopy (FTIR), tensile strength and permeability testing. Subsequently, HBECs were seeded onto scaffolds. Alamar blue assays and fluorescence staining were conducted at specific time-points.

Result: There is a good correlation between the molar concentration of L-AME and size of homogenous pores induced by L-AME on POSS-PCU. L-AME has generated pore sizes ranging from 0.40 μm to 4.8 μm on POSS-PCU for the first time. 270 mg L-AME incorporated POSS-PCU had the highest HBEC viability on day 3 ($P < 0.01$), day 7 ($P < 0.001$) and day 14 ($P < 0.01$) compared to control.

Conclusion: L-AME induced porosity within the polymer scaffold proved to be highly effective in establishing HBEC-material interactions. Improved epithelisation on synthetic scaffolds for tracheal fabrication presents promising regenerative medicine solutions.

POSS-PCU: Polyhedral oligomeric silsesquioxane poly(carbonate-urea) urethane
L-AME: L-Arginine methyl ester
HBEC: Human bronchial epithelial cells

Take-home message:
Modulating topography of polyurethane-based polymers has increased the viability of human bronchial epithelial cells and is promising in improving synthetic trachea for transplant.

O126 RENAL ISCHAEMIA REPERFUSION INJURY; THE MITOCHONDRIAL PERSPECTIVE.

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Introduction: Due to the deficit of donor kidneys, there is an effort to utilise suboptimal organs for transplantation. These organs frequently experience warm ischaemia and are vulnerable to ischaemia-reperfusion injury (IRI) which causes delayed graft function and graft loss. Mitochondria have been implicated in this process through reactive oxygen species (ROS) production and isofluorane has been shown to have a protective effect. Therefore mitochondria may be an important target and isofluorane a potential therapy to ameliorate IRI and increase graft survival. This research aimed to determine the effect of renal ischaemia - reperfusion injury on mitochondrial electron transport chain complex expression and function, and to determine the effect of isofluorane pre-conditioning.

Method: A murine surgical model induced renal ischaemia and reperfusion through renal pedicle clamping. A variety of time courses were used to identify mitochondrial changes. Isofluorane pre-treatment in a group of mice allowed analysis of its effect. After harvest, the kidneys were snap frozen and processed for Blue Native PAGE and in gel activity analysis.

Result: Ischaemia significantly increased Complex III, IV and V levels and decreased Complex II activity. These results were more severe with longer ischaemia and persisted in early reperfusion. Pre-treatment with isofluorane prevented these mitochondrial changes.

Conclusion: The increase in Complex III levels and the reduction of Complex II activity indicate mitochondrial involvement in IRI and could contribute to cellular damage through ROS production on reperfusion. Isofluorane prevented mitochondrial changes and therefore has potential to be a therapeutic agent for IRI in transplantation.

Take-home message:
This research shows a profound effect of renal ischaemia on mitochondrial function which increases oxidative damage and can impact post-transplant graft function. Isofluorane prevented the mitochondrial changes and so could be a therapeutic agent in the prevention or treatment of ischaemia reperfusion injury in transplantation.

O127 NOT PRESENTING

O128 A LOW-COST ALTERNATIVE FOR NASOLARYNGOSCOPY SIMULATION TRAINING EQUIPMENT: A RANDOMISED CONTROLLED TRIAL.

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Introduction; Flexible nasolaryngoscopy (FNL) is a key diagnostic procedure used by many specialities. Simulation based teaching has been shown to be of benefit in endoscopy training, but is limited by its expense. This study assessed if an inexpensive simulation model would be an effective method of training FNL.

Method; A three armed randomised controlled trial was undertaken. One group received no simulation training, while others were trained with either a high or low cost model. All trainees then performed FNL on a volunteer. Their success at performing this task was assessed through; patient discomfort, time taken and blinded expert assessed ability.

Result; Simulation based teaching reduced patient discomfort and improved skill. Low cost model training had no negative effect when compared with training using a high cost model.

Conclusion ; FNL simulated training with a low cost model is effective and may be more accessible.

Take-home message:

Simulated training of some surgical procedures using low cost models is effective and accessible.

O129 SAFETY OF POSTOPERATIVE NSAIDS IN MAJOR GASTROINTESTINAL SURGERY; A MULTICENTRE, PROSPECTIVE COHORT STUDY

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Introduction: Significant safety concerns remain surrounding the use of NSAIDs as analgesics after gastrointestinal surgery, leading to wide variation in their use. This study aimed to determine the safety profile of NSAIDs in major gastrointestinal surgery.

Method: Multicentre, prospective, cohort study of consecutive patients undergoing elective or emergency abdominal surgery with a minimum one night stay during September and November 2014. The primary outcome measure was the 30-day postoperative complication rate, as defined by the Clavien-Dindo classification. All use of NSAIDs within 72 hours following surgery was recorded. Propensity matching was used to account for factors influencing NSAID prescription. Multivariable logistic regression was used to produce odds ratios (OR) and 95% confidence intervals.

Result: From 9267 patients, 24% received postoperative NSAIDs. The overall complication rate was 38% (29% NSAID group, 41% non-NSAID group). Following propensity matching and adjustment, there was no associated increase in the rate of acute kidney injury (OR 0.63 [0.35 to 1.06], p=0.086) or bleeding (OR 1.04 [0.67 to 1.63], p=0.802) in all patients. There was a non-significant increase in anastomotic leak after bowel resection surgery (OR 1.54 [0.63 to 3.94], p=0.374). NSAIDs were significantly associated with a reduction in overall complications (OR 0.82 [0.71 to 0.96], p=0.006).

Conclusion: This study indicates that postoperative NSAIDs have an acceptable safety profile, even in higher risk patients. NSAIDs may reduce complications in this patient group. The conflicting observational evidence means that further cohort studies are not needed.

Take-home message:

Postoperative NSAIDs appear to have an acceptable safety profile after major gastrointestinal surgery. Randomised trials are required.

O130 GENETICALLY ENGINEERED EXOSOMES AS A NOVEL METHOD FOR DELIVERY OF THERAPEUTIC MICRORNAS.

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Introduction: Understanding the role of intercellular communication in cancer development is of critical importance. Small membrane-derived vesicles, known as exosomes, are a vital component in this process. Exosomes selectively package genetic material such as microRNAs, which are important regulators of genes involved in breast cancer progression. Engineering exosomes to carry selected tumour suppressor microRNAs to recipient cells is a new and evolving field of research with exciting therapeutic potential.

Method: HCC-1954 breast cancer cells were transduced to over-express miR-379 (HCC-379) along with a non-targeting control (HCC-NTC). Exosomes were isolated by differential centrifugation, micro-filtration and ultracentrifugation, followed by quantification using a protein assay. The microRNA content was subsequently extracted and analysed by RQ-PCR. The exosomes were then transferred to wild-type HCC-1954 and BT-20 cells to examine the effect on proliferation.

Result: Exosomes were successfully isolated from HCC-379 cells and were found to have enriched expression of miR-379 when compared to exosomes isolated from the HCC-NTC cells. Exosomes were effectively taken up by recipient wild type cells and stimulated increased cellular proliferation. This impact of miR-379 enriched exosomes mirrored the effect of over-expressing miR-379 in the parent cell population.

Conclusion: This promising data highlights genetically engineered exosomes as vehicles for delivery of functional microRNAs. This has important implications for developing novel breast cancer therapies.

Take-home message:
Exosome-mediated transfer of genetic material plays an important role in facilitating intercellular communication in cancer development. Genetic engineering of exosomes shows promise as a novel mechanism for delivery of gene-derived therapeutics to cancer cells.

O131 FEASIBILITY STUDY OF EXHALED BREATH PROFILING IN PATIENTS WITH BARRETT'S OESOPHAGUS

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Introduction: Barrett's oesophagus is the premalignant stage of oesophageal adenocarcinoma. This study assesses the feasibility of differentiating patients with Barrett's oesophagus from non-oesophagus controls through analysing exhaled breath samples.
Method: Selected Ion Flow Tube Mass Spectrometry (SIFT-MS) was used to analyse the volatile organic compounds (VOCs) in breath samples from patients undergoing an endoscopic investigation. The data was assessed with the Mann Whitney U test and binary logistic regression analysis to ascertain the relationship between VOCs and the disease state. Receiver Operating Characteristic (ROC) analysis was used to examine the accuracy of using identified VOCs as a diagnostic tool.
Result: 49 samples were analysed from 4 groups: Barrett's oesophagus (N=13), previous Barrett's oesophagus (N=8), gastro-oesophageal adenocarcinoma (N=8) and normal or benign gastrointestinal diseases (N=20). Patients previously treated for Barrett's showed no significant ($P< 0.05$) changes when assessed against those currently managing the disease. Comparison of the Barrett's and adenocarcinoma group yielded 4 significant VOCs. Similarly, the comparison of the Barrett's cohort to the normal benign gastrointestinal diseases group yielded 5 significant VOCs. The combined Area Under the ROC Curve (AUC) for those 5 VOCs is 0.793 indicating a good diagnostic potential for that profile of VOCs.
Conclusion: Volatile organic compounds can be used to diagnose Barrett's oesophagus. Further work is required to distinguish the unique profile of compounds associated with the disease and improve the diagnostic accuracy, which could aid the vast population suffering with the non-specific symptoms of Barrett's oesophagus.
Take-home message:
There is a unique breath profile for patients with Barrett's oesophagus. Volatile organic compounds have huge potential as a non-invasive diagnostic tool in Barrett's oesophagus.

O132 ARE SURGEONS BORN OR MADE? COMPARING THE PERSONALITY TRAITS AND LEARNING STYLES OF SURGICAL TRAINEES AND MEDICAL STUDENTS

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Introduction: Previous research has found that medical students and surgical trainees differ considerably in both their preferential learning styles and personality traits. This study aims to compare the personality traits and learning styles of core surgical trainees with a cohort of medical students specifically intent on pursuing a surgical career.
Method: A cross-sectional study was conducted contrasting core surgical trainees with medical students currently pursuing an intercalated degree in surgical sciences and specifying surgical career intent. The 50-item International Personality Item Pool Big-Five Factor Marker (FFM) questionnaire was used to score five personality domains (extraversion, conscientiousness, agreeableness, openness to experience and neuroticism). The 24-item Learning Style Inventory Questionnaire (LSI) was used to determine the preferential learning styles (visual, auditory or tactile).
Result: The LSI questionnaire was completed by 53 students and 37 trainees. 29 medical students and 34 trainees completed the FFM questionnaire. No significant difference for learning style preference was detected between the two groups ($p=0.139$), with the visual modality being the preferred learning style for both students and trainees (69.8% and 54.1%, respectively). Neuroticism was the only personality trait to differ significantly between the two groups, with medical students scoring significantly higher than trainees (2.9 vs 2.6, $p=0.03$).
Conclusion: Medical students intent on pursuing a surgical career exhibit similar personality traits and learning styles to surgical trainees with both groups preferring the visual learning modality. Further work is needed to understand what draws these visual learners to surgery, and how to optimise learning in this domain.
Take-home message:
Medical students wishing to undertake a surgical career possess similar personality traits and learning styles to surgical trainees. With both groups preferring to learn through a visual modality, further work is needed to determine what draws these visual learners to surgery, and how we can optimise their learning.

O133 NOT PRESENTING

O134 THE IMPACT OF MEDICAL STUDENT SURGICAL CONFERENCES

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Introduction: Recent reports have shown that in the United Kingdom there has been a decrease in interest towards pursuing a surgical career, while early exposure to surgery may increase interest. We aimed to assess the effect of a one-day medical school surgical conference in encouraging attendees to pursue a surgical career.

Method: All attendees of a 2014 National Undergraduate Conference organised by a university surgical society were invited to participate in an online survey. Data were collected and analysed to evaluate students' reason for attending the conference and attitudes to careers in surgery before and after the conference.

Result: Of 229 students, 130 (56.8%) completed the survey. Year 12 high school and preclinical medical students showed a statistically significant difference in interest in pursuing a surgical career after the conference than before it ($p=0.0002$ and $p=0.0027$, respectively), but clinical medical students demonstrated no such change.

Conclusion: Attendance at surgical conferences designed for medical students can significantly increase desires to pursue a surgical career for high school students and preclinical medical students but may not have the same effect for clinical medical students. Surgical conferences may act as an effective means of recruiting students towards choosing a surgical career for a certain subset of students.

Take-home message:

Younger students tend to be more influenced than senior students in pursuing a career in surgery, after attending a surgical conference. Thus conferences can be an effective way of recruiting potential future surgeons at a younger stage.

O135 EARLY SURGICAL SKILLS ACQUISITION WITH DIFFERENT SURGICAL MODALITIES: A RANDOMIZED CONTROLLED EDUCATIONAL TRIAL

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Introduction: Conventionally, early surgery skill development is attained via open surgery simulation, with very few studies evaluating other methods. The aim of this study was to evaluate the use of microsurgery and laparoscopic surgery as a means of teaching medical students basic surgical skills compared to open surgery as alternatives to acquiring technical skills in surgery.

Method: Medical students with no formal experience in surgical skills were invited to participate. They received the minimal training required to complete three assessment tasks (one in open surgery, one in microsurgery, one in laparoscopic surgery), before undertaking pre-training assessment to measure baseline performance. Participants were block randomised to 3 groups: group 1- open surgery, group 2- microsurgery, group 3-laprascopic surgery. Participants then underwent post-training assessment. Tracking of hand motions or instruments as well as the use of global rating scales were used to assess performance.

Result: Thirty students completed the study, each arm carrying the same number of participants. Improvements in the measured metrics in hand and instrument tracking between the pre- and post-training assessments in the microsurgery group were significant greater compared to the open surgery group ($p = 0.0226$), and the laparoscopic surgery group ($p = 0.0397$). Preliminary analysis with global rating scales revealed similar findings.

Conclusion: These findings provide the first evidence that microsurgery may improve acquisition in surgical technical skill among medical students compared to open surgery and laparoscopic surgery. More studies are warranted to study the effect of other surgical modalities in technical skill acquisition in medical students.

Take-home message:

Other modalities of surgical simulation in early technical skill training is possible and should be investigated.