ACADEMIC: ABSTRACTS

BMedSc(Hon) abstracts 2024

Characterisation of substantia nigra pars lateralis' firing patterns by subthalamic nucleus stimulation

Christopher Carson[1], Kathryn Todd[2], Peter Freestone[1]

1. Department of Physiology, Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand
2. Anatomy and Genetics, Faculty of Physiology, University of Oxford, Oxford, United Kingdom

Background
Compared to the motor symptoms of Basal Ganglia diseases, like Parkinson's, the less easily recognised non-motor symptoms have more poorly characterised pathophysiologies. Because the substantia-nigra-pars-lateralis (SNl) specifically terminates in the tail-striatum (TS), which receives sensory information, its dysfunction likely contributes to non-motor symptoms. The main target of deep brain stimulation (DBS) used in Parkinson's treatment is the subthalamic-nucleus (STN). We have recently shown this to regulate dopamine release in the TS by directly modulating SNl firing. Little is known about this pathway. The firing patterns of rat SNl dopamine-neurons were characterised using electrophysiological techniques to better understand the non-motor basal ganglia pathways.

Materials and Methods
In vivo insertion in rats (urethane anaesthetised) of a bipolar-electrode into STN and multielectrode-array into SNl. Neurons were identified from depth, spontaneous firing frequency and action potential shape/duration. STN stimulated with DBS-like parameters (1mA, 10-150Hz, 0.1ms-pulse, 2s-train) and output recorded with OpenEphys-electrophysiology-platform. Characterisation algorithms programmed in MATLAB.

Results
130Hz stimulation raised SNl firing frequency 2.2 ± 0.4x above its 8.5 ± 4.5Hz baseline (no effect < 60Hz). Numerous parameters, including basal frequency with its coefficient-of-variation, and following STN-stimulation, peak firing frequency and timing of response were characterised. Only frequency and shape combined distinguished individual neurons.

Conclusion
SNl firing patterns show distinctive characteristics from other substantia-nigra neurons. Only high-frequency STN stimulation excited SNl dopamine-neurons, consistent with only high frequency DBS treatment of Parkinson's being effective. This possibly indicates a dopamine-neuron excitation mechanism for DBS. Understanding SNl dopamine-neuron firing patterns helps elucidate non-motor symptom pathogenesis, previously often unrecognised or viewed as untreatable.

An assessment of the prevalence and features of cognitive impairment in cerebellar ataxia, neuropathy, and vestibular areflexia syndrome

Rory Burnell[1], Juno Barnett Collins[1], Lynette Tippett[2], Richard Roxburgh[1,3]

1. Neurogenetics Research Group, Department of Medicine, University of Auckland, Auckland, New Zealand
2. School of Psychology, Faculty of Science, University of Auckland, Auckland, New Zealand
3. Department of Neurology, Auckland City Hospital, Auckland, New Zealand

Background
Cognitive impairment is an emerging feature of the clinical spectrum associated with Cerebellar Ataxia, Neuropathy and Vestibular Areflexia Syndrome (CANVAS), also known as Replication Factor C subunit 1 gene (RFC1) disease. Limited research suggests that the cognitive phenotype in RFC1 disease predominantly involves impairment of executive function, but further research is required.

Materials and Methods
A neurocognitive assessment battery was designed and administered to an RFC1 group (n = 12) and healthy control (HC) group (n = 19). Mean or median cognitive test scores were then compared between the two groups. Correlations between cognitive test scores and disease severity and duration were also explored.

Results
Compared with the HC group, the RFC1 group had significantly lower mean scores across cognitive tests for self-perceived wellbeing, social cognition, verbal fluency and processing speed. Within the RFC1 group, two patients met criteria for clinical apathy and two patients met criteria for clinical dementia. Scores within the RFC1 group did not significantly correlate with disease duration; performance in one of the social cognition tests was negatively correlated with severity of cerebellar dysfunction.

Conclusion
The RFC1 group was found to have impairment in several cognitive domains including fluency, processing speed and social cognition. Generally, the severity and duration of RFC1 disease were not correlated with the degree or characterisation of cognitive impairment. Despite a small sample size, these findings support and build upon the proposed executive-function predominant phenotype of cognitive impairment in RFC1 disease. Further cognitive testing should be performed in larger RFC1 cohorts to corroborate these findings.

Characterising microgliosis in the post-mortem human Huntington's disease neocerebellum

Stephanie Carr[1,2], Adelie Tan[1,2], Richard Faull[1,2], Malvindar Singh-Bains[1,2]

1. Department of Anatomy and Medical Imaging, Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand
2. Centre for Brain Research, University of Auckland, Auckland, New Zealand

Background
Huntington's disease (HD) is an inheritable neurodegenerative disease that manifests in mid-life with motor, mood and cognitive symptoms. HD has no disease-modifying treatments and leads to premature fatalities. Historically considered a disease affecting basal ganglia neurons, studies report additional neuronal loss in the cerebral cortex and cerebellum. Furthermore, there is growing evidence of the involvement of glial cells including astrocytes and microglia. These cells contribute to brain homeostasis, neuroinflammation and pathology. Our laboratory reports a significant loss of Purkinje neurons and increased astrocytic activation in the human cerebellum of HD cases with predominantly motor symptoms. This implicates cerebellar neurons and glia in HD pathogenesis and symptomatology, justifying investigation of microgliosis in the HD human cerebellum.

Materials and Methods
Free-floating immunofluorescence using the microglial markers IBA-1, HLA-DR, and TMEM119 was conducted on post-mortem human cerebellum tissue from 15 HD and 6 neurologically normal cases.

Results
Preliminary results demonstrate an apparent reduction in TMEM119 and IBA-1 expression in HD cases with predominant motor symptoms (HD-motor) compared to HD cases that primarily experienced mood disturbances (HD-mood) and controls. HLA-DR immunoreactivity appears preserved across cohorts.

Conclusion
Preliminary findings suggest a reduction in microglial reactivity in HD-motor cases compared to HD-mood cases and controls, further implicating the cerebellum in HD motor symptoms. Completion of the dataset will enable quantitative analysis of protein expression, coverage, cell number and morphology. Immunoreactivity patterns will be compared between cohorts and correlated with clinicopathological features. Further characterisation of glial pathology in the HD cerebellum may elucidate new therapeutic targets.

Repopulation of decellularised corneal stroma using human umbilical cord mesenchymal stem cells

Solomon Niu[1], Trevor Sherwin[1]

1. Department of Ophthalmology, Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand

Background
Corneal dystrophies involve damage to corneal cells and disruption of the structural integrity of the cornea, resulting in difficulty of focusing light which leads to reduced visual acuity and eventually blindness. Repopulation of corneal tissue using stem cells have been envisaged as a novel therapy for these conditions, with the promise of harnessing the body's repair mechanisms to restore the optical functions of the cornea.

Materials and Methods
Cell culture techniques and PCR were used to culture and characterise the cells from Wharton's Jelly explants of human umbilical cords. Human corneas were decellularised and sectioned, and a new technique, overlaying the explants directly onto corneal stromal sections, was used to repopulate corneal stroma, and the results were visualised using live-dead imaging. PCR was then used to characterise the incorporated cells.

Results
We successfully cultured and characterised mesenchymal stem cells (MSCs) from Wharton's Jelly explants and repopulated the decellularised corneal stroma with these cells. Live-dead imaging demonstrated the survival, migration, and integration of the cells in the corneal stroma, with visual evidence of morphological changes and connections between cells.

Conclusion
MSCs directly growing out of overlaid Wharton's Jelly explants can survive, migrate, and integrate in corneal stroma, with visual evidence of differentiation. PCR experiments are providing further information regarding the differentiation status of the cells that have incorporated into the corneal tissue.

Machine/deep learning to develop interpretable risk prediction models for glaucoma using novel clinical risk factors and large population data

Andrew V Holmes[1], Helen Danesh-Meyer[1,2], William Schierding[1,2]

1. Department of Ophthalmology, University of Auckland, Auckland, New Zealand
2. Vision Research Foundation, Auckland, New Zealand

Background
Primary open-angle glaucoma (POAG) is the leading cause of irreversible blindness worldwide. As POAG is typically asymptomatic until advanced, and treatment cannot reverse vision loss, prevention and early detection are vital. However, as many as half of the individuals with POAG may be undiagnosed, and intraocular pressure (IOP) remains the only widely accepted modifiable risk factor.

Materials and Methods
Machine learning algorithms (e.g., XGBoost, deep neural networks) were trained to predict a report of POAG using data from the UK Biobank, a large prospective study of 40-69-year-olds in the United Kingdom. We selected a cohort of 3,728 glaucoma cases and 108,428 controls. 95 candidate predictors were extracted based on previous reports of their association with POAG and categorised to train different groups of models (ophthalmic, demographic, systemic, lifestyle, and combination models). Models were evaluated using five-fold cross-validation and a held-out test set corresponding to 10% of the data and interpreted using SHapley Additive exPlanations (SHAP).

Results
The most comprehensive model achieved a promising accuracy, with an area under the receiver operating characteristic curve (AUROC) of 0.869, sensitivity of 74.8%, and specificity of 82.8%. In addition to well-recognised risk factors (e.g., IOP, polygenic risk score), top predictors include novel and emerging factors, such as systemic hypotension and dyslipidaemia.

Conclusion
Machine learning is a promising approach for identifying individuals with the highest risk of developing glaucoma and, furthermore, for identifying risk factors. Future work may include a prognostic risk calculator, incorporation of plasma proteomic data, and external validation.

High-resolution MRI for improved delineation of the substantia nigra in Parkinson's disease diagnosis and neurosurgery

Baraa Abuharbid[1,2], Miriam Scadeng[1,2]

1. Department of Anatomy and Medical Imaging, Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand
2. Centre for Brain Research, University of Auckland, Auckland, New Zealand

Background
Parkinson's Disease (PD) is characterized by degeneration within the substantia nigra (SN), subdivided into the pars-compacta (SNc) and pars-reticulata (SNr). Current inconsistencies in delineating these regions across the literature poses a clinical threat, misguiding diagnosis and interventions such as stereotactic surgery and deep brain stimulation, particularly when guided by MRI. These procedures require millimetre precision. This is complicated by limitations of clinically acquired scans, yielding low-resolution images, and not accounting for various confounding factors. This study aims to address some of these limitations through precise segmentation of the SN using high-resolution MRI.

Materials and Methods
Using basic surgical instruments, a protocol was developed and used to extract 10 brainstems from post-mortem donors. Various imaging sequences were then employed on the brainstems at the Centre for Advanced MRI (CAMRI), and the Mātai Medical Research Institute. Histological references were used to guide accurate delineation of the SN in these scans.

Results
Susceptibility-Weighted-Imaging (SWI) with 3D-acquisition provided the highest-resolution and superior contrast for SNc and SNr delineation. T1 and T2 mapping, though useful, offered less clear insights, as the techniques are limited by slice thickness which blur the boundaries within the SN due to the partial volume effect. Volumetric quantification of these regions is currently being processed.

Conclusion
The dissection protocol developed in this study allows for successful extraction of the human brainstem, allowing for more precise imaging compared to whole-head MRI. This enabled more anatomically accurate segmentation of the SN, contributing to improved patient outcomes through more precise assessment and surgical intervention.

Mission: tolerance – the splenic biodistribution of placental EVs and implications in maternal immune tolerance

Jacob Siohane-Royle[1]

1. Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand

Background
The fetus and placenta are an organ transplant. The two are half- paternally derived and are thus semi-allogenic to the maternal immune system. Mechanisms as to how the fetus and placenta are tolerised by the maternal immune system are not well understood. Importantly, obstetric pathologies such as preeclampsia and recurrent miscarriage are associated with immune activation against the fetus and placenta. Research has highlighted that placental extracellular vesicles (pEVs) might induce maternal immune tolerance. Placental EVs are taken up by tolerogenic CD169+MARCO+ macrophages in the splenic marginal zone yet are also taken up by potentially immunogenic antigen presenting cells (APCs), which is perhaps indicative of immune activation. When pEVs are studied in vivo, pEVs are injected into mice at supraphysiological doses. This may result in the "overflow" of pEVs from the CD169+and MARCO+ tolerogenic macrophages into the B cell follicles and non-tolerogenic APCs, potentially contributing an immune response. This "overflow" situation may also illustrate a mechanism for the immunogenicity associated with preeclampsia where there is also an increase in circulating pEVs. Thus, this research aims to investigate whether smaller vs larger doses of pEVs leads to the cessation of interactions between pEVs in B-cell follicle or other splenic immune cells.

Materials and Methods
Pregnant mice (gd = 12.5) were injected with either 100 ug, 10 ug, 1 ug, or 0.1 ug of fluorescently stained large pEVs (>200 nm) from normotensive placentae. Mice were euthanised two hours later and spleens dissected before being frozen, and transverse sections cut 5 um thick. Sections were immunofluorescence stained for APCs and MSI was conducted using the Akoya Biosciences PhenoImager, and colocalization of pEVs with cell marker data collected.

Results
Placental EVs colocalized most with MARCO+ and 169+ macrophages, followed by F4/80+ and CD11c+ least, respectively. Nearly all colocalization exhibited a dose/response relationship.

Conclusion
The colocalization of pEVs with CD11c+ cells may have arrested whilst other pEV/cell-marker interactions were maintained, though this is speculative due to lack of significance and imaging difficulties.

Second generation effects of antenatal corticosteroid exposure: follow-up of the Auckland steroid trial

Libby G Lord[1], Greg D Gamble[1], Jane E Harding[1], Anthony GB Walters[1], Robyn W May[1]

1. Liggins Institute, University of Auckland, Auckland, New Zealand

Background
Antenatal corticosteroids are given to women at risk of preterm birth to reduce newborn morbidity, including respiratory distress syndrome. However, there is concern surrounding potential adverse effects on subsequent generations. Animal studies have demonstrated endocrine and metabolic changes in those exposed to corticosteroids in utero (F1) and in the second generation (F2). We aimed to assess the effects of parental antenatal corticosteroid exposure on health of the second generation (F2) of Auckland Steroid Trial (AST) participants.

Materials and Methods
In the AST, women (F0) expected to birth between 24- and 36-weeks' gestation were randomised to betamethasone or placebo. When their children (F1) were 50 years old, they and their children (F2) were followed up with a self-report questionnaire and data linkage. The primary outcome for this analysis was body mass index (BMI) z-score in the F2 generation. Secondary outcomes included respiratory, cardiovascular, neurodevelopmental, mental and general health, and social outcomes.

Results
Of the 213 F2 participants followed up, 144 had BMI data available. There was no significant difference in BMI z-score between participants whose parent was exposed to betamethasone versus placebo (mean (SD) 0.63 (1.45) n = 77 and 0.41 (1.28) n = 67 respectively, mean difference (95% confidence interval) 0.19 (-0.35, 0.73)). There was no evidence of a difference in rates of overweight, diabetes, respiratory

disease, cardiometabolic risk factors, neurodevelopmental difficulties, mental health difficulties and social outcomes between parental betamethasone versus placebo exposure groups, but confidence intervals were wide.

Conclusion
These findings are reassuring regarding the intergenerational safety of antenatal corticosteroids.

Culturing corneal endothelial-like cells for corneal endothelial dysfunction

Joy Kang[1], Jie Zhang[1]

1. Department of Ophthalmology, Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand

Background
Corneal endothelial diseases affect the inner corneal layer and impact vision clarity. Corneal transplantation is the definitive treatment as human corneal endothelial cells (CECs) have limited regeneration. However, alternative treatments are required as the availability of donor corneas are unable to meet the global need. Adult stem cells at the edge of the corneal endothelium, the transition zone (TZ), were investigated to explore their potential to be cultured into CEC-like cells.

Materials and Methods
TZ cells were cultured in modified culture media over 7 days to assess which small molecules induced differentiation into the most CEC-like cells. Cell morphology was analysed with circularity measurements, while gene expression and protein levels of neural crest, periocular mesenchyme and corneal endothelial markers were revealed through droplet digital PCR (ddPCR) and Western Blot. Additionally, TZ cell suspension injection therapy was trialled in a rabbit corneal endothelial dysfunction model and monitored over 3 months.

Results
TZ cells cultured with glycogen synthase kinase-3 inhibitor CHIR-99021 and Rho-kinase inhibitor Y-27632 had the greatest increase in cell circularity ($p = 0.0002$), higher expression of corneal endothelial markers and a lower expression of stem cell markers compared to the unmodified culture media group. The in-vivo trial demonstrated the safety of the cell injection therapy through corneal clarity restoration and the absence of adverse reactions.

Conclusion
CHIR-99021 and Y-27632 treated TZ cells have a greater resemblance to CECs. The preliminary in-vivo trial provided an optimised protocol for future testing to confirm the efficacy of TZ cells as a potential treatment for corneal endothelial diseases.

Maternal and fetal effects of placental dysfunction: understanding mechanisms and outcomes using magnetic resonance imaging and clinical data

Sophie Hamilton[1], Meghan Hill[1], Lynn Sadler[2], Alys Clark[3]

1. Department of Obstetrics and Gynaecology, Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand
2. Te Whatu Ora Te Toka Tumai, Auckland, New Zealand
3. Auckland Bioengineering Institute, University of Auckland, Auckland, New Zealand

Background
Mechanisms and outcomes of placental dysfunction in early onset fetal growth restriction (FGR) and term hypertension remain unclear. Prior functional magnetic resonance imaging (fMRI) studies suggest supine positioning in third trimester pregnancy may reduce fetal oxygen availability, disproportionately affecting smaller foetuses. Additionally, while term hypertension studies exist, they often focus on populations unlike those served locally.

Materials and Methods
Two FGR affected, and ten healthy pregnancies (24-31 + 6 weeks) underwent fMRI in supine and left lateral decubitus positions. Placental function and blood flow were assessed using a novel fMRI technique (DECIDE) and phase contrast MRI. A retrospective cohort of 474 women with hypertension delivering at Te Toka Tumai Auckland in 2021 was analysed for antenatal Doppler blood flows, FGR, and abnormal cord gases.

Results
Nonsignificant reductions in oxygenation (FO_2, $p = 0.09$), diffusion (D, $p = 0.14$), and blood flow (maternal-placental, $p = 0.57$; fetoplacental, $p = 0.06$) were observed in normal pregnancies when supine. Pregnancy induced hypertension showed evidence of placental dysfunction with lower birthweights ($p = 0.0001$) and abnormal antenatal Dopplers ($p = 0.001$) compared to chronic hypertension. Babies born with FGR also had higher rates of abnormal cord gases ($p = 0.01$). Preeclampsia was also associated with increased maternal morbidity.

Conclusion
Subtle changes in placental function with supine positioning were revealed with fMRI, potentially exacerbated in disease states. This study reinforces the association between placental dysfunction and hypoxic stress, evident through abnormal antenatal Dopplers, growth restriction, and compromised oxygenation at birth.

An investigation of the ciliotoxicity of tofacitinib and tonabersat on sinonasal mucosa

Bosco Yue[1], Daniel Rawlinson[1], Samuel Hale[1], David Broderick[1], Kristi Biswas[1], Raymond Kim[1], Priyanka Agarwal[2], Richard Douglas[1]

1. Department of Surgery, Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand
2. Department of Ophthalmology, Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand

Background
Chronic rhinosinusitis (CRS) affects 10% of the global population, but current treatments have significant failure rates. Tofacitinib and tonabersat are novel immune suppressants with established systemic safety profiles. However, to be used topically, they must preserve ciliary movement, which allows the clearance of harmful stimuli trapped in mucus. This study aims to determine the ciliotoxicities of tofacitinib and tonabersat on sinonasal tissue.

Materials and Methods
Surgically resected inferior turbinates ($n = 9$) were cut into approximately five equal portions and immersed for thirty minutes in either culture medium (negative control), Triton X-100 (positive control), fluticasone 0.005 mg/mL, tofacitinib 0.1 mg/mL or tonabersat 10 μM. After incubation, tissues were rinsed, and epithelial cells were extracted using cytobrushes. Video recordings were captured using differential interference contrast microscopy on three regions of interest (ROI) immediately after incubation and repeated twice in sixty-minute intervals. The cilia beat frequency (CBF) in each ROI was recorded by the software Cilialyzer.

Results
Cells exposed to tofacitinib and tonabersat have intact cilia. The mean CBF recorded immediately after tissue incubation in tofacitinib and tonabersat was 5.9 and 6.2 Hz, respectively. There were no statisti-

cally significant differences in CBF between the treatment groups and the negative controls at each time point ($p > 0.05$).

Conclusion
Preliminary results suggest that tofacitinib and tonabersat have the potential to be safe alternative topical therapeutic agents for CRS. These findings are currently being validated further by histological assessments and resazurin metabolic assays in our group.

Gastric motility responses to heart rate variability biofeedback interventions

Ashley Pereira[1], Stefan Calder[1,2,3], Armen Gharibans[1,2,3], Gregory O'Grady[1,2,3]

1. Department of Surgery, University of Auckland, Auckland, New Zealand
2. Alimetry Ltd, Auckland, New Zealand
3. Auckland Bioengineering Institute, University of Auckland, Auckland, New Zealand

Background
Functional Gastrointestinal Disorders (FGIDs), also termed Disorders of Gut-Brain Interaction, lack identifiable physiological causes, posing significant diagnostic and treatment challenges. Dysregulation of the autonomic nervous system (ANS) is hypothesised to influence FGID pathophysiology. Heart rate variability biofeedback (HRVB), a non-invasive therapy, uses real-time feedback to enhance heart rate oscillations and improve ANS regulation. This pilot study examines if HRVB can improve gut function and alleviate FGID symptoms by enhancing ANS regulation in patients with functional dyspepsia (FD) or chronic nausea and vomiting syndrome (CNVS).

Materials and Methods
Patients with FD or CNVS practice HRVB daily for six weeks. Gastric function was assessed via Body-Surface Gastric Mapping (BSGM), with secondary outcomes including symptom tracking, psychological well-being, and quality of life.

Results
Gastric amplitude showed a significant decrease after the HRVB intervention ($M = 37.17$, $SD = 12.41$ vs $M = 31.36$, $SD = 12.03$, $p = 0.04$). There was also a change in the gastric meal response, which did not reach significance in the pilot sample size ($M = 0.98$, $SD = 0.28$ vs $M = 1.16$, $SD = 0.31$, $p = 0.072$), with changes in total symptom scores during the BSGM ($M = 11.71$, $SD = 6.67$ vs $M = 8.39$, $SD = 6.51$, $p = 0.14$). There was a significant improvement in heart rate variability markers as a percentage increase compared to baseline across the study ($M = 38.57\%$, $SD = 28.57\%$, $p = 0.012$). There were also trends in reported weekly symptoms and psychometric scores.

Conclusion
This pilot trial indicates that gastric function, symptoms and autonomic activity can be effectively modulated by regular HRVB training, opening the door for further studies to be completed in this area.

Student experiences in rural health interprofessional programmes: insights into student learning and reflection

Angel Harbers[1], Kyle Eggleton[2]

1. Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand
2. Department of General Practice and Primary Healthcare, Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand

Background:
This study investigates the experiences of students who have participated in Rural Health Interprofessional Programmes (RHIPs) in Aotearoa New Zealand. These programmes aim to address healthcare disparities in rural areas by exposing students to rural health practices, interprofessional collaboration, and community-based care. The primary focus of this research is to explore what aspects of these programmes lead to in-depth student reflections and learning.

Materials and Methods
Students from RHIPs in Whakatāne and Hokianga engaged in PhotoVoice presentations to capture and reflect on their experiences while on the programme. These reflections were transcribed, and reflexive thematic analysis was conducted to identify key themes.

Results
Five primary themes emerged: barriers to healthcare access, holistic and culturally responsive care, collaboration and teamwork, empowerment through education, and hope for rural healthcare. Students frequently reflected on the challenges of rural healthcare, the importance of cultural competence, and the value of interprofessional collaboration in delivering effective patient care. Students also highlighted the role of education in empowering patients and the need for systemic change to address healthcare disparities in rural areas.

Conclusion
These findings underscore the critical role of RHIPs in fostering a deeper understanding of rural healthcare and interprofessional collaboration within healthcare students. This study also reveals the significance of cultural sensitivity and teamwork in providing holistic care in underserved rural areas. It also emphasises the need for ongoing efforts to reduce rural health disparities and suggests that interprofessional education is key to preparing the next generation of healthcare professionals to meet these challenges.

NETendo: Neutrophil Extracellular Traps in endometriosis

Kayden Borchowsky[1], Emily Paterson[1], Ceridwyn Jones[1,2], Kathryn Hally[1*], Claire Henry[1*]

1. Department of Surgery and Anesthesia, University of Otago, Wellington, New Zealand *Supervisors
2. School of Biological Sciences, Victoria University of Wellington, Wellington, New Zealand

Background
The pathogenesis of endometriosis includes endocrine dysregulation and inflammation. Neutrophil Extracellular Traps (NETs) are a form of immunological defence whereby neutrophils release webs of DNA and antimicrobial peptides. Excessive NETosis is associated with inflammatory diseases, therefore may be involved in endometriosis. The aim was to develop diagnostic NET biomarkers to aid surgical diagnosis of endometriosis.

Materials and Methods
Peripheral venous blood was collected from endometriosis surgery patients (22), and healthy volunteers (11). Surgical participants were assigned to either endometriosis (15) or symptomatic control (7) groups based on histology. Neutrophils were isolated using either negative magnetic bead separation for flow cytometry (FC), or density gradient centrifugation for cell culture. When using FC, neutrophils were identified as being CD15, CD66b double positive. Dead neutrophils were excluded through staining Zombie NIR+. NET expression was defined as staining positive for extracellular DNA, neutrophil elastase, myeloperoxidase and citrullinated histones. Neutrophils isolated by density gradient centrifugation were cultured with progesterone or β-oestradiol, and ionomycin. NETosis was expressed as the fold change in SYTOX Green fluorescence relative to hormonally naïve neutrophils.

Results
NET burden was significantly elevated in the symptomatic control group compared to both endometriosis and asymptomatic control groups but did not vary significantly between the endometriosis and asymptomatic control group. Neutrophils from healthy controls showed a greater amount and variation of NET response when exposed to hormones.

Conclusions
Use of NETs as a diagnostic biomarker for endometriosis was not supported. Elevated NET burden in the symptomatic control group indicated presence of a novel NET-mediated inflammatory pathology, yet to be characterised. There was dysregulation of NETosis in endometriosis neutrophils when exposed to sex hormones.

Ethnicity data reporting in people with kidney failure in Aotearoa New Zealand: a clinical quality audit

Jackie L Hazelhurst[1], Curtis Walker[2], John Kearns[3], Merryn Jones[3], James Hedley[4], Rachel B Cutting[4], Nicholas B Cross[5,6], Lutz Beckert[1,5], Suetonia C Green[1,5], Angela C Webster[4]

1. Department of Medicine, University of Otago, Christchurch, New Zealand
2. Te Whatu Ora Te Pae Hauora o Ruahine o Tararuam, Midcentral, New Zealand
3. Kidney Health New Zealand, New Zealand
4. Sydney School of Public Health, University of Sydney, Sydney, Australia
5. Te Whatu Ora Waitaha Canterbury, Christchurch, New Zealand
6. New Zealand Clinical Research, Christchurch, New Zealand

Background
Accurate ethnicity reporting is a fundamental component of monitoring inequities in health outcomes for Indigenous Peoples and minoritised peoples. The Australia and New Zealand Dialysis and Transplantation registry (ANZDATA) is the national clinical quality registry for people treated with kidney replacement therapy in Aotearoa New Zealand.

Material and Methods
We evaluated the accuracy of ethnicity recording in ANZDATA for Māori commencing kidney replacement therapy between 2006 and 2019 in Aotearoa New Zealand. Non-standardised registry data (ANZDATA) were compared with standardised hospitalisation data (National Minimum Dataset) as the reference standard using deterministic data linkage. Measures of agreement between datasets (sensitivity, specificity, positive and negative predictive values) overall and by demographic and clinical characteristics; trends in sensitivity over time.

Results
Of 7678 people commencing kidney replacement therapy, 2431 (31.7%) were identified as Māori using standardised methods in hospitalisation data, of which the registry recorded 2229 (94.6%). Overall sensitivity of the registry for Māori was 94.6% (95% confidence interval (CI) 93.6–95.4%), with high specificity (98.5%, CI 98.1–98.8%). Inter-rater reliability (Cohen's kappa) exceeded 0.81 both overall and in subgroup analyses, suggesting high agreement between the datasets. Non-reporting of Māori identification in ANZDATA was associated with a shorter time to kidney transplantation (HR 2.20, CI 1.39–3.51), however there was no evidence of an association between ethnicity reporting concordance with all-cause death (HR 0.80, CI 0.60–1.06). Agreement of ethnicity reporting remained consistent over time.

Conclusion
Despite non-standardised ethnicity data collection in ANZDATA, there was consistently high agreement between registry and hospitalisation data over the study period.