# Abstracts from the UK Medical Students' Association conference

The *British Journal of Hospital Medicine* is pleased to publish the following selection of medical abstracts which were presented at the inaugural United Kingdom Medical Students' Association conference in Bournemouth on 11 May 2011. The journal is delighted to be working in partnership with the association to support medical students in becoming the doctors of the future.

## Clinical research

### Descriptive epidemiology of diabetic retinopathy in Botswana

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**Background:** Diabetic retinopathy contributes significantly to the morbidity of patients with diabetes mellitus, and is an important cause of preventable visual impairment and blindness in both developed and less developed countries. A national screening programme for diabetic retinopathy in Botswana was launched in October 2009, and this abstract presents the first set of epidemiological data which have been collected from the programme.

**Aims:** To assess the prevalence of diabetic retinopathy, maculopathy and visual impairment among diabetic patients in Botswana.

**Methods:** The study population comprised people with diabetes referred to the National Diabetic Retinopathy Screening Program. Descriptive statistics were derived using contingency tables and chi-squared tests for differences in proportions.

**Results:** A total of 1022 patients (31.7% males) were included in the analysis. The prevalence of diabetic retinopathy in the study population ($n$=920) was 16.5% (95% confidence interval 14.2–19.1).

Maculopathy was present in 13.7% of patients (95% confidence interval 11.7–16.0) and was strongly associated with the presence of diabetic retinopathy ($P$<0.001).

The prevalence of visual impairment (presenting visual acuity <6/18 in the best eye) was 15.9% (95% confidence interval 13.3–18.9%) and of blindness (visual acuity <3/60) was 1.58% (95% confidence interval 0.83–2.89%) in the study population. There was no association between diabetic retinopathy and visual impairment ($P$=0.23) or blindness ($P$=0.58).

Increasing age was a risk factor for diabetic retinopathy ($P$=0.006), maculopathy ($P$=0.02), visual impairment ($P$<0.001), and blindness ($P$=0.008). There was no gender difference in the prevalence of diabetic retinopathy ($P$=0.54), maculopathy ($P$=0.37) or visual impairment ($P$=0.65).

**Conclusions:** Diabetic retinopathy is a common complication of diabetes mellitus among Batswana patients. These findings are consistent with prevalence rates in other developing countries and underscore the importance of screening for diabetic retinopathy in developing nations.

### Emergence of differences in glycaemic control between Pakistanis and Indians compared to the native white Scottish population of Lothian, Scotland with type 2 diabetes mellitus

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**Aims**: To study the prevalence of poor glycaemic control in Pakistanis and Indians compared to the white Scottish population in Lothian, Scotland after adjusting for sex, age, time since diagnosis and body mass index.

**Methods:** Demographic and clinical outcomes were extracted from the Lothian Diabetes Register for 15 436 patients with known ethnicity (white Scottish=14 852 (96.2%), Pakistani=423 (2.7%) Indians=161 (1.0%)). All other ethnicities were excluded. Good diabetic control was defined as individuals with glycosylated haemoglobin ($HbA_{1c}$) levels <7.5%, and those with $HbA_{1c}$ >7.5% were categorized as having poor diabetic control. A Poisson regression model with robust standard errors was used to obtain prevalence ratios by comparing associations of good glycaemic control with ethnicity, sex, age, time since diagnosis and body mass index. The prevalence was adjusted for these factors to obtain adjusted odds ratios (95% confidence interval) using the Mantel–Haenszel technique.

**Results:** Statistically significantly fewer Pakistani individuals achieved good glycaemic control compared to the white Scottish population (prevalence ratio 0.76, 95% confidence interval 0.68–0.85, $P$<0.001), while no significant difference was seen between Indians and white Scottish individuals (prevalence ratio 0.95, 95% confidence interval 0.82–1.09, $P$=0.449).

Good glycaemic control was positively associated with increasing age (prevalence ratio 1.01, 95% confidence interval 1.009–1.012, $P$<0.001), and negatively with increased time since diagnosis (prevalence ratio 0.98, 95% confidence interval 0.98–0.99, $P$<0.001) and body mass index (prevalence ratio 0.99, 95% confidence interval 0.988–0.992, $P$<0.001).

Sex was not significantly associated with good glycaemic control (prevalence ratio 1.00, 95% confidence interval 0.98–1.03, $P$=0.999). The adjusted Mantel–Haenszel common odds ratio for good diabetic control in Pakistanis compared to white Scottish was 0.65 (95% confidence inter-

val 0.52–0.80, $P$<0.001), and between Indians and white Scottish was 0.96 (95% confidence interval 0.68–1.35, $P$=0.807).

**Conclusions:** There is a significantly lower number of Pakistani individuals achieving the clinical target of good glycaemic control compared to the white Scottish population in Lothian, Scotland. However, this discrepancy is not present between Indians and the white Scottish population. Good glycaemic control is significantly associated with age, time since diagnosis and body mass index, but not with sex.

## Case reports and audit

### Glycaemic control, socioeconomic status and the Quality and Outcomes Framework: an observational population-based study in south-east Scotland

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**Aims:** One of the Quality and Outcomes Framework (QOF) clinical indicators for diabetes was changed on 1 April 2009. To gain maximum points general practices now have to achieve a glycosylated haemoglobin ($HbA_{1c}$) level of <7.0% among 40–50% of their diabetic patients. Before this indicator was changed, using existing QOF data we investigated whether the revision of this clinical indicator may impact more upon GPs in deprived areas than affluent areas.

**Methods:** An observational study using data extracted from the Scottish care information diabetes collaboration. Practice deprivation was based on an average Scottish Index of Multiple Deprivation score for the practices diabetic population. Records of 29 934 type 1 and type 2 diabetic patients from Lothian were available. The study population consisted of the five practices with the highest Scottish Index of Multiple Deprivation score (most deprived) ($n$=1649) and the five practices with the lowest Scottish Index of Multiple Deprivation score (most affluent) ($n$=970). Practices with less than 100 diabetic patients were excluded. The main outcome measures were last $HbA_{1c}$, type of diabetes, body mass index, age and gender.

**Results:** Attainment of the former $HbA_{1c}$ target (<7.5%) was 59.94% in the most deprived and 66.84% in the least deprived patient populations of this study ($P$<0.001). Attainment of the revised $HbA_{1c}$ target (<7.0%) was 45.34% in the most deprived area and 50.37% in the most affluent area ($P$=0.014).

**Conclusions:** Introducing the new $HbA_{1c}$ target would halve the QOF points of practices in deprived areas but leave affluent practices unaffected. Physicians may not be motivated to improve patient care if they are now unable to achieve maximum remuneration via the QOF system. Alternatively the new target may exert a greater effect on practices in deprived areas to improve capacity and capability.

## Scientific research

### In-vivo assessment of atherosclerotic lesions in mice using high frequency ultrasound

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**Background:** Apolipoprotein E-/- mice are commonly used as animal models of atherosclerosis as they develop fatty streaks similar to atherosclerotic plaques in humans. There is a need for in-vivo assessment of atherosclerotic lesions in mice during pre-clinical scientific research to alleviate the number of mice sacrificed in studies, increase experimental power and reduce variability.

**Aims:** This study aimed to assess whether high frequency ultrasound could be used for in-vivo assessment of atherosclerotic lesions in the brachiocephalic trunk and carotid arteries of apolipoprotein E-/- mice. It also aimed to determine the sensitivity and specificity of high frequency ultrasound by comparison with ex-vivo optical projection tomography and histology.

**Methods:** Five adult male apolipoprotein E-/- mice were fed a high-cholesterol 'western' diet (D12079B, Research Diets Inc, New Brunswick, USA) for 12 weeks to induce lesion development. The mice underwent ultrasound scanning to assess the lumen and wall thickness in the arteries of interest. Following ultrasound analysis, the mice were culled for ex-vivo optical projection tomography and histology analysis.

**Results:** There was significant correlation between ultrasound and optical projection tomography when comparing brachiocephalic trunk plaque volume (R2=0.9365, $P$<0.05) and carotid plaque volume (R2=0.9716, $P$<0.05). There was significant correlation between ultrasound and histology when comparing carotid plaque volume (R2=0.9998, $P$<0.05) but not brachiocephalic trunk plaque volume (R2=0.5503, $P$>0.05).

**Discussion:** The results show that ultrasound was significantly accurate at calculating both brachiocephalic trunk and carotid artery plaque volume in mice, when compared with optical projection tomography and histology. The introduction of in-vivo assessment of atherosclerotic lesions in mice during pre-clinical scientific research would increase the statistical power of preclinical research and gain serial and longitudinal data on plaque progression.

**Conclusions:** The results from this study suggest that ultrasound can be used to measure plaque volume in the brachiocephalic trunk and carotid arteries of apolipoprotein E-/- mice.

### Arterial stiffness and abdominal aortic aneurysms: a pilot study

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**Background:** Pulse wave velocity is a non-invasive measure of arterial stiffness and a predictor of subsequent cardiovascular events. Abdominal aortic aneurysm disease

is associated with loss of elastin and increased cardiovascular events. This study aimed to assess the reproducibility of carotid-femoral pulse wave velocity and brachial-femoral pulse wave velocity values and to determine whether or not pulse wave velocity values are significantly different in patients with abdominal aortic aneurysm compared with controls.

**Methods:** Carotid-femoral pulse wave velocity and brachial-femoral pulse wave velocity were assessed by two investigators using the Vicorder in 30 subjects (15 with an abdominal aortic aneurysm and 15 controls) with a standardized approach.

Repeatability was assessed via inter-observer and intra-observer error calculated using the Bland–Altman method. Spearman rank correlation coefficient was used to assess the non-parametric correlation between abdominal aortic aneurysm group *vs* controls (data is expressed as median (interquartile range)). Logistic regression was used to control for potential confounders.

**Results:** The abdominal aortic aneurysm group were older than the control group (77 years (75–80 years) *vs* 68 years (60–73 years) in abdominal aortic aneurysm and control groups respectively, $P$=0.013).

Vicorder carotid-femoral pulse wave velocity and brachial-femoral pulse wave velocity measurements were highly repeatable between investigators.

There was no significant difference between the groups in carotid-femoral pulse wave velocity (9.97 m/s (8.17–11.17 m/s) *vs* 9.77 m/s (9.20–10.57 m/s) in abdominal aortic aneurysm and controls respectively, $P$=0.534) and brachial-femoral pulse wave velocity (15.5 m/s (12.17–22.25 m/s) *vs* 14.27 m/s (12.35–21.27 m/s) in abdominal aortic aneurysm and controls respectively, $P$=0.678) measurements.

Carotid-femoral pulse wave velocity showed less variability than brachial-femoral pulse wave velocity and was deemed more accurate. Finally, aortic diameter showed no correlation with pulse wave velocity (carotid-femoral pulse wave velocity $P$=0.929, correlation coefficient=0.017 and brachial-femoral pulse wave velocity $P$=0.843, correlation coefficient=0.038).

**Discussion:** Pulse wave velocity measurements were highly repeatable, but carotid-femoral pulse wave velocity appeared to be more reproducible. There was no difference in the pulse wave velocity measured in the abdominal aortic aneurysm and control groups, and no relationship between aortic diameter and pulse wave velocity, but this may be an effect of the small sample size. Further work is required to explore the relationship between abdominal aortic aneurysm disease and pulse wave velocity.

## Characterization of corneal stromal cells as a novel mesenchymal stem cell source

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**Background:** Mesenchymal stem cells are found in the connective tissue of many organs in the body. These fibroblastic cells display stem cell differentiation and proliferation properties and are currently used for tissue engineering in a clinical setting. Corneal stromal cells are also fibroblastic in morphology but have not been fully characterized although their stem cell potential has been alluded to in several publications.

**Hypothesis:** Corneal stromal cells contain a population of mesenchymal stem cells.

**Methods:** Corneal stromal cells harvested from the limbal region of human donors were cultured in vitro and characterized using set criteria defined by the International Society of Cellular Therapy to identify mesenchymal stem cells. A profile of positive and negative mesenchymal stem cells cell-surface markers were analysed using flow cytometry at passage 3 and the cells were then differentiated into adipocytes, osteoblasts and chondroblasts and analysed using standard staining techniques. Finally, the corneal stromal cells were clonally expanded to assess their proliferative capacity and uniformity. First trimester fetal liver mesenchymal stem cells were used as a control throughout the experiment.

**Results:** The corneal stromal cells were spindle-shaped, plastic adherent, and were positive for CD29, CD44, CD73, CD90 and CD105 and negative for CD11b, CD19, CD34, CD45 and HLA class II antigen. The cells showed differentiation potential into adipocytes, osteoblasts and chondroblasts, and were able to be clonally expanded.

**Conclusions:** This work is the first to demonstrate that corneal stromal cells fulfil the criteria for mesenchymal stem cell characterization. Therefore in the fullness of time corneal stromal cells and mesenchymal stem cells may be exploited therapeutically for corneal regeneration.

## Patterns of stigma towards depression in adolescents of differing genders and ethnicities

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**Aims:** To investigate stigmatization of depressed people among UK adolescents of different ethnicities, genders and socioeconomic status.

**Methods:** A cross-sectional survey of 14–16-year-olds was conducted in early 2010 in Birmingham secondary schools. Participants were asked to agree with ten stigmatizing statements about depressed people on a five-point Likert scale. Participants indicated their ethnicity, gender and whether they received free school meals (socioeconomic status).

Comparisons were made between mean responses by gender, ethnic group and whether participants received free school meals, using *t*-tests and one way analysis of variance, with Bonferroni correction for multiple comparisons.

**Results:** There were 1035 responses from eight secondary schools. Respondents were 44% white, 42% Asian, 7% black and 7% mixed or other; 70% of respondents were male and 25% received free school meals. Male participants were more

likely to agree with the statements 'Depressed people have done something wrong and deserve to be depressed', 'Depressed people are lazy' and 'Depression is less important than a physical illness'.

Recipients of free school meals were more likely to agree with the following statements 'Depressed people have done something wrong and deserve to be depressed', 'Depressed people are lazy', 'Depression is less important than a physical illness' and 'Depressed people are usually violent'.

Compared to white participants, Asians were more likely to agree with statements 'I would not tell my friends if I became depressed', 'Depressed people have done something wrong and deserve to be depressed', 'Depressed people are lazy' and 'Depressed people are usually violent.'

**Conclusions:** We found evidence of more stigmatization of depressed people among males, recipients of free school meals and Asians (mainly South Asians). In particular these groups attributed more responsibility to depressed people for their illness and attributed more problematic behaviour to depressed people.

## Validating the reproducibility of coronary flow reserve using non-invasive transthoracic Doppler echo

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**Introduction:** Coronary flow reserve is an important measurement reflecting the functional consequence of stenotic epicardial arteries and has been previously measured using mainly invasive techniques. In the absence of major epicardial stenosis, coronary flow reserve has been used to assess the integrity of the coronary microvasculature which may be impaired in a variety of cardiac and systemic diseases. This study aimed to demonstrate reproducible coronary flow reserve measurements using transthoracic Doppler echo, enabling a non-invasive alternative method of measurement.

**Methods:** Thirteen healthy volunteers were recruited. Baseline and hyperaemic (intravenous adenosine administration, 140 μg/kg/min) blood velocities were measured using transthoracic Doppler echo in the mid-distal left anterior descending artery. Coronary flow reserve was defined as the ratio of hyperaemic:basal coronary flow velocity for peak and mean and time velocity integral or area under the curve (VTi) of the blood flow-envelope. Volunteers attended twice and results between experiments (same day) and between visits were compared. Bland–Altman analysis and *t*-tests were performed.

**Results:** Clear envelopes of resting and hyperaemic diastolic coronary flow velocity were observed in 12 out of the 13 volunteers. No significant difference was noted in the same healthy volunteer between experiments (peak $P$=0.5667; mean $P$=0.4743; VTi $P$=0.8390) or between visits (peak $P$=0.9797; mean $P$=0.6839; VTi $P$=0.7103).

**Conclusions:** Non-invasive transthoracic Doppler echo provides reproducible measurements of coronary flow reserve in the same individual and is not significantly affected by inter-experiment or inter-visit variability. This allows use of transthoracic Doppler echo for measuring coronary flow reserve in future research.