

associations using multivariable linear regression models. All analyses were corrected for multiple testing and adjusted for confounders.

**Results** Data from 6,446 participants were included in this study. We identified highly significant associations between volumetric brain MRI measures of subregions in the occipital lobe (intracalcarine cortex), parietal lobe (postcentral gyrus), cerebellum (lobules VI, VIIb, VIIIa, VIIIb and IX) and deep brain structures (thalamus, hippocampus, caudate, putamen, pallidum and accumbens) with the thickness of the innermost retinal sub-layers and total macular thickness (all  $P < 3.3 \times 10^{-5}$ ). We did not observe statistically significant associations between brain IDPs and the thickness of the outer retinal sub-layers.

**Conclusion** Thinner inner and total retinal thicknesses are associated with smaller volumes of specific brain regions. These associations go beyond anatomically established retina-brain connections. Furthermore, the links between the normal variations in retinal and brain structures broaden our understanding of neurological ageing in general population.

#### OP-10 BIOINSPIRED INTELLIGENT VISUAL ATTENTION SYSTEM FOR THE HUMANOID ROBOT ICUB EXPLORING EVENT-DRIVEN SENSING AND NEUROMORPHIC HARDWARE

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**Introduction** Visual applications in robotics must meet strict requirements for power efficiency, low latency, and data processing capacity. Despite the remarkable performance achievements of traditional computer vision methods, they struggle to generalise effectively and often rely on vast datasets, increasing data processing and transfer. The proposed system leverages bioinspired visual attention mechanisms to process only relevant parts of the scene, further exploring event-based sensing and neuromorphic computing via Spiking Neural Networks (SNNs).

**Aims** This scientific challenge aims to connect bioinspired hardware with biologically plausible algorithms, thereby showcasing the potential of spike-based implementations for online robotics visual applications.

**Methods** The bioinspired saliency-based visual attention model processes events from event-driven cameras on the humanoid robot iCub, running on SpiNNaker neuromorphic hardware. Intensity, disparity, and motion are the bottom-up feature extraction channels competing for scene representation. These cues feed into a biologically plausible saliency-based proto-object model based on Gestalt perceptual grouping theories to detect only relevant scene parts. The model produces saliency maps with salient areas representing regions potentially containing objects, called 'proto-objects'.

**Results** The online system accurately generates saliency maps in ~16ms detecting salient proto-objects and disregarding clutter. The system has been qualitatively and quantitatively validated, achieving comparable results to the frame-based implementation, in online simple office scenarios, as well as when compared against the ground truth fixation maps from real human subjects (NUS3D dataset).

**Conclusion** This project is the first significant step towards more complex real-world robotic applications for vision, where bioinspiration sets the basis for fast, power-efficient

online robotic applications and innovative computer vision approaches.

## Poster Presentations (P)

#### P-01 THE DEVELOPMENT OF A GLAUCOMA-SPECIFIC SYMPTOM QUESTIONNAIRE USING THE NOMINAL GROUP TECHNIQUE – A PILOT STUDY

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**Introduction** Few symptom-specific questionnaires exist within the glaucoma literature. Existing questionnaires have not used participant-led analyses, reducing patient influence and reports from lived experience. They also have not assessed the impact or severity of individual symptoms.

**Aims** To pilot use of the Nominal Group Technique (NGT), to generate a glaucoma-specific symptom list and facilitate development of a symptom questionnaire.

**Methods** Participants included one glaucoma (n=6, median [IQR] age: 77 [71, 79.5]) and one age-similar control group (n=10, median [IQR] age: 73 [66, 74]). The glaucoma group were asked to identify vision changes attributable to their glaucoma. The controls were asked to identify vision changes since the age of 50. Group discussions achieved a unique symptom list through group consensus via the NGT. Participants then individually ranked their symptoms based on frequency, severity, and activity-limitation. Lists were compared between groups, and common symptoms removed.

**Results** The final, glaucoma-specific symptom list consisted of 12 unique symptoms. Needing more light for near tasks was the most frequent and severe symptom, with the greatest impact on daily living. The second highest ranked symptom for all measures was sensitivity to bright light/sunlight. Some symptoms were not ranked by any participants, indicating some misunderstanding of task requirements.

**Conclusion** Indications that the ranking task was not fully understood suggest an important limitation of this methodology. In future, a hand count will determine frequency of symptoms. Participants will also indicate their single most severe and most activity-limiting symptom. Multiple sessions with glaucoma and control participants will inform development of the questionnaire.

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#### P-02 THE EFFECT OF VARYING STORAGE CONDITIONS ON THE MECHANICAL PROPERTIES OF PORCINE RETINA

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**Introduction** Accurate characterisation of the physical properties of the retina is essential for understanding the effects of age, disease mechanisms and developing effective surgical interventions. Ex vivo measurements have been used to do

this, however the effect of storage conditions on the results of these biomechanical tests are unclear.

**Aims** The objective of this study was to investigate effects of commonly used laboratory storage media on the mechanical performance of retinal samples.

**Methods** Freshly enucleated porcine eyes were dissected, and superior vertical strips taken. Strips were incubated in phosphate buffered saline (PBS), balanced salt solution (BSS) Ringer's solution and extracted porcine vitreous (control) for 60 minutes at 4°C. Sixteen 3x9mm strips of porcine retina, 4 per group, were subjected to uniaxial load to failure testing post incubation. Strip thickness was determined by light microscopy.

**Results** The mean maximum stress was closest to the control (5.6KPa) for BSS (7.4KPa) followed by Ringer's solution (1.6KPa) then PBS (0.4KPa). All changes were significantly different to the control ( $P<0.05$ ).

**Conclusion** The biomechanical properties of porcine retina are highly variable depending on the media they are stored in pre-testing. Strips incubated in BSS provided results closest to the control samples. Caution should be taken when considering results taken from different storage media when assessing biomechanical changes in the retina and other soft tissues.

**Acknowledgements** The Dunhill Medical Trust

#### P-03 PRACTICE APPROACHES AMONG CANADIAN OPHTHALMOLOGISTS

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**Introduction** Although there has been a trend towards gender balance in ophthalmology, this has not yet translated into equal representation in leadership roles.

**Aims** We aimed to assess the current practice patterns of ophthalmology in Canada by analysing gender disparities in leadership and identifying barriers to leadership advancement.

**Methods** A listing of all ophthalmologists registered with the Royal College of Physicians and Surgeons of Canada in 2019 was used as the sample population. A listserv was created by searching public websites and email invitations to participate in a survey was forwarded.

**Results** Out of 117 participants, 38 (32.8%) were female, with an average age of 49 years compared to 57 years for males. Female practitioners had 16.9 years of practice on average, while males had 25.6 years ( $P<0.001$ ). Fellowship numbers were similar for both genders ( $P=0.39$ ), but females leaned towards neuro-ophthalmology, while males favored retina.

Thirteen females (34.2%) and nine males (11.5%) held graduate degrees ( $P=0.005$ ). Practice settings showed no significant gender difference, whether hospital-based or private clinics ( $P>0.05$ ).

Fewer females held academic appointments (55.2% vs. 84.6%,  $P=0.001$ ), especially full/associate professorships (18.4% vs. 41.0%,  $P=0.02$ ). Assistant professorships were comparable (26.3% vs. 37.2%,  $P=0.29$ ). Both genders faced similar career advancement challenges, including work-life balance, support, and time constraints.

**Conclusion** Ophthalmology has a male-dominated practice, and Canadian leadership trends reflect this. Inequities in higher

leadership positions may stem from historical gender imbalances. Our survey reveals that those dissatisfied with their careers cite barriers related to work-life balance and support.

#### P-04 PATIENT OUTCOMES AND EXPERIENCES OF A COMMUNITY-BASED GLAUCOMA CLINIC

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**Introduction** Glaucoma care demand in UK hospitals has increased rapidly in recent years resulting in a push to community care models to reduce the burden on hospitals and on patients.

**Aims** To ascertain patient's experiences of their care delivered in community clinics.

**Methods** Patients' thoughts of feeling safe under the care of the community clinical team were gathered. Patient experiences were assessed using a modified Glaucoma Patient-reported Outcome and Experience Measure (POEM) instrument that included patient's perspective on diagnosis, treatment, fear of blindness, and experience.

**Results** Ninety-six consecutive patients (M:F 47:49, mean age 70±12 years) completed the study. Feeling safe under the clinical team produced a mean Visual Analogue Scale (VAS) score of 90 (SD 15) and feeling care was organised produced a mean VAS score of 87 (SD 17). Patients had positive perceptions of their clinic experience with 96% of patients reporting that their experience of attending the community clinic was comfortable, and 93% felt their experience was the same as expected from the hospital. Patient age, gender, disease characteristics, and socioeconomic status had no influence on perceived experience. Patients aged <60 years had significantly lower understanding of their diagnosis compared to older groups ( $P=0.027$ ), as did suspect glaucoma patients when compared to primary open glaucoma patients ( $P=0.045$ ).

**Conclusion** Patients expressed a positive experience, felt safe under the care of their clinical team and that their care was organised. Patients <60 years, and those with no confirmed diagnosis may benefit from longer consultation time and educational materials to improve their understanding of the disease.

#### P-05 THE ATTITUDES AND CLINICAL BEHAVIOUR OF EYECARE PRACTITIONERS TOWARDS FITTING CONTACT LENSES FOR CHILDREN AND YOUNG PEOPLE

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**Introduction** In the UK, prescribing contact lenses (CLs) for children is undertaken by two groups of Eyecare Practitioners (ECPs): optometrists and contact lens opticians (CLOs).

**Aims** To explore the attitudes and prescribing habits of UK ECPs for fitting CLs in patients under 18 years of age.