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Visual acuity anisotropy in simulated visual impairment

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Purpose The gap in a Landolt-C optotype is more difficult to resolve when vertical than horizontal. We investigated this visual acuity (VA) anisotropy in normally sighted subjects with optimal acuity and with simulated visual impairment (VI).

Methods VA thresholds were measured for 12 subjects (mean age 26, range 21-32) in five conditions, viewing normally or with mild or severe VI simulated by contrast sensitivity reduction (fogging with Ryser occlusion foils) or blur (positive lenses). Single Landolt-C stimuli were presented in each of the 4 cardinal directions with the gap position selected randomly. The size of the gap when 3/5 stimuli were correctly identified was taken to be the threshold. Separate regression models were fitted to compare thresholds by gap position for each viewing condition.

Results VA anisotropy was not observed when viewing normally. For simulated visual impairment, right (R) and left (L) VA thresholds were better than up (U) by -0.14 logMAR ($p = 0.006$ and 0.005). Because thresholds for R and L, and U and down (D) were similar, a second analysis compared vertical (V) and horizontal (H) positions. This analysis found a significant main effect of position ($p=0.005$) and an interaction of position and condition ($p=0.008$); the difference in threshold between H and V was greater for fogging (H vs. V, -0.12 logMAR) than blurring (H vs. V, -0.06 logMAR).

Conclusion The step size for small stimuli may have been large relative to the size of the VA anisotropy when viewing normally. The anistropy observed for simulated VI was consistent with previous studies. The finding that the size of VA anisotropy depends on the type of simulated impairment justifies closer study of the phenomenon in subjects with simulated and real vision impairment.

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Variations in ocular biometry in University Students in Portugal

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Purpose This study was initiated to describe the variation in ocular biometry in university student's population in Portugal.

Methods The exams were performed on 199 right eyes from 199 young adults. Mean age of 21.6±2.66 years.Axial ocular dimensions, including axial length (AL), anterior chamber depth (ACD), lens thickness (LT), and vitreous chamber depth (VCD) were measured using an A-scan ultrasound device. Corneal eccentricity (CE) was measured with an autorefractor.The sphere values (S) were measured using the subjective distance refractive method with cycloplegic.High myopia (HM) was defined as $S<-1.50D$, low myopia (LM) $-1.5D \leq S < -0.25D$, emmetropia (E) as $-0.25D \leq S \leq +0.25D$,low hyperopia (LH) as $+0.25D < S \leq +1.5D$ and high hyperopia (HH) as $S > +1.50D$.

Results The AL, ACD, LT, VCD, and CE,values were 23.31±0.88mm, 3.51±0.26mm, 3.64±0.14mm, 16.17±0.80mm and 0.48±0.12 (mean±SD), respectively. Statistically there are significant differences between the groups for the AL, ACD, and VCD. The values for the AL component in mm was (HM=24.61±1.09; LM=23.78±0.62; E=23.29±0.60; LH=23.08±0.73; HH=22.69±0.64).The values for the ACD component in mm was (HM=3.76±0.27; LM=3.67±0.24; E=3.48±0.25; LH= 3.46±0.24; HH=3.35±0.24).The values for the VCD component in mm was (HM=17.24±1.08; LM=16.47±0.59; E=16.23±0.60; LH=15.96±0.69; HH=15.72±0.62).For LT, and CE there are no significant differences.

Conclusion This is one of the first survey from the Portuguese population. Just like in other studies, ours results also revealed that ocular refraction vary with ocular dimensions. The ACD e VCD have the main influence in the development of the error refractive.

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Optoelectronic visual aid based on reconfigurable logic for severe peripheral vision loss rehabilitation

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Purpose A low cost non-invasive optoelectronic visual aid based, to provide information on the peripheral field of view without compromising the residual visual acuity of central fovea. To improve the reduced navigation capabilities of tunnel vision patients, due to diseases as RP, Usher syndrome, or advanced glaucoma. The aid pretends be portable and useful during the evolution of the disability and for other user requirements, as zoom or night blindness.

Methods A head-mounted video camera captures a wide angular field. After video processing, a see-through head mounted display presents a minified only-edge version of the captured image overlapping the user normal view in the central visual field.For the video processing unit, we have selected a reconfigurable hardware (FPGA) logic that allows the easy and cheap modification of the device features.As preliminary evaluation, subjects with simulated tunnel vision have selected settings adapted to realistic video scenes in a wide field screen.

Results A first prototype has been integrated. Real time video edge extraction is achieved with the FPGA with user customized settings. The user can modify processing parameters dynamically. Selected settings are dependent on subject preferences even with similar visual loss.

Conclusion We have shown the feasibility of such a portable visual aid for peripheral field loss. The inclusion of a reconfigurable circuit FPGA allows real time video processing, the setting control by the user, and personalisation for each individual person in a simple way. This platform has the possibility of having several processing configurations at the same time as digital zoom or TV enhancement.

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Disadvantage of the superotemporal field in normal subjects as revealed by techniques that study the function of the magnocellular pathway

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Purpose Available evidence regarding anisotropies of superior/inferior and nasal/temporal retinal function have been previously documented based on psychophysical measurements. We aimed to assess such anisotropies within the magnocellular pathway, using frequency doubling technology (FDT) which isolates the My magnocellular pathway.

Methods FDT perimetry was performed by the following tests: T1. Humphrey C-20 (n= 36 eyes) and T2. N-30 (n= 22) T3. N-30-F Threshold (n=80) T4. our custom-made C-20 -like(n = 69). Groups performing tests 3 and 4 were independent from all the other groups.

Results The superotemporal(ST) field showed in general higher thresholds. The interaction between ST and inferonasal(IN) fields was statistically significant for all tests: T3 ($p < 0.0001$, ANOVA), T2 ($p = 0.0032$), T1 ($p = 0.0025$) and T4 ($p = 0.0012$). Also for ST and superonasal (SN): T3 ($p = 0.0008$), T2 ($p = 0.0028$), T1 ($p = 0.0028$) and T4 ($p = 0.0343$). The same for the ST and the inferotemporal(IT) fields, except for T2. T3 ($p = 0.0043$), T1 ($p = 0.0343$) and T4 ($p = 0.0002$). No significant differences were found for left and right hemifields. Significant effects between upper and lower fields were found only for tests T3 and T4 ($p= 0.0025$ and 0.0001, respectively). T3 revealed a significant interaction between nasotemporal and updown assymetries ($p= 0.03$).

Conclusion The results showed that in normal subjects the magnocellular pathway within the superotemporal quadrant has relatively worse performance as compared to other regions of the visual field. This type of anisotropy is consistent with the previous finding that this region shows earlier abnormalities when assessed by motion perimetry in glaucoma.