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Visual Information Processing from extracellular recording in Lateral Geniculate Nucleus (LGN) of the rat

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Purpose The lateral geniculate nucleus (LGN) is the main thalamic relay nucleus for the visual information that arrive from the retina to the cortex. The main issue of the present work is the electrophysiological caracterization of the rat LGN and the response of its neurons to complex visual stimuli.

Methods Extracellular multiunit recordings have been performed in Wistar anesthetized rats stimulated with flashes and moving gratings. We have determined the latencies, number of spikes and presence of oscillatory activity in the responses evoked by flashes as well as the spatial distribution of these characteristics among the neurons of the LGN. Complex stimuli represented by moving gratings have allowed us to study the behaviour of the neurons as a function of orientation, velocity and spatial frequency of the stimuli.

Results The neuronal response patterns change both linearly and non-linearly depending on these parameters showing in the majority of the cases an increase in their latency with respect of flash stimulation and oscillation frequencies in all ranges except α.

Conclusion One key tool for our study has been the variation coeficient of averaged spiking frequency of neuronal population which show us that bars orientation is a very important parameter.

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Effect of a polarized on photopic contrast sensitivity and disability glare

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Purpose To establish the effect of a solar polarized filter on photopic contrast sensitivity (CS) determined with and without glare and on disability glare.

Methods Natural sunlight is partly polarized and polarized filters are the only way capable of blocking the glare produced by reflection. Other types of solar filters only reduce the level of luminance.CS with and without glare were determined using the CGT 1000 (6 stimulus sizes –6.3 to 0.7 degrees; 12 levels of contrast –0.01 to 0.45; 8 peripheral glare sources) at photopic luminance level and under different conditions: without filter (to avoid the patient learning effect) or using a graphite or polarized filter on an alternating basis. The study sample was comprised of 82 subjects aged 18 to 95 (56± 21) years.

Results Differences in disability glare were recorded for intermediate stimulus sizes between both filters. Differences statistically significants in disability glare according to the filter versus without filter were recorded for intermediate stimulus sizes. CS values for intermediate stimulus determined in the presence of glare differed significantly when comparing the use of no filter versus both filters, or between both filters with glare.

Conclusion The use of solar filters improves CS for intermediate stimulus sizes, being highest values using the polarized filter

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Monochromatic Ocular Aberrations in Professional Tennis Players

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Purpose To report monochromatic aberrations distribution in a population of professional French tennis players with a non corrected monocular visual acuity of 20/20.

Methods Inclusion criteria are: professional tennis player, monocular visual acuity superior or equal to 20/20 (determined with a Landolt rings chart). Sphere measurement has to be inferior to 0,5 Diopter and astigmatism less than 0,75 Diopter.A Shack-Hartmann type aberometer is used. 3 measurements are performed: without and with dilation (5% Neosynephrin).

Results Compared to the literature data on normal subjects, the global level of ocular aberrations (total RMS) of this specific population is low. There seems to be a correlation between both eyes for spherical aberration, astigmatisms with a mirror symmetry (enantiomorphism) and for aberrations with oblique variation axis (Coma 0, Trefoil O). Spherical aberration is the most common aberration observed in pilots with a natural "Super Vision". It might play a role in compensating retinal image quality.

Conclusion In this specific population, higher order aberrations do exist. The good visual performances and sport abilities of these subjects are not correlated with a complete absence of ocular aberrations. Associations of selected ocular aberrations might even be beneficial. Aberrations distribution in this population may help define new standards for specific sport aptitudes.

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Refractive error changes in young adults during a period of 3 years

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Purpose This study was initiated to assess the prevalence and changes of refractive state in university student's population in Portugal during a period of three years

Methods In a longitudinal study 118 universitary students (34 males and 84 females) with a mean age 20.5 ± 2.33 years (mean ± SD), received two visual examinations at intervals ranging from 30 to 38 months. The results obtained by the subjective distant refractive with cycloplegia method were used in the analysis and the refractive values were converted into spherical equivalents (SER) for some analysis. Myopia was defined as SER<=-0.50D, emmetropia as SER >-0.50D and <+0.50D and hyperopia as SER >=+0.50 D

Results The refractive error of the sample in the 1st visit, ranged from –6.75 to +3.00 D mean spherical equivalent + 0.20 ± 1.53D (Mean ± SD.). The maximum amount of astigmatism was –2.25 D. The incidence of refractive errors in the 1st visit was 22.0% of the students had myopia, 28.8% had emmetropia and 49.2% had hyperopia and for the 2nd visit was 27.1% of the students had myopia, 33.1% had emmetropia and 39.8% had hyperopia.There are statistically significant differences between 1st and 2nd visit (1st mean refractive error (MRE)=0.04 ± 1.49D; 2nd MRE=-0.25 ± 1.72D). The mean diferrence between the two visits was 0.29 ± 0.38 D, p <0.001. We verify that 17.6% of the students with emmetropia became myopic and 19% of the students with hyperopia became emmetropic (p<0.001). We also verify that 72.9% change value of the refractive error in the myopic direction and 39.8% experiment a changes greater than 0.38D in SER

Conclusion The results show an incidence of myopia similar to the other results in other countries. The results show a significant and preoccupant myopia shift