

FACULTAT DE CIÈNCIES
CURS D'ADAPTACIÓ AL GRAU EN ÒPTICA I
OPTOMETRIA

REPETIBILITAT INTRAOBSERVADOR DEL
CAMPÍMETRE ATD DE DOBLE MODULACIÓ EN EL
CANAL CROMÀTIC
ROIG-VERD

Vicenta F. Moncho Gascón

ABSTRACT

PURPOSE: • Show the repeatability of the obtaining of data intraobserver, for the frequencies that favour the path of the information for the channel T (opponent Red-Green) and that it modulates with frequencies space-temporal 0.5 cfd/ 2 Hz.

METHODS: A single eye of 20 individuals with 30 ± 10 years were tested, with visual acuity $> 20/25$. We took 20 patients without pathologies. All patients were wearing their correction if they needed it.

The data were studied with statistical programs to show their normality and repeatability. The visual fields sensitive measures were made with the ATD perimeter; for the spatial frequencies of 0.5 cfd and the temporal frequency was 2 Hz. We took these measures for visual channel T (chromatic Red-Green)

The advantage of the ATD perimeter, with regard to the other kinds of perimeters, is that you can analyze the CSF in 21 different points of retina (including fovea), in the three visual channels (A, T and D).

RESULTS AND CONCLUSIONS: We finally verify repeatability intraobserver, we have verified by means of the statistical study that the measures are repeatables for the Red-Green channel.

ÍNDEX

PRÒLEG

1 INTRODUCCIÓ	1
1.1. Camí de la informació visual	2
1.2 Campimetria. Camp visual	7
1.3 Campímetre	10
1.4 Objectius	11
2 MÈTODE	13
2.1. Criteris selecció	13
2.2 Campímetre ATD de doble modulació	15
2.2 Estudi estadístic	18
3 RESULTATS I INTERPRETACIÓ	21
4 CONCLUSIONS	27
5 BIBLIOGRAFIA	29

PRÒLEG

En aquest estudi avaluarem la repetibilitat de les mesures preses amb el campímetre ATD de doble modulació, utilitzant estímuls espai-temporals modulats en la direcció cardinal del canal Roig-Verd (T-0.5 cpg /2 Hz), que afavoreixen les respostes del canal parvocel.lular. Es realitzarà un estudi intraobservador comparant 3 mesures repetides pel mateix observador i supervisades pel mateix clínic (l'autora) .

Aquest treball forma part dels estudis de validació desenvolupats pel grup de investigació que ha dissenyat el campímetre ATD de doble modulació (Grup de Visió de la Universitat de Valencia), un prototipus de campímetre de sensibilitat al contrast espai-temporal , amb patents US 7.641.344 B2 i ES 2246174 desenvolupat amb la col.laboració de l'empresa INDO i el Institut Català de la Retina (ICR) i que compta amb la finançament provinent dels projectes PTR 1995-0909-OP i DPI2000-0116-P4-02 del Ministeri de Ciència i Tecnologia.

5. CONCLUSIONS

Hem disenyat un estudi amb 20 subjectes normals, als que se'ls ha realitzat tres campimetries en el canal T Roig-Verd, sota la supervisió d'un mateix clínic A.

Respecte la repetibilitat intraobservador (mateix pacient, mateix clínic) hem comprovat, mitjançant l'estudi estadístic, que les mesures són repetibles per al canal Roig-Verd.

5. CONCLUSIONS

We have designed an study with 20 normal subjects, to those that has realised them three perymetries in the T Red-Green channel, under the supervision of a same clinical A.

Respect the repeatability intraobserver (same patient, same clinical) we have checked, by means of the statistical study, that measures are repeatebles for the Red-Green channel.

6. BIBLIOGRAFIA

1. Barber AJ. A new view of diabetic retinopathy: a neurodegenerative disease of the eye. *Prog Neuropsychopharmacol Biol Psychiatry* 2003;27:283–290.
2. Fledelius H. Refractive change in diabetes mellitus around onset or when poorly controlled: a clinical study. *Acta Ophthalmologica* 1987;65:53–57.
3. Sparrow J. Biometry of the crystalline lens in early-onset diabetes. *British Journal of Ophthalmology* 1990;74:654–660.
4. Pacheco-Cutillas M, Sahraie A, Edgar D. Acquired colour vision defects in glaucoma – their detection and clinical significance. *Br j. Ophthalmology* 1999; 83; 1396-1402.
5. Di Leo MA, Caputo S, Falsini B, Porciatti V, Minnella A, Greco AV, Ghirlanda G. Nonselective loss of contrast sensitivity in visual system testing in early type I diabetes. *Diabetes Care* 1992;15:620–625.
6. Verrotti A, Lobefalo L, Petitti MT, Mastropasqua L, Morgese G, Chiarelli F, Gallenga PE. Relationship between contrast sensitivity and metabolic control in diabetics with and without retinopathy. *Ann Med* 1998;30:369–374
7. Kawasaki K, Yonemura K, Yokogawa Y, Saito N, Kawakita S. Correlation between ERG oscillatory potential and psychophysical contrast sensitivity in diabetes. *Doc Ophthalmol* 1986;64:209–215
8. Greenstein VC, Shapiro A, Hood DC, Zaidi Q. Chromatic and luminance sensitivity in diabetes and glaucoma. *J Opt Soc Am A* 1993;10:1785–1791.
9. Spafford MM, Lovasik JV. Clinical evaluation of ocular and visual functions in insulin-dependent juvenile diabetics. *Am J Optom Physiol Opt* 1986;63:505–519
10. Adams AJ. Chromatic and luminosity processing in retinal disease. *Am J Optom Physiol Opt* 1982;59:954–960.
11. Zisman, F.; Adams, AJ. Spectral sensitivity of cone mechanisms in juvenile diabetics. In: V, G., editor. *In Doc Ophthalmol Proc Series 33*. The Hague: DW Junk; 1982. p. 127-131
12. Afrashi F, Erakgun T, Kose S, Ardic K, Mentis J. Blue-on-yellow perimetry versus achromatic perimetry in type 1 diabetes patients without retinopathy. *Diabetes Res Clin Pract* 2003;61:7–11.
13. Realini T, Lai MQ, Barber, Impact of diabetes on glaucoma screening using frequency-doubling perimetry, Conference Information: Annual Meeting of the Association-for-Research-in-Vision-and-Ophthalmology, May 04-09, 2003 Ft Lauderdale, FL, *Ophthalmology* 111: 2133-2136, 20004 .

14. Davies N , Morland A . Extent of foveal tritanopia in diabetes mellitus . Br. J. Ophtalmol. 2003; 87 ; 6. 742.
15. Tyler C , Specifics dèficits of flicker sensitivity in glaucoma and ocular hypertension. Invest. Ophtalmol. Vis. Sci. February 1981 ; 204-212.
16. Shuwairi S M , Cronin-Golomb A et al. Color discrimination in schizophrenia. Schizophrenia reseach 55 , 2002 ; 197-204.
17. Mäntyjärvi M ,Teräsvirta M Et al. Color vision defect in Purtscher's disease. 1993. February 609-611.
18. Phipps J A , Dang T M , Vingrys A J And Guymer R H . Flicker perimetry losses in Age-related Macular Degeneration . Investigative Ophtalmology & Visual Science, September 2044, vol. 45, No. 9; 3355-3360.
19. Müller T, Woitalla D, Peters S, Kohla K , Przuntek H . Progress of visual dysfunction in Parkinson's disease . Acta Neural Scand 2002 : 105 : 256- 260.
20. Barthelmes D , Sutter F K , Kurz-Levin M M , Bosch M M et al. Quantitative Analysis of OCT Characteristics in Patients with Achromatopsia and Blue-Cone Monochromatism Investigative Ophtalmology & Visual Science , March 2006 ; v. 47 ; No 3.
21. McKendrick A M , Vingrys A J , Badcock D R and Heywood J T . Visual Field Losses in Subjects with Migraine Headaches . Investigative Ophtalmology & Visual Science . April 2000 ; Vol. 41 , No 5;1239-1247.
22. Leeprechanon N MD, Giangiacoamo A MD, Fontana H MD , Hoffman D BA and Caprioli J MD . Frequency-Doubling Perimetry : Comparison with Standard Automated Perimetry to detect Gaucoma . American Journal of Ophtalmology 2007 ; 143 : 263-271
23. Johnson C A , Marshall JR. Aging Effects for Opponent Mechanisms in the Central Visual Field . Optometry and Vision Science . 1995 , Vol. 72 No 2 ; 75-82.
24. Artigas J M , Capilla P , Felipe A y Pujol J . Óptica fisiológica. Psicofísica de la visión . Mcgrau-Hill-Interamericana de España .1995 : 253-260.
25. Hubel, D.H. Ojo, cerebro y visión. Universidad de Murcia 1999.
26. Tovée, M.J. An introduction to the visual system. Second edition. Cambridge University Press 2008.
27. Gegenfurtner, K. R., Sharpe, L.T. Color vision. From genes to perception. Cambridge University Press 1999.
28. De Valois, K. Seeing. Academia Press 2000.
29. Kanski J L. Oftalmología Clínica. 7ª edición. Elsevier España S.L. 2006 Barcelona.

30. Capilla, P., Artigas, J.M., Pujol, J. Fundamentos de colorimetría. Publicaciones de la Universidad de Valencia (2002).
31. Artigas, J.M., Capilla, P., Pujol, J. y coords. Tecnología del color. Publicaciones de la Universidad de Valencia (2002) Capítulo 9.5. pg 324-327 Pujol, J. El color en la detección de las patologías oculares.
32. Gulrajani, M.L. Colour measurement. Principles, advances and instrumental applications. Woodhead Publishing Limited, 2010.
33. Farnsworth D. The Farnsworth-Munsell 100 hu and dichotomous test for color vision. J Opt Soc Am 1943 ;33 ; 568-578.
34. Manual del campímetro ATD de doble modulación. Facilitado por el Grupo de Visión de la Universidad de Valencia.
35. Morilla-Grasa A, Antón A, Santamaría S, Capilla P, Gómez-Chova J, Luque MJ, Artigas JM, Felipe A. Contrast sensitivity differences between glaucoma, ocular hypertensive and glaucoma suspect patients found by ATD perimetry, ARVO 2009, Invest. Ophthalmol. Vis. Sci. 2009. 50: Issue 5; E-Abstract 5290.
36. Prieto L, Lamarca R, Casado A. La evaluación de la fiabilidad en las observaciones clínicas: el coeficiente de correlación intraclase: Med Clin 1998: 110(4); 142-145
37. Hanneman SK (2008) Design, analysis, and interpretation of method-comparison studies. AACN Advanced Critical Care 19:223-234.
38. Krouwer JS (2008) Why Bland-Altman plots should use X, not $(Y+X)/2$ when X is a reference method. Statistics in Medicine 27:778-780.
39. Armstrong R, Davies L, Dunne M , Gilmartin B Ophthalmic and Physiological Optics Volume 31, Issue 2, pages 123–136, March 2011
40. Piñero DP, Saenz González C, Alió JL. Intraobserver and interobserver repeatability of curvature and aberrometric measurements of the posterior corneal surface in normal eyes using Scheimpflug photography. J Cataract Refract Surg. 2009 Jan;35(1):113-20.
41. Doménech Amigot, B, et al. "Repeatability and concordance of the Pentacam system: comparative study of corneal parameters measured with Pentacam and Atlas". Óptica Pura y Aplicada. Vol. 42, n. 1 (marzo 2009). ISSN 0030-3917, pp. 51-60
42. Pita Fernández, S., Pértegas Díaz, S., La fiabilidad de las mediciones clínicas: el análisis de concordancia para variables numéricas. Unidad de Epidemiología Clínica y Bioestadística. Complejo Hospitalario Universitario de A Coruña (España)

43. Latour J, Abraira V, Cabello J y López Sánchez J Métodos de investigación en cardiología clínica (IV). Las mediciones clínicas en cardiología: validez y errores de medición Rev Esp Cardiol. 1997;50:117-28. - Vol.50 Núm 2.