DIAGNOSIS: RETINA SEMEIOLOGY OF THE RETINA

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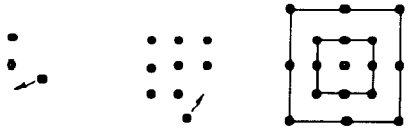
QUANTIFICATION OF METAMORPHOPSIA USING A SCANNING LASER OPHTHALMOSCOPE (SLO)

GOBERVILLE M.[1], GUEZ J.E.[1], LE GARGASSON J.F.[1], MARCHAL P[1]., GRALL Y.[1] and GAUDRIC A[2].
1 Service de Biophysique, Hopital Lariboisière, Paris (France).
2 Service d'Ophtalmologie, Hopital Lariboisière, Paris (France).

PURPOSE: To assess metamorphopsia in patients with epimacular membrane, using a SLO.
METHODS: A SLO was used to project 17 spots on the retina. A first spot considered as a reference appears at a constant place above a central flickering spot. The task consists in moving 15 other spots, appearing one after the other, in order to draw two regular squares as shown in the figure below.



During the whole test the central fixation is monitored by the examiner. The test was performed on 10 normal eyes and 15 with epiretinal membranes.
RESULTS: This test was easy to perform for all the subjects. The squares drawn by healthy subjects were reproducible and not distorted. The squares drawn by patients with epimacular membranes without metamorphopsia (3/15) were not distorted whereas those drawn by patients complaining of metamorphopsia were distorted (9/12). This distortion was stressed for 5/9 cases. In these cases, the center of the membrane contraction was far from the fovea. Patients with metamorphopsia without visible distortion of their test (3/12) had central membanes with a perifoveal contraction.
CONCLUSION: SLO allows a precise assessment of metarmophopsia in patients with epimacular membranes. It may be a usefull tool to better evaluate the results of membrane surgery.

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THE BLOOD-RETINA BARRIER: MODEL SIMULATION OF FLUOROMETRIC DATA.

SANDER B[1]. MOLDOW B[1]. ENGLER C[1]. LUND-ANDERSEN H[1].
[1]*Dep.of Ophthalmology, Herlev Hospital, University of Copenhagen (DK)*

Purpose: The retina is separated from the blood-stream by the tight blood-retina barrier (BRB). A breakdown of the barrier is found in diabetic retinopathy, eventually leading to oedema. Two components of the BRB seems to be important for the transport through the BRB: 1) passive transport from the blood to the vitreous 2) active transport from the retina to the blood. Both the passive and active component can be calculated from vitreous fluorescence curves measured with an ocular fluorometer. The active component is calculated from the vitreous curve 1 to 5 mm in front of the retina 7-10 hours after fluorescein injection. The methology is complicated by the low signal/noise ratio at this time as well as the influence of different diffusion properties in the vitreous (D). We present a method, which simulates the vitreous fluorescence from individual estimates of D, plasma fluorescein, passive and active permeability. **Method:** Vitreous fluorescence is calculated in a series of small compartments, from the retina to the center of the eye. The transport from the plasma to the cell closest to the retina is the result of passive and active transport through the BRB, for all other cells only the vitreous diffusion coefficient determines the concentration. **Results:** A close relation has been found between the model and experimental data of vitreous fluorescence after fluorescein injection and the model both in healthy voulenteers and in macular oedema. **Conclusion:** The model simulates experimental data well and improves the precision in calculations of active permeability. The model confirms the hypothesis of an active transport in the retina.

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HIGH RESOLUTION VITREOUS FLUOROMETRY IN HEALTH AND DIABETES. PRELIMINARY RESULT

LOBO C.[1], ISIDORO J.[2], SIMÕES PC.[2], MORGADO P.[1], CUNHA-VAZ JG.[1]
[1]Department of Ophthalmology and Visual Sciences and
[2]Department of Instrumentation of the Institute of Biomedical Research on Light and Image, University Hospital, Coimbra, (Portugal).

Purpose: Characterisation of Blood-Retinal Barrier (BRB) inward and outward fluxes of fluorescein in normal individuals and diabetic patients with no ophthalmoscopically visible retinopathy using high-resolution vitreous fluorometry.

Methods: Five normal volunteers (20-40 years of age) presenting with normal ophthalmological examination and five patients with IDDM, type I diabetes and no ophthalmological signs of retinopathy were examined by a modified confocal laser scanning optical system capable of performing high resolution vitreous fluorometry.

Results: In the eyes examined, the *in vivo* spread function of the new instrument never exceeded 3% of the peak fluorescence at a distance of 800 µ from the retina surface. The improved resolution indicates that more reliable measurements of the inward BRB fluorescein flux are obtained within the first thirty minutes after intravenous administration, whereas measurements of the outward BRB flux are best performed five hours after fluorescein administration.

Conclusions: High resolution vitreous fluorometry offers extremely promising perspectives for separation of the inward and outward fluorescein fluxes across the BRB. These preliminary results suggest that the outward fluorescein flux is preferentially affected in the initial stages of diabetic retinal disease.

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SLO ANGIOGRAPHY USING AUTOLOGOUS FLUORESCENT LABELED PLATELETS AND LEUKOCYTES IN RABBITS

LE GARGASSON J-F. [1], PAQUES M.[3], GUEZ J-E.[1], BOVAL B.[2], MUNDLER O.[1], .RIGAUDIÈRE F.[1],. GRALL Y. [1], GAUDRIC A.[3].
1 Service de Biophysique
2 Service d'Hématologie
3 Service d'Ophtalmologie
Université Paris 7. Paris, France.

Purpose. To visualize the blood flow of platelets and leukocytes with a SLO in retinal vessels, SLO angiography was performed on 5 rabbits with autologous platelets and leukocytes labeled with fluorescein (FLAPs).
Methods. Two samples of platelets and leukocytes were isolated by centrifugation of 15ml of blood taken from each rabbit. The first sample was studied with a flux cytometer. The second one was labelled by incubating platelets and leukocytes in fluorescein. Excess of fluorecein was washed out by a second centrifugation. One part of the FLAPs was analysed with a flux cytometer. The other part was rapidly reinjected into a vein of the left ear of the rabbit to perform a SLO angiography of FLAPs. During the SLO angiography, a sample of blood was taken from the right ear. The platelets and leukocytes of this sample were analysed with a flux cytometer.
Results. The results of the flux cytometry showed that : 1/ platelets and leukocytes were isolated by centrifugation and actually labeled with fluorescein, 2/ FLAPs were 10% bigger than normal platelets and leukocytes. Analysis of the blood sample taken in the right ear of the rabbit during the SLO angiography demonstrated that: 1/ FLAPs were discernible from other elements; 2/ FLAPs were not immediatly captured by the spleen despite their fluorescence and their increase of size. SLO angiography showed that the circulation of FLAPs were always clearly discernible from the background noise in retinal blood vessels.
Conclusion. It was possible to obtain functional autologous labeled platelets and leukocytes and to observe FLAPs retinal flow with a SLO. Application of this technique to human platelets is in progress.