

Retinal Photography Without Mydriatics

Yves J. Alloucherie*

Abstract

Two main reasons may be given to explain why retinal photography is not used more frequently by optometrists: the high cost of the specialized cameras required and the "need" for mydriasis. It is of course true that fundus cameras, like all other complex optical instruments, are expensive. It will however be shown in this paper that very acceptable photographs of the retina may often be obtained easily, even by inexperienced optometry students, without any drug-induced mydriasis, after only a few minutes of instruction and experience.

Abrégé

Deux raisons principales peuvent être données pour lesquelles peu d'optométristes prennent des photos du fond d'oeil: le coût élevé des appareils requis et la "nécessité" d'employer des drogues mydriatiques. Il est évident que les caméras de fond d'oeil, comme tout autre instrument optique compliqué, sont dispendieuses. Le présent travail a cependant démontré qu'il était souvent facilement possible, même pour des étudiants en optométrie sans expérience préalable, d'obtenir des photos de la rétine d'une bonne qualité, après seulement quelques minutes d'instruction et d'expérience, et sans mydriase artificielle.

Introduction

The myth that drug-induced mydriasis is essential for success in retinal photography is unfortunately reinforced by some camera manufacturers. For instance, the instruction manual of the Topcon Retinal Camera Model TRC-F¹ clearly states

*O.D., Ph.D., Clinical Resident, School of Optometry, University of Waterloo, Waterloo, Ontario N2L 3G1.

that "If the pupils are not dilated completely, illumination will not be sufficient for photography. (The pupil diameter should be over 7 mm)."

According to Duke-Elder², a minimum pupillary diameter of at least 5 mm is required. This advice unfortunately resembles that given in certain ophthalmology texts³, where the reader is admonished that direct ophthalmoscopy should routinely be performed with dilated pupils, or that accurate retinoscopy should be determined with cycloplegics for patients less than 46 years of age. There are of course certain cases when mydriatics and/or cycloplegics should be used, but this does not mean that useful results cannot be obtained without them.

The results described below have shown that retinal photographs of acceptable quality may frequently be obtained easily without any drug-induced mydriasis: furthermore, the operators involved were not highly skilled clinicians, but third-year optometry students without any prior experience in retinal photography.

Protocol

A simple training program was organized to teach third-year optometry students at the University of Montreal the use of retinal photography. The instrument used was a standard Topcon Model TRC-F retinal camera. The program involved three basic steps:

1. Instruction in the basic controls of the instrument
2. Practice in focussing and photography using schematic eyes
3. Practice in focussing and photography using human eyes

The film type used throughout was

a DIRACOLOR (very similar to KODACOLOR) color negative model, with ratings of 100 ASA or 21 DIN, and was processed commercially. After some experimentation, the following instrument settings were found to give good results:

Illumination filter plate:	1/2
Filter switching knob:	1/3
Illumination control switch:	low to medium
Flash control switch:	50

It should be explained that two optical filters can be adjusted independently on the instrument: the "illumination filter plate" controls the amount of incident light striking the retina, while the "filter switching knob" controls the amount of light reflected from the retina and entering the camera system. This distinction is important since, as was pointed out by Leutwein and Littman⁴, a large pupillary diameter is not necessary for photography per se, but only for retinal illumination, since only a small part of the incident light is reflected. The "illumination control switch" controls the amount of steady-state light used prior to photography proper to focus and center the camera (then used as an ophthalmoscope) on the area of interest. Finally, the "flash control switch" controls the brightness of the electronic flash illumination used for the actual photography.

The above control settings correspond to the recommended values given in the instrument user's manual.

Two schematic eyes were used for demonstration and practice:

1. A Bernell cylindrical eye normally used for retinoscopy practice, with a pupillary diameter of about 10 mm, modified by the addition of a simple internal cardboard shell drawn to simulate a retina.

2. A.M.I.R.A. eye normally used for binocular indirect ophthalmoscopy practice, with a pupillary diameter of about 6 mm.

Finally, photographs of human retinas were taken by the students on each other. The room light was turned off and the illumination control switch was set as low as possible to prevent excessive myosis. Prior use of schematic eyes with large pupils greatly facilitated this step.

The total training time per student did not exceed 15 minutes.

Results

A number of typical results are reproduced in Figs. 1-4.

Discussion

The results obtained in this study have shown that, contrary to commonly held assumptions, drug-induced mydriasis is not always absolutely essential to obtain acceptable retinal photographs. It remains to be seen if even better results could be obtained by switching off the illumination light source completely for a few seconds after focussing is completed, just prior to actually taking the photographs, leaving the eye then in complete darkness except for the very faint red fixation light. This should achieve wide natural mydriasis. Triggering the bright xenon electronic flash light will of course bring about a strong pupillary contraction but, since the latency period for myosis is about 0.2 sec (according to Adler⁵) and therefore much slower than the duration of the electronic flash or the film exposure time, the photographs would be taken with the pupil still dilated. Photographic quality could also be improved by using higher-quality slide-type films.

Conclusion

Optometrists who are unable or unwilling to use mydriatics for whatever reason should not automatically dismiss retinal photography as part of their diagnostic armamentarium. Very limited practice should give rewarding results

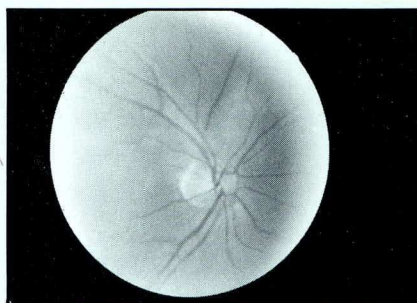


Fig. 1

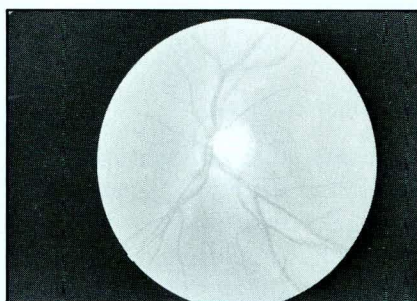


Fig. 2

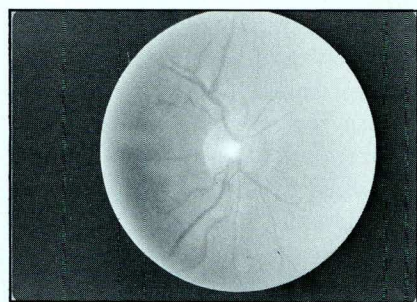


Fig. 3

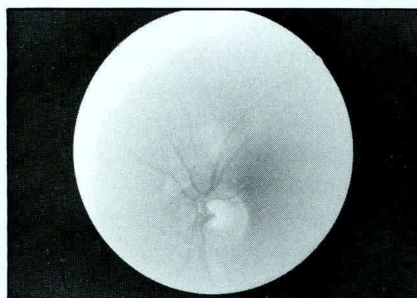


Fig. 4

that could be invaluable in long-term photodocumentation of patients' retinas. Patients with truly myotic pupils or lenticular opacities will still probably need to be dilated however.

References

1. User's manual, Topcon Retinal Camera Model TRC-F, Tokyo Kogaku Kikai K.K.,

p. 15.

2. System of Ophthalmology, Vol. VII, The Foundations of Ophthalmology, edited by Sir Stewart Duke-Elder, The C.V. Mosby Company, St. Louis, 1962, p. 306.
3. Textbook of Ophthalmology, Harold G. Scheie and Daniel M. Albert, W.B. Saunders Company, Philadelphia, 1977, pp. 177, 272.
4. The Fundus Camera, K. Leutwein and H. Littman, Duane's Clinical Ophthalmology, Vol. 1, pp. 61.2-61.3, Harper & Row Publishers, Hagerstown, 1979.
5. Adler's Physiology of the Eye, Clinical Application, edited by Robert A. Moses, Sixth Edition, the C.V. Mosby Company, St. Louis, 1975, p. 334.

PRACTICE APPRAISALS

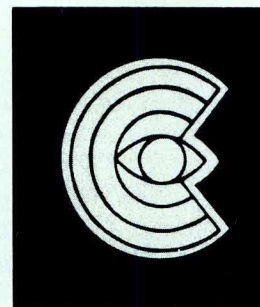
(Goodwill & Assets)

For purposes of
Associate Buy-In
Partnership
Cost Sharing
Group Practice
Sale of Practice

Confidential Professional Services
Established 1973

ROI Management Incorporated
Mississauga, Ontario
(416) 278-4145

**FEB. 16
WILL BE TOO LATE!**



The **final** deadline for submitting an application for a grant under the 1983 C.O.E.T.F. Awards Program is **Feb. 15, 1983**. **NO APPLICATIONS WILL BE ACCEPTED AFTER THIS DATE.** An application form is on P. 201. Please use it — but before February 15, 1983.