

# Polaroid Photorefractive Screening of Infants

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## ABSTRACT

We modified a Polaroid SE camera for use as a photoretinoscope. A total of 187 infants between 2 and 18 months of age were photographed using this device. About half of these infants (97) participated in a double blind study in which the results of photorefraction were compared with those of standard cycloplegic retinoscopy. Eighty-three infants were photographed without cycloplegia. Thirty-four infants were photographed while cycloplegic. Photographs were evaluated for significant refractive errors and other ocular abnormalities.

The effectiveness of the camera system to screen for significant refractive errors without the use of cycloplegia was assessed. Infants were identified to be at risk by photorefraction if, in any photograph, a hyperopic bright crescent calculated to be  $\geq +1.25$  D was present in the pupil. Clinically significant refractive errors were defined by the results of cycloplegic retinoscopy: "at-risk" infants had either 3.5 D or more hyperopia in either eye, or astigmatism in either eye  $\geq 2.5$  D, or anisometropia  $\geq 1.5$  D. With these clinical criteria and the above photographic screening criterion, the camera's sensitivity and specificity were 83% and 69%, respectively.

The present system compares favorably with earlier, more sophisticated units in alerting practitioners to

potentially significant refractive errors in infants. Additionally, as a screening tool, this device offers the benefits of being inexpensive and easy to use, and of providing immediate feedback.

## INTRODUCTION

Photographic refraction shows potential for use as a screening device for possible amblyogenic factors such as refractive errors, strabismus, and ocular media opacities. It shows special promise in pre-verbal children and infants, age groups where, ideally, detection and treatment should be directed.<sup>1,2</sup> Ehrlich et al<sup>1</sup> recommended that screening be done before 24 months of age. Recent research affirms such a recommendation. Gwiazda et al have shown that meridional amblyopia can result from astigmatism which has resolved by 18 months of age, suggesting that some reduction in plasticity may have occurred by this young age.<sup>3</sup> Ingram et al<sup>2</sup> found a strong association between bilateral hyperopia, and/or astigmatism or anisometropia at age 1 year and the eventual onset of strabismus and/or amblyopia. Furthermore, Ingram and colleagues have found a very close association between astigmatism and anisometropia in 1 and 3½-year old children.<sup>4</sup> They recommend that screening occur by 1 year of age, and have suggested further that one of the new objective photographic screening techniques (eg, photorefraction) be used for screening.<sup>2</sup> With a prevalence for amblyopia and strabismus in pre-school children of at least 5%,<sup>1</sup> the need for early identification of children at risk is clear.

Two basic classes of photographic devices have been developed. Both utilize fundus reflection of light sources which have been doubly refracted by the dioptries of the eye: once upon entry and once upon reflection off the fundus. In one system, the illuminating and observation paths are co-axial. In the other system the two paths are

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