

# Identification of Amblyogenic Risk Factors with the Brückner Reflex Test using the low-cost 'Arclight' Direct Ophthalmoscope



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**Background:** The Arclight Ophthalmoscope<sup>1</sup> (AO) (Figure 1) is a frugal solar powered device developed for low resource settings.

Observation of asymmetry or absence of a child's red reflex at arm's length can help identify strabismus, media opacity or anisometropia. This is known as the Brückner Reflex Test<sup>2</sup> (BRT) (Figure 2) and can allow for quick, simple and effective screening for amblyogenic risk factors.

This test is however rarely performed in low resource settings due to lack of training and access to ophthalmoscopes<sup>3</sup>.

**Aims and objectives:** To establish the sensitivity and specificity of the AO to perform the BRT in a paediatric population in India.

**Methods:** 64 patients referred to the paediatric ophthalmology department of the LV Prasad Eye Institute, Hyderabad were evaluated using the BT by both an 'expert' (consultant ophthalmologist) and a 'non-expert' (medical student). The results of a full clinic workup were defined as the 'gold standard'.



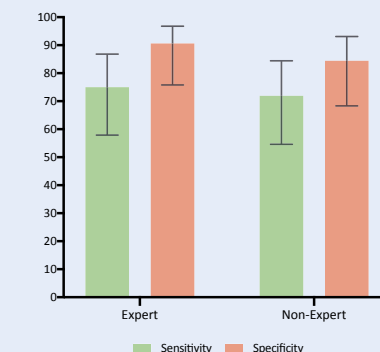
Figure 1: The Arclight Ophthalmoscope



Figure 2a: Examination of a healthy individual shows a symmetrical Brückner Reflex



Figure 2b: Examination of an individual with exotropia shows an abnormal Brückner Reflex (abnormal eye has a brighter reflex)



Bruckner Reflex Test: Expert vs Non-Expert Observer

Figure 3: This bar graph series compares the sensitivity and specificity of the BRT when used by an expert and non-expert observer in picking up risk factors for amblyopia.

## Results

BRT screening by the expert had a sensitivity of 75.0% [95% CI: 57.9–86.8%] and a specificity of 90.6% [95% CI: 75.8–96.8%]. The non-expert sensitivity and specificity were 71.9% [95% CI: 54.6–84.4%] and 84.4% [95% CI: 68.3–93.1%] respectively (Figure 3).

## Conclusion

The BRT when performed by a non-expert using the AO was highly specific and moderately sensitive in identifying treatable amblyogenic risk factors. In regions where systematic paediatric eye care screening and access to traditional direct ophthalmoscopes is typically limited the strategy of using a non-expert non-ophthalmic health care worker to perform the BRT with a simplified low cost direct ophthalmoscope offers the opportunity for earlier referral and better outcomes.

## References

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3. Mndeme FG, Mmbaga BT, Kim MJ, Sinke L, Allen L, Mgaya E, et al. Red reflex examination in reproductive and child health clinics for early detection of paediatric cataract and ocular media disorders: cross-sectional diagnostic accuracy and feasibility studies from Kilimanjaro, Tanzania. Eye [Internet]. 2020; Available from: <https://doi.org/10.1038/s41433-020-1019-5>