Visual Field Perimetry for Children using the MonCVOne Machine
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Purpose
Visual Field (VF) perimeter tests in young children can be both difficult and unreliable. For most children, reliability improves after the age of approximately 7-9 years. Recent data for VF assessment in children is scarce. Our aim was to assess the potential for obtaining accurate VF results for children under the age of 9 years.

We trialled the MonCVOne machine (Figure 1) to see whether the machine can provide accurate VF results in children under the age of 9.

The MonCVOne is a projection perimeter capable of static, kinetic and mixed perimetry. The machine is connected to a desktop or laptop, which is placed to the side of the machine to allow the examiner to monitor the patient’s fixation through an eye tracking device. This permits for subjective and objective responses. The kinetic perimeter function can be used manually in a way similar to Goldmann perimeter. The integrated high resolution infrared video sensor is used to monitor the fixation of the eye throughout the test and can also be used to record objective stimulus responses.

Method
We used the MonCVOne machine on a manual option to test perimetry, in a way similar to Goldmann perimeter. We aimed to use subjective responses where possible. In some patients, objective responses were necessary due to patient understanding.

For a subjective response, the patient was asked to press the button on presentation of a white stimulus. For an objective response, the patient was asked to look at the white stimulus whenever it was presented. This would allow the examiner to record the response as the patient looks at the stimulus using the video sensor. To ensure accurate fixation the examiner would present the stimulus in the center after each peripheral stimulus presented to control the patient’s fixation.

Results
We trialled the machine on a total of 18 patients of age range 3-9 years old. 85% of the patients were aged 6 or 7 years and in particular 30% were under the age of 5.

Figure 3 shows an example of a 6 year old patient’s VF results from just the MonCVOne machine using subjective responses.

Figure 4 shows an example of an 8 year old patient’s visual field result from kinetic perimetry on the MonCVOne machine. The results are presented and compared to Goldberg VF results shown in figure 5. This result in particular shows the validity of the MonCVOne machine in obtaining a VF result similar to that of Goldberg parameters.

Conclusion/Discussion
The MonCVOne gives reliable and accurate VF estimates in children under 9 years. We found that younger children (under 5 years old) responded better on the test when recorded objectively as less information was needed to be given to the patient to undergo the assessment.

We essentially demonstrated the machine’s validity by comparing the kinetic perimetry results with Goldberg perimetry results for the same patient. Although this patient was slightly older than 7 years old, this information is still valuable as we know we can perform the MonCVOne on younger children which would identify defects in a way similar to Goldberg perimetry.

The Goldberg VF machine is difficult to operate for examiners who may have time constraints and so the MonCVOne provides an easier method of operation. We found that examination is quicker for the patient to maintain steady fixation and non-stop duration of test was variable on ability but including exploration to patient aid from approximately 15 minutes. This was with presentation of a maximum of 32 points in most cases. Non-stimulus intensity. With the assessment being simpler and quicker than Goldberg VF assessment this gives an advantage for accuracy. Patients being able to record the results on a computer allows for saving and results would benefit in the event of missing tests.

Some authors describe the time of the stimulus presentation prompting the patient to respond in a manner similar to Goldberg but we didn’t find this to be a problem with the MonCVOne.

In conclusion, we have found the MonCVOne to be a useful method of VF assessment for children. We plan to conduct a pilot study in order to validate its reliability in children.