

**Low vision
Protocol of assessment**

[1 Introduction](#)

Before speaking about CVI it's very important to know what "low vision function" is, both the perceptive and the oculomotor sections.

[2 Assessment tools](#)

The criteria to carry out these tests is :

The relevance of the tests to the project:

- Children from 3-12 years old
- Visual acuity 0.05-0.5 with suspicion of CVI
- verbal cognitive level > 70

The standardization of the test

The international authenticity of the test

For the low vision part we divided our population into two categories: one for children from 3 to 6 years old and one for children from 6 to 12 years old.

The following table summarizes the different functions that will be assessed in the "low vision" section

<u>Function</u>	<u>Specific function</u>
Visual acuity	Recognition acuity Resolution acuity

Contrast sensitivity	
Color vision	Arrangement test Pseudo isochromatic
Binocular vision	Stereopsis Convergence Accommodation Ocular deviation
Mobility	Version (distance vision & near vision) Duction Fixation Saccadic eye movement
Visual field	Confrontation Kinetic perimetry

Visual acuity: it is very important that we use E AND symbols / numbers AND pictures (see clinical remarks).

Contrast sensitivity: we'll use low contrast if visual acuity is more than 0.1 and if it's less we'll use hiding Heidi.

Color vision: we'll use pseudo isochromatic tests if contrast sensitivity is OK and if there is a problem with contrast vision we'll use the arrangement test.

Binocular vision : Except for the stereopsis test, all the tests of specific functions are objective tests.

Mobility : there is no standardized test for children from 3 to 5. Some specific functions will be tested only with objective tests.

Visual field : confrontation is always objective and better with 2 examiners.

For each function and specific function, we propose either one or several tests. Our preference is the first one, but if the examiner doesn't have the first one, he can choose the second or the third.

Functions	Specific functions	Name of the test/subtest	Age	Standardisation	Description of the task	Clinical remarks	Test duration	References
Visual acuity	Recognition acuity	1/ Tumbling E <i>single, linear</i>	3-12 years	Validation	1/Angular test	Measure the need for light	1/ 10 min	Lea labo
		2/ Lea Symbols <i>single, linear and single crowded test for distance / single and linear test for near (25% crowded linear test for near could also be administred, if</i>	3-6 years	Validation	2/ It can be used to measure the resolution of visual pathways in an amblyopic or visually impaired child. For children with less than 0,1 visual acuity we can use Lea Symbols/Numbers at a	Comparison between results from 1/ and 2/ : If the visual acuity measured with E is significantly higher than with Lea symbols or numbers	2/ 10 min	

		<i>possible)</i> 2/ Lea Numbers <i>Single and linear test for distance / linear and 25% crowded linear test for near</i>	6-12 years	Validation	closer distance (less than 3 m) or use a Lea Symbols/Numbers Low Vision Test (at 3 m).	– we should suspect a child has agnosia. If the visual acuity measured with E is lower – we suspect a child has spatial problems		Lea labo
		3/ Kay Picture Test A) Low Vision Book Set (single pictures), B) Single Crowded Book, C) Linear Crowded Book	3/ A) and B) 18 months+ 3/ C) 30 months+	Validation	3/ A) The Low Vision Book Set is specifically targeted to testing those with poor vision. It has single, uncrowded picture presentation in twelve LogMAR sizes, which, at three metres is from 1.3 to 0.2 plus a near vision test and matching card.		3/ 5 min	Kay Pictures
	Resolution acuity	1.1./ Teller Acuity Cards	4 months - 3 years	Validation	1/ The infant or child detects the presence of parallel lines of decreasing width, a task		1.1./ 5-6min	1.1./ Tropique
			4months-3					

		1.2./ Lea Gratings 2/ Cardiff Acuity Test	years 1-3 years	Validation Validation	simpler than the recognition of optotypes. Preferential looking is used. 1.1./ present in form of a rectangular card, the examiner is behind a screen. The patient can only see the card. 1.2./ present in form of a paddle 2/ present in form of rectangular cards, picture of an object is located on the upper or the lower part of the card. Preferential looking is used.		1.2./ 8min 2/ 10 min	1.2./ Lea labo 2/ Kay Pictures-richmondproducts-bernell...
Contrast sensitivity		1/ Lea Symbols 1/ Lea Numbers	3-6 years	1/Validation	1/ Recognition tests. In order to make a valid comparison between the visual acuity and contrast	1/ Both tests have 2 types: Flipchart (10M sized optotypes of	1/ 5min	Lea labo

			6-12 years		sensitivity, it is important to use the same set of optotypes in tests ² . For the purpose of this project, contrast sensitivity should be measured at 10% and 2,5% contrast.	different contrast levels) or translucent tests for lightboxes (different optotype sizes for each contrast). Reporting: write down the contrast value and visual acuity at that contrast (2,5% contrast: VA 0,2 (2m/10M) ²	1/ 5 min	
		2/ Cambridge Low Contrast Gratings	3-12 years	2/Validation	2/ Detection test. This can be used when the visual acuity is measured with gratings – it gives information about the visibility of long low contrast lines in the environment ² . If the child's visual acuity is less than 0,1 (1,0 LogMAR), it is difficult to use Lea Symbols/Numbers – then Cambridge Low Contrast Gratings can give a rough assessment of contrast sensitivity.	2/ It can be used if a child's visual acuity is below 0,1 (1,0 LogMAR). The test distance is kept within the visual sphere of the child, shorter than the originally recommended 6 meters ² .	2/ 5 min	

		3.1./Hiding Heidi	4months-12 years	3/ Validation	3.1./ The expression of the face in HH card is made up of very slightly contrasting shadows and barely visible changes in the contours of the mouth and the eyes. Preferential looking is used.	3.1./ It can be used if a child's visual acuity is below 0,1 (1,0 LogMAR). Reporting: write down the distance used and the lowest contrast level seen by a child at that distance.	3.1/ 5 min	Lea Labo
		3.2./ Cardiff Contrast Sensitivity Test	1-3 years	3/ Validation	3.2./ Preferential looking is used. It is suggested to use this test if the visual acuity is tested with the Cardiff AcuityTest. It has norms for age groups.		3.2/ 10 min	
Color Vision	Arrangement tests	1/Farnsworth 15 or 2/Panel 16	5 years+	Validation Validation	This type of color blindness tests are based on a set of colored plates or discs which have to be arranged in the correct	if there is a contrast sensitivity problem	1/ 10min 2/ 8min	

	Pseudo isochromatic	1/ Ishihara 2/ Babydalton 3/ CVTME	3-12 3+ 3+	Validation Validation Validation	<p>order. Colorblind people will have difficulties arranging the given colors and will make mistakes. Based on these mistakes and the resulting confusion vector, the type of your color blindness and also its severity can be calculated.</p> <p>this test is only made to check for <u>red-green color blindness</u>. Only one of these tests can be used, because they are similar.</p>	if there is no contrast sensitivity problem	1/ 10 min 2/ 3min 3/ 3min	
Binocular vision		Lang I and II	3-12	Validation	LANG STEREOTEST is an easy to use and designed test for the detection of stereoscopic vision problems in Children. Two versions		2min	

	Convergence	Penlight Sticks	3-12	Objective method	are available, which differ only in the three-dimensional (3D) elements to be recognised. convergence is the simultaneous inward movement of both eyes toward each other, usually in an effort to maintain single binocular vision when viewing an object		1min	
	Accommodation	1/ RAF 2/ Dynamic retinoscopy 3/ Flippers +/- 1 or 2	3-12		1/ finding out « punctum proximum » 3/ the flexibility of accommodation is measured			
	Ocular deviation	Cover test	3-12	Objective method	Single and alternate cover test. The presence of ANY movement on a single cover test indicates a tropia. The alternate cover test is the most dissociative cover test and measures		5min	

		Corneal reflection (Hirschberg test)	3-12	Objective method	a total deviation, including the tropic plus the phoric/latent component. Observing the corneal reflection of a pointed light source placed at 50cm, facing the patient, at the height of his eyes		2min	
Mobility	Version (distance vision and near vision)	Target	3-12	Objective method	The versions represent the conjugate movements of the two eyes in the same direction. The study of the versions is most easily performed in near vision by setting within 8 diagnostic directions of gaze, eccentric 30 degrees. The versions can also be studied, less easily, in far vision. They are, in general, realized by turning the head of the subject who always fixes on the same point.		3min	
	Duction	Target	3-12	Objective method	Eye movement seen in one eye at a time, in the diagnostic positions of		3min	

					gaze to study: - the motor properties of each eye and - the limits of the ductions with respect to the normal marks			
	fixation	Fixation sticks (minimum visible) Penlight	3-12	Objective method	Point to be fixed, the size of which varies according to the visual acuity of the patient. Stability of fixation is observed while the child is fixating on a small object or picture.	Highest possible contrast, different sizes	2 min	
	Pursuit	NSUCO Fixation sticks	5-12 3-12	Standardized Objective method	The NSUCO allows a standardized assessment, and consequently quality of the pursuit and saccadic eye movements on four dimensions: aptitude, precision, cephalic or body compensation.		2 min 2min	

	Saccadic eye movement	DEM NSUCO Fixation sticks, small objects	6-14 5-12 3-5	standardized Standardized Objective method	It consists of reading vertical and horizontal columns of numbers. After, the numbers are unevenly spaced. scores are compared to standardised norms. Identical to "pursuit" Small and long saccades are observed.		10min 2min 2min	Development eye movement-BERNELL

Visual Field	Confrontation	Toys Lea paddle Stycar balls	3-12	Objective method	With the examiner seated directly across from the patient, the patient should direct their gaze to the corresponding eye of the examiner. The testing itself can be performed using stationary or moving targets (Toys or Lea Paddle).	it's better with 2 professionals	5min	Lea test
	Kinetic perimetry	Goldmann	6-12		A Goldmann perimeter utilizes different-type targets that can be varied according to size and light intensity. The larger or brighter objects are perceived in the periphery while smaller targets outline boundaries and defects of the central visual field.		20min	

¹ Hall Lueck, A.; Dutton, G. N. (2015). *Vision and the Brain: Understanding Cerebral Visual Impairment in Children*. AFB Press

² Hyvärinen, L. & Jacob, N. (2011). *WHAT and HOW Does This Child See?*. VISTEST Ltd.