



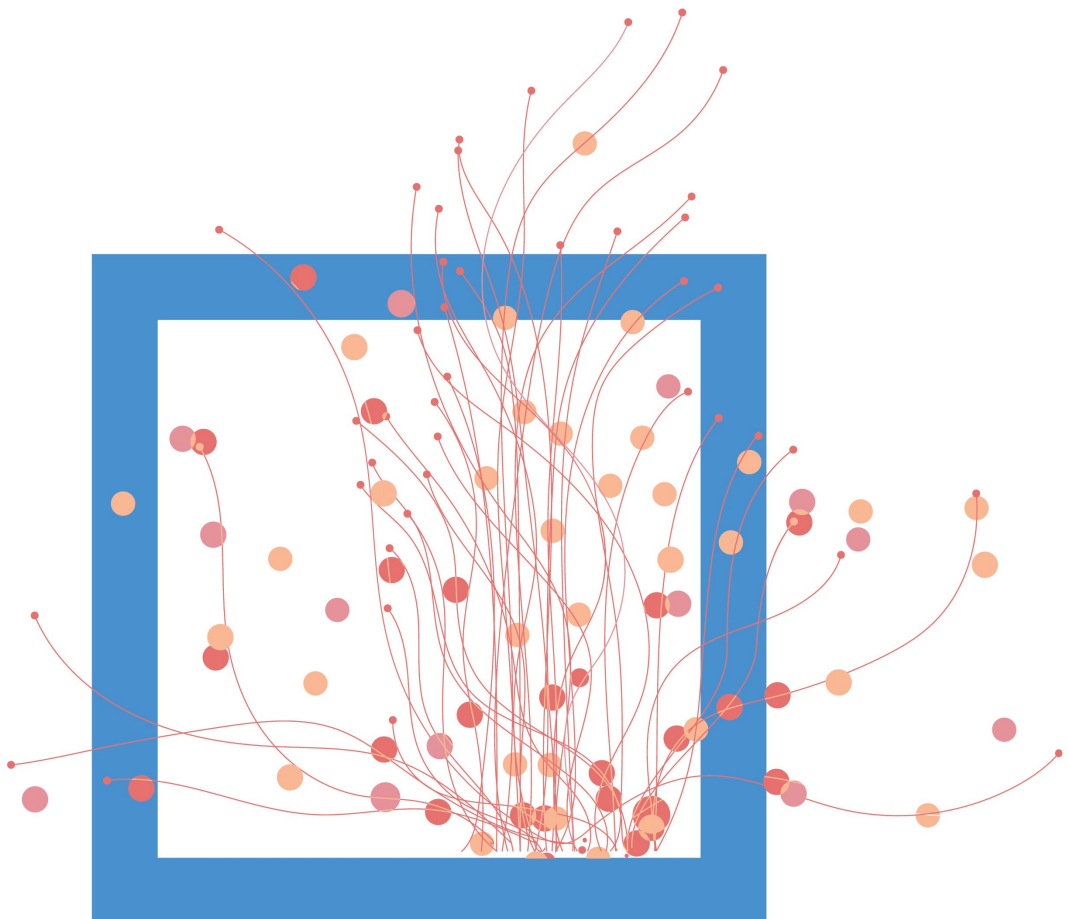
FONDAZIONE  
MARIANI

Child neurology. Just ahead

Workshop online

**/ Synchronous mode / 23-24 February 2024**

## **Visual function assessment in neonates at high risk for visual deficit**





con i bambini per la neurologia infantile

**Workshop online**

**Visual function assessment in neonates at  
high risk for visual deficit**

**Synchronous mode**

**23-24 February 2024**

*in collaboration with*



## COURSE DIRECTOR

### **Daniela Ricci**

National Centre of Services and Research for the Prevention of Blindness and Rehabilitation of Visually Impaired  
IAPB Italia Onlus, Rome

## SCIENTIFIC SECRETARIAT

### **Lorenzo Orazi**

National Centre of Services and Research for the Prevention of Blindness and Rehabilitation of Visually Impaired  
IAPB Italia ONLUS, Rome

## SCIENTIFIC COMMITTEE

### **Mariani Foundation Network on visual function** — 11 Centres (\*)

#### **Domenico Marco Romeo**

Pediatric Neuropsychiatry Unit  
Fondazione Policlinico Universitario  
A. Gemelli IRCCS, Rome

#### **Francesca Gallini**

Neonatal Intensive Care Unit  
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- 8) Child Neuropsychiatry and Early Neurorehabilitation Unit, Spedali Civili of Brescia, Department of Clinical & Experimental Sciences, University of Brescia
- 9) Developmental Neurology Unit, IRCCS Foundation Neurological Institute Carlo Besta, Milan
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- 11) Multifunctional Centre OFFICINA DEI SENSI - HABILIS Coop. Sociale, in collaboration with UICI Italian Union of Blind and Visually Impaired, sections of Ascoli Piceno and Fermo, Ascoli Piceno

## PRESENTATION

This workshop will give a background of information on the typical development of early visual function and the influence of the most frequent brain lesions and eye conditions on the early development of visual functions. Besides the model of early intervention of the newborn at risk of neurological and visual impairment will be presented. The early assessment of visual function, proposed by Ricci et al. in 2008, chosen by the Mariani Foundation Network on visual function for the newborn age, will be presented and described with videos during specific lectures and tutorials with videos.

The network, founded in 2015 thanks to a grant of the Mariani Foundation, had the goal to define and standardize the methodology of early detection of visual impairment in children with brain injuries. It consists of 11 centres spread throughout Italy. The centres have different specificities. Some have great experience in the evaluation and rehabilitation of children with visual impairment, of ocular or cerebral origin. Others are large neonatology units with big experience in the follow up of infants at high neurological risk but not in evaluating visual functions. Still others deal specifically with neuromotor and visual rehabilitation.

After the initial meetings to establish common protocols for the evaluation of visual functions for both newborn and follow-up, shared protocols were also agreed on neuroimaging and eye assessment for the enrolment of children. The organized protocols were intended to make it possible, after a short training, that even specialists who follow children at risk for visual impairment, with little or no experience on the evaluation of visual functions, could include our protocol of visual assessment in their follow up.

Originally the training was performed in presence but the advent of the pandemic greatly limited this activity and we thought to organize an interactive online course, with lectures and discussion of videos of the assessment. In order to facilitate the learning of the assessment we decided to separate the neonatal age assessment from that of the infant.

February 23<sup>rd</sup>, 2024

9.00

**Greetings**

Maria Majno  
Vice President Mariani Foundation,  
Milan

**1<sup>st</sup> Session**

***The Assessment of the Neonatal  
Visual Function***

9.10

**The Mariani Foundation Visual  
Network**

Daniela Ricci, Rome

9.30

**Vision and Neurodevelopment**

Elisa Fazzi, Brescia

10.15

**Development of the Neonatal Visual  
Assessment**

Eugenio Mercuri, Rome

10.45

**The Neonatal Visual Assessment**

Daniela Ricci, Rome

11.30

**Break**

11.45

**Visual Function in Low Risk Preterms**

Domenico Marco Romeo, Rome

ore 12.30

**Discussion and videos**

Daniela Ricci, Rome  
Domenico Marco Romeo, Rome

13.15

**Lunch break**

**2<sup>nd</sup> Session**

***Neonates at Risk for Visual Problems***

14.15

**Neonatal Ocular Pathologies**

Lorenzo Orazi, Rome

15.00

**Neuroimaging in Term Neonates at  
High Risk**

Luca Ramenghi, Genoa

15.30

**Neuroimaging in Preterm Neonates  
at High Risk**

Monica Fumagalli, Milan

16.00

**Break**

16.15

**Visual Function in Term and Preterm  
Neonates at risk of CVI**

Andrea Rossi, Brescia  
Jessica Galli, Brescia

17.15

**Discussion and videos**

Daniela Ricci, Rome  
Domenico Marco Romeo, Rome

18.00

**End of the day**

February 24<sup>th</sup>, 2024

**3<sup>rd</sup> Session**

**Early Diagnosis and Follow-up**

9.00

**Visual Function in Term and Preterm Neonates with Ocular Pathologies**

Daniela Ricci, Rome

Lorenzo Orazi, Rome

9.45

**The Visual Assessment in the Early Follow Up**

Sabrina Signorini, Pavia

Antonella Luparia, Pavia

10.30

**Break**

10.45

**Case presentation: experience from the NICU of the Italian Network**

ore 12.00

**Discussion and videos**

Daniela Ricci, Rome

Domenico Marco Romeo, Rome

13.00

**Lunch break**

**4<sup>th</sup> Session**

**Early Intervention**

14.00

**Early intervention in infants with brain damage: the role of vision**

Andrea Guzzetta, Calambrone (PI)

Ada Bancale, Calambrone (PI)

15.00

**Early intervention: case discussion**

Andrea Guzzetta, Calambrone (PI)

Ada Bancale, Calambrone (PI)

16.00

**Break**

16.15

**The neonatal visual assessment methodology in summary and videos**

Daniela Ricci, Rome

Domenico Marco Romeo, Rome

17.30

**Discussion and conclusions**

18.00

**End of the course**

## SPEAKERS

### **Bancale Ada**

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Calambrone (PI)  
Pisa University

### **Fazzi Elisa**

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### **Fumagalli Monica**

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### **Galli Jessica**

Department of Clinical and  
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Child and Adolescent  
Neuropsychiatric Unit  
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### **Guzzetta Andrea**

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### **Signorini Sabrina**

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occhi per crescere',  
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## ABSTRACT

### **The Mariani Foundation**

#### **Visual Network**

Daniela Ricci, Rome

This presentation will describe the Mariani Foundation Visual Network, presenting the individual centres that are part of it and the initial objectives of the group. The significance of a network composed of centres with different specificities and expertise and the importance of integrating different knowledge will be explained. The initial objective was to organize specific protocols for diagnosis, follow-up, and intervention depending on the aetiology of the deficit; to organize training sessions to share expertise on early assessment with centres dealing with children at risk of CVI but lacking experience in assessing visual function; to create common databases so that data can be shared; and to correlate the developmental pattern of different aspects of visual function with different patterns of brain injury. The first results obtained in terms of organizing the assessment and diagnosis protocol will be described. Finally, the motivation and the way in which the Visual Network included training among its goals, not only of the centres initially involved but also of other centres scattered throughout Italy, will be presented.

### **Vision and Neurodevelopment**

Elisa Fazzi, Brescia

The increased prevalence of visual disorders during development in the last decades and the consequential growth of new studies on the maturation and plasticity of visual system functioning have strongly modified both diagnostic and rehabilitation approaches to paediatric-related visual disorders.

This perspective not only involves ophthalmological aspects but neurodevelopmental ones as well and has led to an enlargement of knowledge about visual disorders during development with a focus on the newborn. Visual function plays an essential role in the neurodevelopment of a child. This is connected to perceptual-motor, neuro-cognitive and emotional development, and it is strongly influenced by environment and experience. The visual system, with its plasticity, is the preferred channel through which reality is analysed, and the first mental representations are largely based on visual experience. For this reason, early damage to the visual system can threaten the development of the first emotional and mental processes that allow infants to organize their experiences and develop different learning skills. At the same time, a congenital or acquired neurological disease can threaten the visual function at various levels (ocular, oculomotor, perceptual, and visuo-cognitive) with consequences on other adaptive functions. An accurate assessment of signs and symptoms connected to a visual dysfunction can improve our accuracy with important goals on diagnostic precision and rehabilitation objectives. Following the lessons of Oliver Braddick and Jan Atkinson, the presentation underlines the role of vision which is therefore crucial for neurodevelopmental disorders and for a tailored early intervention.



## **The Neonatal Visual Assessment**

Daniela Ricci, Rome

Typical development and description of individual items. The battery of the visual assessment neonatal published by Ricci D et al (2008) will be presented. Each of the 9 items provided will be analysed. Participants will have at their disposal the image of the proposed targets that they can download from the course website and also use during the course. They will also have at their disposal the examination evaluation protocol and the bibliography describing the construction of the material and the reference data for both the term newborn and the premature. It will be explained how to perform the exam, starting from the position of the child, the lighting of the visiting room, the type of target to use, the mode of proposal of the target. For each item we will also discuss every possible type of response of the child, highlighting the differences in order to make the score expressed by the examiner and the participants homogeneous. The session will be interactive, with a request to the participants to assign the score to the teacher's proposals. Proposing photos and videos for the different possible answers for each item.

## **Neonatal Ocular Pathologies**

Lorenzo Orazi, Rome

The main ophthalmic pathologies of the early age of life will be discussed, with special emphasis on those that threaten early neurodevelopment and are the subject of possible surgical and/or rehabilitative treatment: congenital cataracts, retinopathy of prematurity, congenital glaucoma, retinal dystrophies, congenital anterior and posterior segment alterations (aniridia, chorioretinal colobomas). Oncologic pathologies: retinoblastomas. Examination of the red reflex should be universal at birth (will be briefly illustrated). New methods of diagnosis and surgery make it possible to detect and treat clinical pictures previously considered inauspicious for vision. Clinical pictures and brief examples of ophthalmic follow-up will be presented to illustrate the ophthalmologist's working methodology at a paediatric low vision centre and the importance of early optical correction in severe refractive deficits.

## **Neuroimaging in Term Neonates at High Risk**

Luca Ramenghi, Genoa

One of the problems is the definition of high risk, especially in term neonates. The enigma can be partially solved by identifying encephalopathic neonates, a group of newborns not always easy to be categorized as the definition outside convulsions can be pretty equivocal, with hypotonia, difficulty in breathing and nutritional suction especially if we focus on 35-week-old babies, potentially included in such definition. Ultrasound, for sure, is playing an important role but in our opinion, MRI has to be offered to these babies as quite few pathologies can be identified with specific diagnosis (i.e. perinatal arterial stroke, haemorrhages, malformations etc.). In certain cases, specific diseases have to be suddenly excluded like when a thalamic and intraventricular haemorrhage appears at ultrasound as they are almost pathognomonic of cerebral sinus venous thrombosis, an undervalued condition amenable to treatment. The lecture will focus on these aspects.

## **Neuroimaging in Preterm Neonates at High Risk**

Monica Fumagalli, Milan

Acquired perinatal brain injuries in prematurely born infants are a leading cause of lifelong disability with social, emotional, and financial implications, and still represent a challenge for neonatologists as no therapeutic options have been implemented into clinical practice. Injuries to the preterm brain include overt focal brain lesions (germinal matrix-intraventricular hemorrhage, GMH-IVH; cystic periventricular leukomalacia, cPVL; cerebellar hemorrhage) as well as diffuse white and grey matter damage which underlie a spectrum of connectivity impairments. Even in the absence of overt brain lesions, preterm birth has been associated with alterations in brain development (dysmaturation) including atypical development of cortical, white, and deep grey matter structures (impaired cortical folding, alteration in white matter microstructure, disturbances in regional brain growth) and dysconnectivity of neural networks that may contribute to the neural basis of subsequent adverse neurodevelopmental outcome.

Neuroimaging plays a key role in the early identification of infants at high risk of neurodevelopmental impairment. Cranial ultrasound (cUS) is the most widely used neuroimaging technique to study the preterm brain and it can reliably detect brain lesions associated with unfavourable neurodevelopment (high grade GMH-IVH, cPVL, large cerebellar hemorrhage) but it has poor predictability for diffuse signal abnormalities, low-grade IVH, and smaller cerebellar hemorrhages. Magnetic resonance imaging (MRI) at term equivalent age is now widely used to support cUS in the detection of prematurity-related brain lesions and alterations in brain maturation and growth. However, brain MRI at term equivalent age has shown a high predictive value for motor impairment but its predictive value for neurocognitive and behavioural impairments is still limited.

## **Visual Function in Term and Preterm Neonates at risk of CVI**

Andrea Rossi, Brescia

Jessica Galli, Brescia

Cerebral visual impairment (CVI) is now mostly defined as a verifiable visual dysfunction which cannot be attributed to disorders of the anterior visual pathways or any potentially co-occurring ocular impairment (Sakki, 2018). CVI is one of the leading causes of childhood visual impairment, particularly in preterms infants with brain damage due to the improvement of survival rates of newborns at risk and the upgrading of diagnostic tools (clinical, neuropsychological and instrumental). Assessing visual function in newborns, especially those at high risk for visual deficits, is a crucial aspect of pediatric healthcare. More recently, the feasibility of testing early visual function has increased considerably, and several authors have developed methods for the examination of visual function in neonates. Increasing attention to these issues could lead to the eventual development of a visual screening protocol suited for newborns in the neonatal and intensive care unit. This is of particular importance given current evidence suggesting that the monitoring of visual function during the early stages of development may be helpful in following the maturation of the central nervous system and its potential reorganization as a result of brain damage (Atkinson et al., 2008). This evaluation is important because prompt detection of visual problems can lead to early intervention. Early visual training (along with environmental adaptations and high social engagement) can improve vision-related performance and specific aspects of neurological development outcomes in infants with visual impairment (Fazzi E., 2021).

## **Visual Function in Term and Preterm Neonates with Ocular Pathologies**

Daniela Ricci, Rome

Lorenzo Orazi, Rome

This lecture will examine the presence of eye disorders in the neonatal period. Very little is known about early visual abilities in these situations. In most cases, these disorders are managed by ophthalmologists to initiate the diagnostic pathway and the type of follow-up to be carried out. The same ophthalmologist decides whether it is necessary to initiate the genetic study of the situation. Some of these conditions, such as cataracts, congenital glaucoma, some eye malformations, and retinoblastoma, require surgical correction within a few weeks of birth.

Particularly in the case of infants born at term, the child is rarely subjected to an early assessment of visual function, so eye surgery is often considered decisive. Information on visual capacity is mainly derived from assessment at an early age after neonatal period. In the prematurely born child, more information is already available in the neonatal period, both because of the higher risk of retinopathy in the premature infant and because a neurological assessment is more often performed, which includes at least the exploration of cranial nerves, including through fixation and pursuit elicitation.

Examples from our case history and from the literature will be presented.

## **The Visual Assessment in the Early Follow Up**

Sabrina Signorini, Pavia  
Antonella Luparia, Pavia

Vision plays a pivotal role in a child development. Visual Impairment may affect both a child's neuro- and visual function development in every of its component (perception-"to see"; oculomotion-"to look"; visuo-cognition-"to understand") and multisensory integration. When visual impairment is associated with other neurological issues, it becomes challenging to determine the extent to which a child's developmental characteristics are due to these associated disorders rather than to vision impairment. Over the past 20 years, changes in the landscape and pathogenesis of visual deficits in developmental age have prompted reflections and modifications in diagnostic and rehabilitative approaches to these patients.

We have witnessed a progressive reduction in isolated visual deficits secondary to ocular causes (congenital or acquired) and an increase in visual deficits associated with neurological pathologies of various degrees. Specifically, Cerebral Visual Impairment (CVI), resulting from damage or malfunctioning of retrochiasmatic visual pathways (optic radiations, occipital cortex, visual associative areas), is the most frequent cause of visual impairment in paediatric age in Western countries. Early recognition of a possible visual disorder and characterizing it in its different components, as well as intervening as promptly as possible to reduce any interference in the various areas of development, are essential prerequisites for supporting the growth and development of children with visual disorders.

Moreover, creating a network among healthcare professionals (multi and interdisciplinary), family, and school in the perspective of an integrated approach (multidimensionality) is crucial, in order to improve their quality of life, as everyday experiences support and amplify the value of what is done in rehabilitative contexts.

Considering these aspects, paediatric Visual Impairment requires a multi- and interdisciplinary approach involving various professional figures from the child neuropsychiatric and ophthalmological areas. Defining the nature and characteristics of visual deficit is crucial for diagnosis and intervention. Quantitative evaluation of visual function is essential as a guiding tool, also with the additional role of verifying functional changes in the visual picture, highlighting the effectiveness of treatment. A thorough assessment of visual functions necessarily depends on the context and the child's participation. It requires more hours to verify the reproducibility of responses and must take into account factors such as the subject's age, level of development, type of pathology, and individual characteristics. An early neuro-ophthalmological diagnosis, which also takes into account functional aspects, and timely and as effective as possible treatment are therefore indispensable prerequisites to prevent repercussions on the overall development of children with visual deficits. An early visual rehabilitation is of primary importance, both to maximize the plasticity of the central nervous system in the early stages of life and to prevent interference of visual disability with the overall development of the child.

## **Early intervention in infants with brain damage: the role of vision**

Andrea Guzzetta, Calambrone (PI)

Ada Bancale, Calambrone (PI)

Visual impairment in children with CP is very common and can have a huge impact on neurodevelopment. Neurodevelopmental outcomes are highly dependent on the infant's experience and interaction with the environment, especially their parents/caregivers. The ability to visualize the social and physical environment, including caregivers, is essential to infant development, as it provides input and, often, context for the integration of all sensory channels so that the infant can make sense of their world.

In spite of the high prevalence of CVI and a consensus on the need for early detection and intervention, the role of vision difficulties in the context of rehabilitation is under-recognised, under-treated and under-studied. In infants with severe vision impairment, developmental therapy services need to be utilized more effectively to include vision-aware strategies to improve infant development. We will present empirical studies of interventions that combine vision-awareness with vision stimulation coupled with active motor training within a family-centred approach as well as the preliminary results of a randomized controlled trial, the VISIBLE study, aiming at testing early vision-aware intervention in infants at high risk.

## Participant information

The course will take place in synchronous mode (Italian time zone): participation in remote training sessions via a dedicated multimedia platform (webinar), accessible live via an internet connection.

Synchronous participation provides for the connection of the trainees at the pre-established times of the training programme and guarantees interaction between lecturers and trainees. Particularly, the synchronous mode of use is enhanced by the interactive part, with the alternation of theoretical lectures and discussions and exercises with videos.

*Anyway the recording will be made available for 2 weeks after the end.*

**For privacy reasons, please note that it is strictly forbidden to record the course in both video and audio modes. It is also illegal to reproduce the course as it is the property of the Mariani Foundation.**

## Registration and certificate of attendance

We remind you that the enrolment includes:

- participation in the Course sessions
- the educational material
- the certificate of attendance and the payment receipt which will be available in electronic format in your account on the website

[www.fondazione-mariani.org](http://www.fondazione-mariani.org)

## Program changes

The Mariani Foundation reserves the right to modify the program for scientific and/or organizational needs.

## For Italian participants only

### Training objective

Application of the principles and procedures of evidence based practice (ebm - ebn - ebp) in daily practice.

### ECM - Continuing Medical Education

The course has been accredited for: Doctors, Psychologists, Psychotherapists, Neuro and Developmental Age Psychomotricity Therapists, Occupational Therapists, Physiotherapists, Speech Therapists, Orthoptists and Ophthalmology Assistants and entitles to 22.5 credits.

Please note that in order to obtain the credits, the course must be attended in synchronous mode and the presence of the learners will be recorded through the recording of the lectures.

It is mandatory to certify attendance at 90% of the sessions and to complete the ECM learning test, which will be administered online and must be completed in the 3 days following the end of the course (25, 26, 27 February 2024). Each participant will have 5 attempts with double randomisation (after each attempt the order of submission will be automatically changed).

To obtain credits, the outcome of the ECM questionnaire must be above 75%.



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