

Module III.8

Cerebral palsy

Dr. Elvira Mercado Val
University of Burgos

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Cerebral palsy

1.1. Concept of cerebral palsy

1.1.1. Types of cerebral palsy

1.1.2. Complications of cerebral palsy

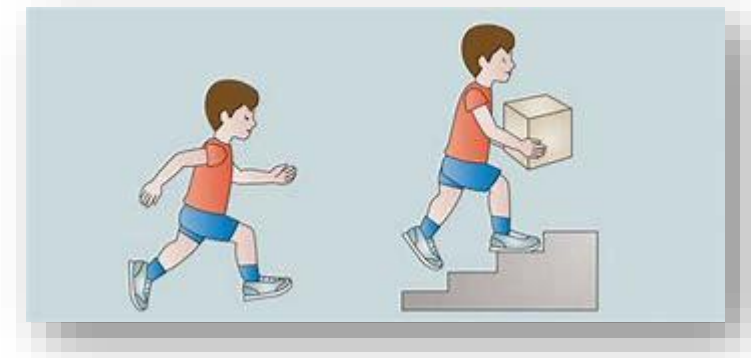
1.1.3 Functional assessment of the child with cerebral palsy

1.1.4 Multidisciplinary approach in the treatment of the child with cerebral palsy

Cerebral palsy

1.1. Concept of Cerebral Palsy

ICP encompasses a heterogeneous group of syndromes **involving persistent motor dysfunction** affecting **muscle tone, movement and posture**, due to a **lesion in the developing brain**. Although it is a non-progressive disorder, its clinical expression varies with the age of the child and the occurrence of various comorbidities that may condition quality of life even more than neurological disorders (Bax et al, 2003).



Cerebral palsy

1.1 Concept of cerebral palsy:

Cerebral palsy in children is attributed to disorders that occurred in the developing brain and are diagnosed during the first 4-5 years of life. It is therefore the result of a brain disorder whose origin is multifactorial (Peláez-Cantero et al, 2021).

CP can occur in the prenatal, perinatal and postnatal stages, notably (Carrillo et al, 2018).

- Presence of hypoxic-ischaemic lesions
- Intraventricular and periventricular haemorrhage
- Early defects in neuronal migration
- Cerebrovascular malformations and infections of the central nervous system



Most common causes of cerebral palsy

| Stage of development | Developmental disorders |
|---|---|
| First trimester | Malformations: proliferation, cell migration, synaptic organisation |
| Second/third trimester/prematurity | White matter damage, intraventricular haemorrhage, cerebellar damage, perinatal infarction. |
| Brain damage in the newborn | Hypoxic-ischaemic encephalopathy, Perinatal infarction, Metabolic disease |
| Postnatal period | Trauma, infections, metabolic disease. |

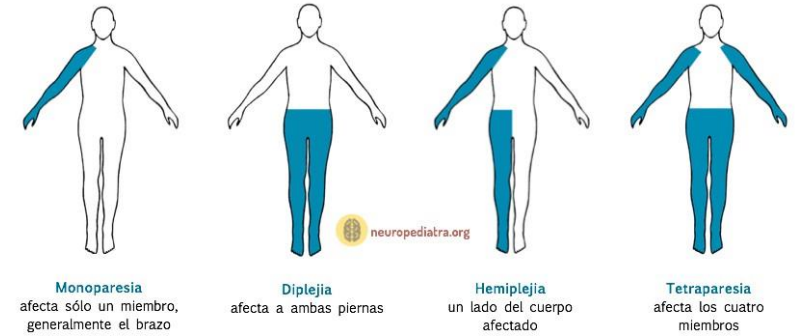
Types of cerebral palsy

1.2 Types of cerebral palsy.

1.2.1 Spastic cerebral palsy

The lesion occurs in the **motor cortex or in the pyramidal bundle**. Increased muscle tone of greater or lesser intensity is observed, with a decrease in voluntary movement. There is a predominance of flexor or extensor muscle groups resulting in shortening and deformities (Carrillo de Albornoz et al, 2018).

This type of paralysis can occur unilaterally or bilaterally, where muscle tone in both upper and lower limbs is increased.

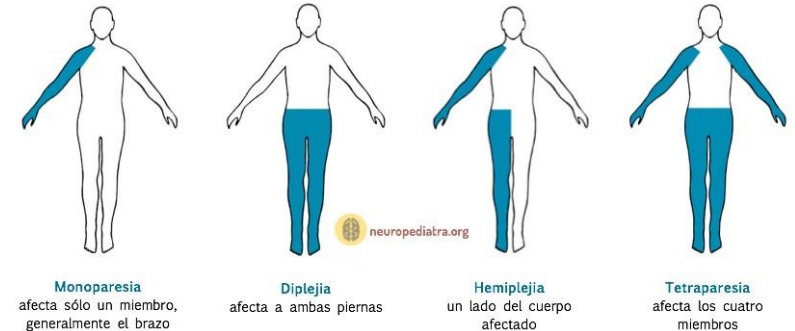


Types of cerebral palsy

1.2 Types of cerebral palsy

1.2.2. Dyskinetic or dystonic cerebral palsy

Arises as a consequence of damage to the **basal ganglia or the extrapyramidal bundle**. Involuntary movements and sudden changes in tone appear. Discharge the presence of hypokinesia and hypertonia being the dystonic type of paralysis and where hyperkinesia and hypotonia predominate, it is considered choreoatheto-aethetotic or dyskinetic paralysis.

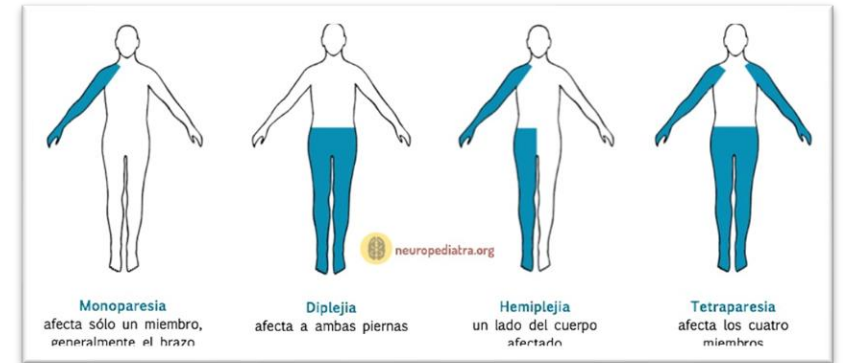


Types of cerebral palsy

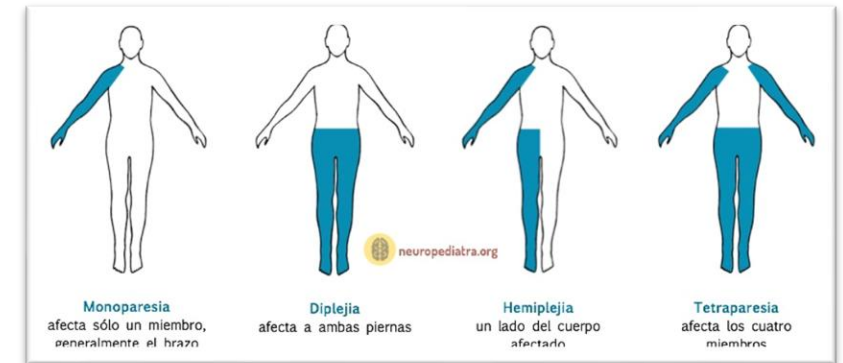
1.2 Types of cerebral palsy

1.2.3. Ataxic cerebral palsy:

This is caused by **damage to the cerebellum**. Characterised by hypotonia, incoordination and impaired balance.



Types of cerebral palsy



1.2 Types of cerebral palsy

Considering the **anatomical distribution of the motor impairment**, CP is classified into diplegia (impairment of movement of all four limbs, but with greater involvement of the lower limbs), hemiplegia (involvement of the upper and lower limbs on the same side) and quadriplegia (involvement of all four limbs).

Cerebral palsy

1.1.2 Associated problems in cerebral palsy:

Children with cerebral palsy require, in most cases, a multidisciplinary approach to treat the problems associated with this motor pathology, so it is common to find associated problems such as:

Neurological problems

Digestive problems

Spasticity

Pain

Sleep problems

Intellectual disability

Speech and language disorders

Hearing problems Sialorrhoea

Visual problems

Neuropsychiatric problems

Bone health problems

Orthopaedic problems Orthopaedic

problems Oral problems

Urologic problems



Associated problems in cerebral palsy

Neurological problems:

Epilepsy is more frequently present in children with pathological neuroimaging findings and greater motor impairment. An EEG can be useful to establish neurophysiological parameters compatible with the presence of a seizure of epileptic origin.

Intellectual disability:

40-70% of children with spastic and quadriplegic paralysis have intellectual disability and to a lesser extent with dyskinetic and hemiplegic paralysis. It is also associated with the presence of epilepsy and pathological neuroimaging.

Language disorders:

The most common language disorders in CP are dysarthria (in 40%) followed by 25% showing absence of verbal language. They may also present difficulties in other areas of communication, such as the development of gestures and facial expression, acquisition of comprehensive, expressive language and voice production.

Associated problems in cerebral palsy

Hearing problems:

In infants with CP, neonatal screening should consist of otoacoustic emissions and auditory evoked potentials, warning signs can range from poor response to auditory stimuli, abnormal behavioural responses and impaired language development.

Sialorrhoea:

Found in 10% and 58% of children with CLI, so it is important to quantify the frequency, severity and impact on the quality of life of children and their caregivers.

Neuropsychiatric problems:

Present in more than 50% of children with CP, the most frequent being emotional disorders, behavioural and social interaction problems, presence of hyperactivity and attention deficit, which, added to all the problems present, aggravate the school and adaptive problems. of these children.

Associated problems in cerebral palsy

Spasticity:

Occurs in 85% of children with CP and causes functional problems in ADLs (walking, feeding, dressing and hygiene). This disorder usually causes muscle pain, spasms and dystonic postures.

Orthopaedic problems:

Largely caused by spasticity, leading to fixed muscle contractures causing osteoarticular deformities (including thumb, wrist and elbow flexion, scoliosis, hip displacement/luxation, clubfoot, which worsen the child's clinical situation, requiring in certain cases, a surgical approach.

Digestive problems:

Present in 80-90% of cases related to nutrition and growth and the presence of dysphagia, gastrointestinal reflux and constipation.

Associated problems in cerebral palsy

Bone health problems:

These children are at risk for low bone density and osteoporosis. Pathological fractures are present in up to 20% of children with CP and most frequently affect the distal femur. Recognition is important as most cases are asymptomatic (80% of vertebral fractures).

Oral health problems:

Children with CP have more frequent caries, malocclusions and periodontal disease (90%).

Respiratory problems:

One of the main causes of morbidity and mortality in children affected by CP. Respiratory symptoms vary with the age of the child, with infants presenting with feeding difficulties, aspiration or apparent life-threatening episode, persistent cough, noisy breathing and recurrent respiratory infections being more common. There is also a risk of sleep apnoea-hypopnoea syndrome.

Associated problems in cerebral palsy

Visual problems:

Between 40-75% of children have some form of visual impairment, nystagmus, absence of reflex visual response, aimless eye movements and visual inattention and curiosity may occur.

Urological problems:

60% of these children have voiding dysfunction, enuresis, urinary urgency, incontinence or neurogenic bladder. Warning signs are continual dribble incontinence, the need for abdominal pressure to start urination or weak urinary flow or polydipsia.

Sleep disorders:

Present in 25% of children with CP. The main sleep disorders are difficulty initiating and maintaining night-time sleep, difficult morning awakening, nightmares and sleep anxiety.

Associated problems in cerebral palsy

Pain:

Most common symptom in cerebral palsy in children, the most frequent mechanisms generating pain include both nociceptive pain: somatic (spasticity, hip subluxation, fracture, etc.) and visceral pain (constipation, GER, gastric ulcer), neuropathic pain and pain secondary to treatments: physiotherapy, botulinum toxin infiltration.

Functional assessment in cerebral palsy

To assess the functional capacity and degree of dependency of children with CP, there are currently five scales that assess motor, manual function, communication, feeding and visual aspects.

Functional assessment scales and degree of disability in CP:

- Gross Motor Function Classification System (GMFCS) (Palisano et al, 1997)
- Manual Ability Classification System (MACS) (Eliasson et al, 2006)
- Eating and Drinking Ability Classification System (EDACS) (Sellers et al, 2013)
- Communication Function Classification System (CFCS) (Hidecker et al, 2011)
- Visual Function Classification System for Children with Cerebral Palsy (VFCS) (Baranello et al, 2020)

Gross Motor Function Rating System (Palisano et al, 1997)

It is currently the most widely used system for classifying motor severity.

It establishes five levels of severity and allows to assess the natural evolution of cerebral palsy which is different at different levels of involvement and also to assess the usefulness of treatments.

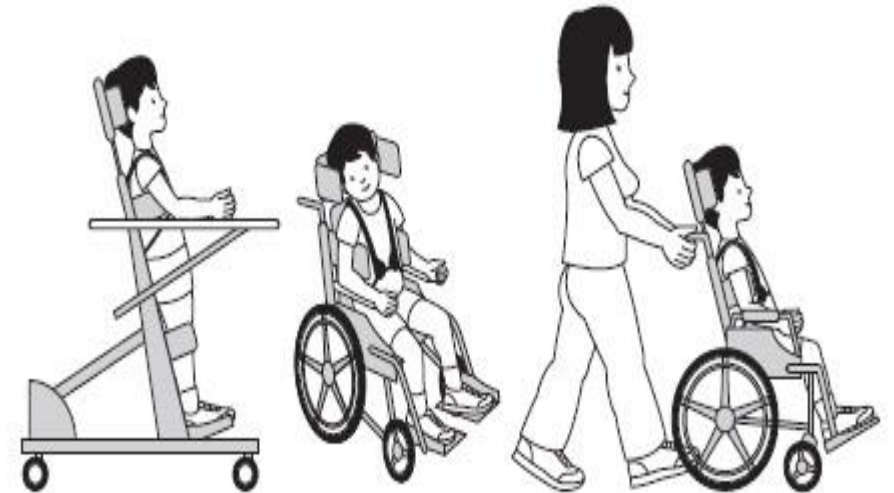
Level I: Unrestricted walking.

Level II: Walking without aids, but with spatial limitations.

Level III: Walking with support or orthoses.

Level IV: Fairly limited independent mobility.



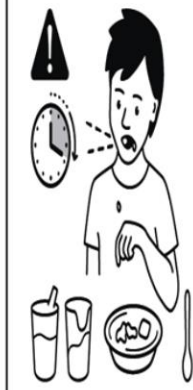


Level V: Totally dependent for movement.



Eating and Drinking Ability Classification System

- Classifies and describes the ways in which people with CP eat and drink.
- Five levels of skills that assess the functional activities of eating, sucking, biting, chewing, as well as adaptation of food consistencies, feeding route and level of independence.
- **Feeding safety and efficiency.**
- Safety as the risk of choking and bronchial aspiration associated with eating and drinking.
- Efficiency as the time and effort required for feeding (how long it takes the child to eat).

Eating and Drinking Ability Classification System from 3 years: descriptors and illustrations

| | | | | |
|---|--|--|---|--|
|  |  |  |  |  |
| <p>Level I Eats and drinks safely and efficiently.</p> | <p>Level II Eats and drinks safely but with some limitations to efficiency.</p> | <p>Level III Eats and drinks with some limitations to safety; there may be limitations to efficiency.</p> | <p>Level IV Eats and drinks with significant limitations to safety.</p> | <p>Level V Unable to eat or drink safely – tube feeding may be considered to provide nutrition.</p> |

Sellers, D., Mandy, A., Pennington, L., Hankins, M. and Morris, C. (2014), Development and reliability of a system to classify the eating and drinking ability of people with cerebral palsy. *Dev Med Child Neurol*, 56: 245-251. <https://doi.org/10.1111/dmcn.12352>

Illustrations © Jane Coffey

MACS

- **It describes how children with cerebral palsy (CP) use their hands to manipulate objects in everyday activities.**
- This system describes five levels of manual dexterity.
- The levels are based on the child's ability to self-initiate the ability to manipulate objects and their need for assistance or adaptation to perform manual activities in daily life.

CFCS

- **It assesses the child's performance in everyday communication.**
- It focuses on the levels of activity and participation described in the World Health Organisation's (WHO) International Classification of Disability and Health Functioning (ICF).
- **It establishes five levels of communicative effectiveness.**
- The CFCS is analogous and complementary to the Gross Motor Function Classification System (GMFCS-ER), the Manual Ability Classification System (MACS) and the Eating and Drinking Ability Classification System (EDACS).

Visual Function Classification System (VFCS)

It allows to classify in **five levels** the visual abilities of these children and how these abilities are used by these children in their daily life...

Visual Function Classification System (VFCS)

I. Uses visual function easily and satisfactorily in vision-related activities.

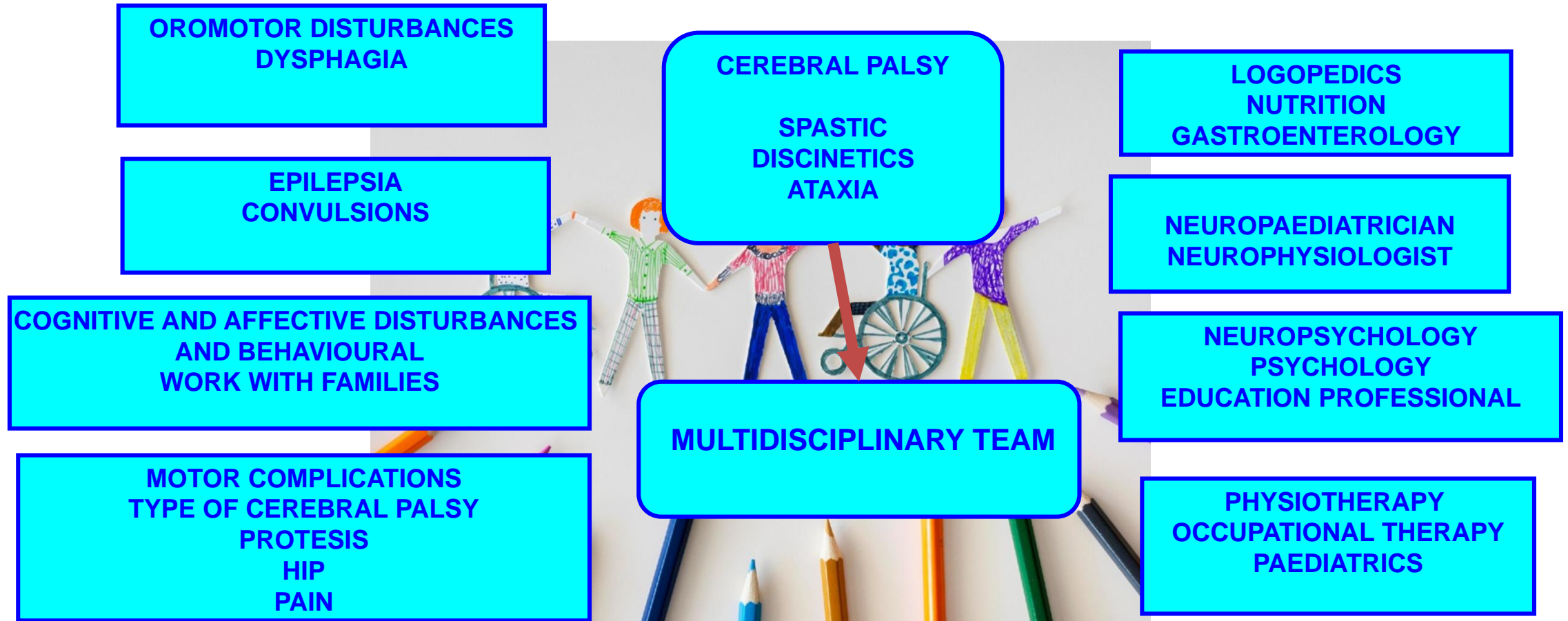
II. Uses visual function satisfactorily but needs self-initiated compensatory strategies in most vision-related activities.

III. Uses function but needs adaptations in most vision-related activities.

IV. Uses visual function inconsistently even in adapted environments.

V. Does not use the visual function even in adapted environments.

Multidisciplinary approach to cerebral palsy



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Images

Image 1 <https://cparf.org/what-is-cerebral-palsy/severity-of-cerebral-palsy/gross-motor-function-classification-system-gmfcs/>

Image 2 <http://colmedrc.org/6-de-octubre-dia-mundial-de-la-paralisis-cerebral/>

Image 3 <https://neuropediatra.org/2015/03/04/tipos-de-paralisis-cerebral-infantil/>

Image 4 <https://neuropediatra.org/2015/03/04/tipos-de-paralisis-cerebral-infantil/>

Image 5 <https://neuropediatra.org/2015/03/04/tipos-de-paralisis-cerebral-infantil/>

Image 6 <https://www.ausacpdm.org.au/updated-gmfcs-descriptors-illustrations/>

Image 7 <https://sussexcommunity.nhs.uk>

Image 8 https://www.macs.nu/files/MACS_Spanish.pdf

Image 9 http://cfcs.us/wp-content/uploads/2018/11/CFCS_Spanish_2012_02_09.pdf

Image 10 <https://www.fundacioninstitutosanjose.com/blog/el-abordaje-de-la-paralisis-cerebral-desde-la-fisioterapia-y-la-terapia-ocupacional/>



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Author: Dr. Elvira Mercado Val
Area of Personality, Evaluation and Psychological Treatment (PETRA)
Faculty of Health Sciences
University of Burgos



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