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INDEX

Summary

Child neuropsychology is a scientific discipline that studies the development of the nervous system to discover what happens in the child's brain and then relate brain dysfunctions and emotional and cognitive difficulties that may develop during childhood and adolescence, up to the age of 18.

Thanks to Neurology the field of Neuroscience in the psychological area has been very well received, which has been given for being essential to approach the Nervous System as an important element in the learning processes, behavior, emotions, feelings, thoughts and even in social relations; However, when did psychology emerge? At what point did neuropsychology emerge? How has it helped today?

Keywords: Pediatrics, Psychology, Learning, Training, Clinical Psychology

CHAPTER 1:
INTRODUCTION TO THE Neuropsychology

Brief review of neurology

The field of medical sciences is one of the oldest in human history, which allows us to count on various findings for what would later be the specialties in this science. Consequently, neurology shares this historicity to the point that from making mere observations on individuals progressively began to intervene in neurological diseases and disorders involving the nervous system.

The civilizations of yesteryear carried out their own interventions for the evils of the time, an example of this being the operations for head traumas that were carried out by the Egyptians in ancient times. Findings were also found on body functions and how these are affected by cervical problems or brain lesions; intracranial pulsations; stories about meninges and the existence of cerebrospinal fluid. On the other hand, paraplegia was a condition

raised by the Sumerians and although it was attributed to epilepsy a divine etiology was Hippocrates who years later would propose that its origin would be more of an organic type. At the same time it was the Greeks who began to study the physiognomy of the brain by dissecting it; and, the description on brain, meninges and cerebellum is due to Aristotle.

There are traces that the archaic Greeks tended to attribute that reason had a link with brain functions thanks to Pythagoras and his son Alcmeon, who according to records is the first anatomist, by dissecting brains knew parts of it as optical nerves. Then Plato proposed that the higher cognitive functions of the human being were linked to the head; since, for him a "soul" takes place in this and is going to be limited of the different components of the body due to the division that creates the neck, this approach lays the foundations for the neuroanatomy of the brain. Aristotle to be a disciple of Plato mentioned that the bodily experiences created the thoughts, This means that what was perceived with the senses impelled to have certain ideas of the nature surrounding the subject and at the same time mentioned that the reasonable and sensitive impulses of man give him will and free will.

Hippocrates, father of medicine, already gave further indications of neurophysiological functions of the brain by mentioning that the "phlegm" of the organs was transformed by the brain and this converted it into a kind of precipitation for the body, This gives us a clue as to what the nerves and the ventricular system would be, and that diseases have their genesis in the brain. More other Greek characters gave their contributions to the neurological area as Anaxagoras who discovered the central organs of the sensory and peripheral; and later his disciple Empédocles the cochlea which is an important part of the ear; On the other hand, the use of the terms pía and duramadre for the membranes of the brain is due to Democritus.

After highlighting the main characters of archaic Greece, it is essential to mention others who increasingly complemented the work carried out; therefore, it must be recounted about Herofilo of Alexandria who detailed on the venous sinuses, the choroids, the fourth

ventricle, the calamus iscriptorius also perform a differentiation between sensory and motor nerves. Erasistrato, being from the same place, wrote about the auditory and optical nerves as well as the convolutions of the brain. Celsus who described with great care about the cynical spasm, apoplexy, prosopalgy, migraine and morbus comitialis or epilepsy, disorder that causes convulsions and sometimes loss of lucidity. However, Aretaeus of Cappadocia was the first to make a distinction between nervous diseases and mental disorders; he continued to carry out studies on epilepsy, apoplexy, paresis; among others.

In Rome they continued with dissections, but using animals such as the monkey and these procedures performed by Galen was that emerged the importance of recurrent laryngeal nerves which send sensory and motor impulses, These stem from the vagus nerve then enter into the larynx and below the mucosa attach to what we call vocal cords. By accidentally cutting these nerves in a vivisection, it was found that the tied animal was still moving but not making any noise.

The classical period in the accounts of Neurology culminated with Galen in the X and XIII centuries the precursor of surgical methods separating them from clinical was the Institute of Medicine in Salerno, also French in collaboration with Vorignano de Boloña and Constantino Africano managed to give traces on wounds in the cerebellum and skull fractures. Some of the Greco - Roman beliefs remained valid until the 16th century and in the next century some doctors went from dualism as a support that the life of man itself has manifestations of the soul he possesses.

The Renaissance era meant great advances for Neurology by taking the anatomy of the brain as a primary study to gradually understand reason, mind and soul, it was with Leonardo Da Vinci because he created molds of the ventricular cavities and cross sections; more Vesalio his disciple in his notes could detail anatomically that the fluids of the pituitary extend to the cavity of the nose, all this was made possible by galenic influences.

Once reported about the advances in Italian lands it is necessary to report that studies continued all over Europe thus arriving in Germany with Jorge Stalh, because starting from a Platonic dualism, putrefaction occurred because the soul separates from the body, itself, which is only necessary for a brief stage on earth. Also, this soul trying to regain its power in the body caused the disease and for this the treatment was based on making it recover from that supremacy soul - body.

The French philosopher and mathematician Rene Descartes aimed to make the mental have a validity as mathematics, for him the somatic was that product of an error in the reception of stimuli by means of the organs of the senses. The somatic was res extensa and the spiritual res cogitans the same being completely different could only be attached through the pineal gland.

In the Experimental Medicine we find Tomás Willis for his part detailed about six of the twelve cranial nerves and about the arterial ring that is found in the foundations of the brain, it reinforces Descartes' conception of man as a machine because it points to the nerves and reactions as an oscillation of forces to which the being is subject, but also noted that muscle contractions and involuntary functions such as breathing are carried out by the nerves; in this century Willis ended up writing about the brain as the center of thought and the cerebellum as the controller of non-voluntary mechanisms.

The apotegma of Valsava was verified by Giovanni Morgagni since the starting point to understand that hemiparalysis is that this lesion had a different place of origin than the stroke, this helped him to detail more precisely about the severity of brain lesions. In this century the Saturnine colic was described by Francois Citois; the lack of thiamine, vitamin B1, has as name beriberi turns out to be by Bonitus; minor chorea, the product of a complication with rheumatic fever, by Sydenham.

The period of medical individualism and formal theories by neuroanatomists is in the seventeenth century itself, in which Scarpa stands out,

outstanding disciple of Morgagni, and Sómmering since they proposed cardiac innervation, but clinically it is possible to list the following characters:

- Tuberculosis meningitis by Robert Whytt
- The discovery of cerebrospinal fluid and sciatica by Wrisberg
- The cerebrospinal fluid and sciatica by Cotugno
- The eponym by Meckel and Gasser
- The 7th by Wrisberg
- Sensitivity of the nervous system and contractibility in addition to muscle irritability by Albert Von Haller
- Bodies of an olive tree by Prochaska

From all these discoveries one must place a main emphasis on certain experiments and refutations that contributed to the dismantling of the belief of animism, concept which supports the endowment of soul to elements present in nature; after a trip through the archaic Greek - Roman period, this soul present in humans has functions linked to mind, reason, ideas, behavior or sensations; and this is precisely what changes in the seventeenth century since the father of Physiology in Modernity, Albert Von Haller, because he separates it from the branch of anatomy by taking sensitivity as an object to be experienced and related to muscle function; in this way Stahl's animism was ruled out. Subsequently, it was stated that the substances of the body are those which create that force to perform the functions of life. However, who despite attributing that the soul was sustenance of organic life in all its expressions took a step to be able to establish the links between the anatomophysiological was Whytt because by detailing on the experiments in what is action - reflection, the quadrigeminous tubercles with the constriction of the reflex of the pupils and the shock of the spinal cord contributed to consider that certain parts of the nervous system is linked with different clinical pictures as those described above.

Experimenting with animals is a fact within the sciences because these approaches to a living system give references of how could work that of a human being; therefore, when Lorry conducted tests on dogs and cats of sub-occipital puncture and in the

lower part of the back culminating with the importance of the spinal cord or also called medulla oblonga, final part of the brainstem. In addition to these findings we can with the following:

- The motor cortex or psychomotor of the cortex is nothing less than the area where movements are generated voluntarily, an injury is serious and can generate various pathologies including paralysis. We have this information and more about this area because Porfour de Petit emphasized the importance of its functions.
- Sauvage ended up detailing about uterine epilepsy a disease caused by altered brain activity
- Percival Pott, a surgeon from Great Britain, for his part investigated the vertebral caries that affects the vertebrae of the lower back.
- Prosopalgia or trigeminal neuralgia, on the other hand, meant an important pathology to describe for Fotihergill as an unbearable pain for those who suffer it.

If we continue with a timeline, we can find that during the eighteenth and nineteenth century there is a clinically neurological aura and for this reason both the contributors and their studies are highlighted in the following table.

Neurologic clinical area drivers	
18th century	
Name	**Contribution**
Saucerote, Lassone y Molinelli	Studies on contralateral innervation.
Charles Bell	In the lateral area of the oblong medulla is the point where breathing is largely controlled.
Franz Gall	He founded phrenology.
Johann Reil	It is who gives name to what we call the insula.
Marie Flourens	One of the founders of experimental neurobiology in addition to studying brain functions.
19th century	
Luiggi Rolando and Herman Weber	Detailed about the touch and its sensitivity.
Volta and Galvani	They encouraged experiments in the physiological and electrical field of brain functions.
Jan Purkinje	He described the cells that bear his name and are found in the cortex of the cerebellum.
Robert Remak	Details about amielinic fibers.
Rudolf Kölliker	Studies multi-polar cells that link to previous roots.
August Waller	He experimented with the distal segment by severing a nerve.

When it comes to the study of neural cells and how they relate to neurological diseases we have the following table:

Histological studies in neurology	
Name	**Contribution**
Gerlach, Weigert, Marchi, Goldi, Waldeyer, Ramón and Cajal	They are the creators of neural theory.
Arien Kappers	He is the originator of the theory on the phylogeny of neural cells.
Baptiste Bouillaud, Paul Broca, William Deltmond, Carl Wernicke, Joseph Dejerine, Pierre Marie, Giobanni Mingazzini, Constantin von Monakow, Hugo Liepmann y Arnold Pick	They ventured into the realm of aphasias which are disorders in language that cause problems for the individual to communicate correctly; on the other hand, they also studied the Brain pathologies that are unable to create movement in a coordinated way.
Salomon Henschen, Constantin von Ecónomo y Korbinian Brodmann.	His main contribution is from his cytological studies in different brain regions.

Even having all these contributions started from a point in the Jean Martin Charcot gives way to modern neurology, he together with his disciples managed to study nosological pathologies such as amyotrophy type sclerosis and plates in addition to hysteroepilepsy. From now on.

When we find in the contemporary era at the University of Iowa the professor of Neurology Antonio Damasio, he mentions that Descartes was wrong to propose that both in the development and the evolutionary review of a being the body arises before reason, mind or consciousness.

It was so much the separation that created between body and mind that published a book based on the refutation of the statements of René Descartes, but continued with neuropsychological proposals to explain the activity of the mind. It is only at this time that we can have greater clarity about brain activity because for centuries we started from the same conception, generalizing to the mind from spiritual and biological terms, which meant centuries of scientific delays in the study of it and it was only with Psychology and Philosophy that these topics were separated from the true purposes of Medicine.

Neurology and rehabilitation in the 20th century

Once made a journey in time with respect to Neurology a point to be treated separately is its advances in the twentieth century, the most prominent is that of incorporating rehabilitation as a means to improve the disorders that were identified after global disasters. Who stands out at the beginning of this century is Shepherd Ivory who studies the approaches of Catell and Wundt but focused on speech and language disorders, from him we can highlight the following:

Shepherd Ivory Franz	
Profession	American psychologist.
Studies	Brain plasticity, localization of mental functions and treatments for speech and language disorders.
Approach to work	Practice and re-education with resources that are of interest to the patient.
Principle of re-education (rehabilitation)	Treatment follows a slow process of constant effort to optimize mental processes.

Time after the First World War begins with which mental sequelae appear that need new treatments and make it possible to reduce or stop the ravages of malaise. The rehabilitation of these people in Germany, the United States and other countries of Europe is a priority to ensure that these individuals are able to continue with their lives and return to their jobs.

Around 1920, not only did people with their post-war problems but disabled people represented an extra burden for governments, more in previous centuries the assistance to these people was of assistance type but they begin to integrate nihilism in the treatments, position of rationality that denies everything that can reduce discomfort and improve health, and thus treat soldiers with neurological injuries with the same servility as previous periods but this turns out to be another problem when seeing these war veterans as people who only need charity because recovery is an impossible aspect to achieve.

The picture changes when a minority group of specialists whose perspective is that with the treatments that best fit to each case, the impacts of their deficits are reduced to a certain degree

of autonomy; and, therefore, the US creates hospitals where soldiers affected by neurological injuries achieve a better quality of life through neurosurgical services.

Other psychologists and neurologists help in the same way, although their resources were not organized in the best possible way; this was how it happened in Britain, but Germany had more success because Poppelreuter was the one who was in charge of the care centers at that time coming to improve visual, perceptual and spatial deficits, the same ones would be detailed in his work "The psychological damage caused by a shot in the head in war" and this in turn becomes the first writing of neuropsychology by rehabilitating with measures that managed that the limitations of the patient were not significant and in some cases the recovery was total allowing the individual to feel and be useful to society.

The Cologne institution and others forming the German care network were under the command of Sickinger, Goldstein and Isserlin but also came to follow that model in Austria with two institutions headed by Hartmann in Graz and one by Froeschels in Vienna. In this context it is important to highlight the work of Kurt Goldstein, neurologist, who showed interest in rehabilitative actions with the belief that each neurological injury causes a certain disorder and it is the reaction of the body itself which gives way to understanding the signs and symptoms.

Convergence between Neurology and Psychology

Thanks to Neurology the field of Neuroscience in the psychological area has been very well received, which has been given for being essential to approach the Nervous System as an important element in the learning processes, behavior, emotions, feelings, thoughts and even in social relations; However, when did psychology emerge? At what point did neuropsychology emerge? How has it helped today?

First, psychology shares certain illustrious figures in the history of medicine such as Plato, Aristotle, Hippocrates, Leonardo Da Vinci, Franz Gall; It was founded as a scientific discipline by the Leipzig laboratory in Germany in 1879, when the physiologist Wilhem Wundt tried to find the origin of the higher mental processes and showed how they would evolve in great strides in the 20th century. On the other hand, in order for Neuropsychology to become that link between Neurology and Psychology it must be emphasized that as all science has its history; Thus, it manages to have its first sketches in the XXI and XX century.

Alexander Luria comes to be the founder of this convergence being that his work was focused on taking the locations of the brain as responsible for pathologies such as aphasias; the existence of this discipline contributes to which observable and subjective situations have a basis or explanation with this the neurologist or psychologist can apply their techniques and diagnoses; for example, the neurologist applies a Magnetic Resonance (MRI) and notes that in the area of Broca there is a poor activity at the brain level this involves at the same time to mirror neurons, when giving a report to the psychologist will intervene so that the infant gradually managed to perform , depending on the degree of the spectrum, socialize, empathize or imitate behaviors.

Once posed that the Neurosciences link to two sciences of different object of study it is valid to question In what other or other aspects are you united? The answer to this is in Neuropsychology, a specialty that focuses on the signs and symptoms of disorders; as well as the cognitive functions and behaviors that are altered.

What will determine that neurological diseases, neurodevelopmental disorders, degenerative disorders, cranioencephalic trauma or other spectra are treated adequately is the neuropsychological evaluation with which the head professionals how from different areas will be able to intervene optimally to the infant.

Children's neuropsychology

In itself this new field is an extension of what would be applied to adult neuropsychology; with a view exclusively to this population with cognitive impairments. It was in the middle of the 20th century that the children's group became interested in understanding learning difficulties, but in order to achieve this he should not only rely on neurology or psychology, from the educational psychology branch, whose main object is development and learning.

In the 1960s, Kirk used the term "learning problems" to indicate developmental gaps in language, reading, arithmetic or writing due to emotional difficulties. Then the US government promotes a project focused on brain damage and in turn that the minimum damages would be according to a learning problem with a normal intelligence, the same, could have alterations at the level of mental processes such as language, attention, memory; among others.

For the members of that project, such a difficulty represented a discrepancy with motor, academic, psychological or sensory development which caused problems when carrying out school activities.

At the end of the 1970s, "specific learning problem" began to be used as a term for difficulties in literacy and mathematics; Other names for school problems such as dyscalculia, digraphy or dyslexia are also included. Neuropsychology in the early 80's begins to have a heyday in question of studies and publications in Spanish as well as English; so that the main contributions are:

- The application of neurological imaging techniques.
- Implementation of preventive projects.
- Implementation of courses on children's neuropsychology in various parts of the world.
- Proposals for a neuropsychological approach.
- Development of child development assessments.

It meant a lot that neuropsychological tests and programs can be developed different from those of the adult since they are populations divergent in terms of development, because there are essential neurological differences such as:

- The child's brain is predisposed to learn more because it is developing.
- Diagnosis in children is based on establishing a developed neurological pathology.
- The causes of ailments and disorders are different.
- Adult neurological conditions are often closely related. with degenerative diseases, cardiovascular disease or cranial trauma.
- The procedures are different because the child's brain has more plasticity than that of an adult.
- In neuropsychological assessments, the child's age is weighed against that of the adult.
- The values in the evaluations are different.
- The neurological techniques and instruments to be used with children should be more flexible according to the stage in which they are.

Children's neuropsychology itself is a new science that deals with both child development and the aftermath or effects of a pathology. In turn, it relies on techniques that allow a vision of the brain and have images of its functioning or affected areas, but has also meant understanding even more the phenomena that cause changes in cognitive processes, emotions and behaviors

CHAPTER 2:
MORE DISORDERS FREQUENT. PEDIATRIC EPILEPSY

Introduction

Epilepsy is one of the most prevalent and potentially disabling chronic childhood disorders. Pediatric epilepsy is generated in a wide spectrum of conditions that present clinical, electroencephalographic (EEG) properties and differentiated evolutions, with neuropsychological profiles increasingly better defined. It can not be considered as an easy expansion of what happens in adults, to understand the cognitive and/ or behavioral alterations comorbid with which it undergoes must take into account extra components, including differential etiologies, the damaging effects of prolonged seizures and antiepileptic treatments on a developing brain, as well as the function of useful cerebral plasticity in boys, which is not continuously adaptive.

Epilepsy passes in 1-2% of the pediatric population, usually a convenient crisis control is achieved with antiepileptic drugs (FAEs); However, about 25% of the children with epilepsy, despite a suitable pharmacological procedure, continue to present crises, being considered refractory epilepsies. Those cases with epilepsy in which an origin of the seizures is shown in a specific brain area have the possibility to benefit from surgical procedure. A fundamental number of boys have the possibility to have crises within specific epileptic syndromes, which will be described later in this chapter, describing the clinical and neuropsychological properties more properties of them.

The appearance and type of neuropsychological alterations in pediatric epilepsy remain conditioned by several components: the age of onset of crises and their frequency and severity, the distribution and persistence of electroencephalographic epileptiform discharges (EEG), the underlying disease, lateralization, location and expansion of the epileptogenic lesion, and the side effects of antiepileptic drugs. The predominance of all these components will be discussed later.

ROLE OF THE NEUROPSYCHOLOGIST

In epilepsy, clinical neuropsychology began by studying patients with seizures not controlled by antiepileptic drugs, called refractory or intractable epilepsies, with a fundamental role in the lateralization and location of the epileptic focus, with a prominent role in epilepsy surgery. Beyond the location of the focus epileptonego in someone with epilepsy, implanting a baseline of the neuropsychological profile can demonstrate the effect of various components, which will be checked in this chapter, underlying disease, side effects of anti-epileptic drugs... The relationship of various components, affects differently the nature and expansion of cognitive deficits associated with the epileptic process

The purpose of a neuropsychological assessment in epilepsy is determined by the reason for referral, which will also depend on points such as patient age, academic points and cognitive impairment. In a similar way, in any assessment that is made

need to check the patient's medical history, collect information from both family and student environment, do a clinical interview with parents, and the neuropsychological assessment itself. The aim is to obtain a profile of the cognitive strengths and weaknesses of various domains, in order to offer a response to the referral, as well as assist in the execution of an individualized procedure strategy.

Regarding the voting of tests to be used, the evaluation has to cover all cognitive domains, which would integrate: wisdom, attention-concentration, learning and memory, language, visospatial and visoperceptive capabilities, executive functionalities, motor skills and educational skills. Depending on the individual's age, the reason for referral, and the information collected in the clinical interview, evaluations may be more or less extensive, not forgetting that the effect of epilepsy on a developing brain may lead to the establishment of more extensive dysfunctional networks than would be expected in basic etiology functionality, it is always essential to emphasize that boys are not simply "small adults", so the behavior-brain collaborations applied to adults are often inappropriate for boys.

Functions and objectives are based on evidence-based neuropsychology. The main objectives of neuropsychological assessment are:

1) Benefit in the detection of neurological disorders.
2) Establish a baseline of the neuropsychological profile, to detect once there is danger of developmental, cognitive, academic and psychopathological inconveniences from the instant in which the first crisis is generated. The neuropsychological information it provides is an objective procedure to see behavioral and cognitive changes in patients at all times.
3) Monitor cognitive and behavioral changes during the pathology. The neuropsychological evaluation from the first moment in which the diagnosis is made, can go identifying those children at risk of having student problems, and guide probable interventions in this direction.

4) Diagnose psychopathological disorders and evaluate their effect on both cognition and adaptive capacity of the infant.
5) Evaluate adaptive management in neuropathology or psychopathology functionality and use this information to favor the educational approach.
6) Evaluate the likely adverse side effects, both cognitive and behavioral, derived from the procedure with antiepileptic drugs (FAEs), as well as the effectiveness of medical treatments

In patients who are candidates for epilepsy surgery, an important section of the preoperative evaluation is estimated:

1) Provides information about the dysfunctional area related to the lesion and/or epileptogenic focus. The "functional deficit zone" is defined by integrating data from various forms of research, EEG, structural and utility neuroimaging, and neuropsychological research. Discordant information may suggest the life of an atypical organization of functionalities.
2) Makes it possible to guess the probable cognitive dangers of surgery. These risks need to be assessed in order to determine whether the patient is an optimal surgical candidate.
3) Evaluate the results of surgery. The pre-surgical evaluation enables a baseline to be established to match the results of post-surgery follow-up.
4) Optimizing patient reasoning: data helps parents and teachers better understand the infant and the causes of a special behavioral, social or emotional performance chief. Placing cognitive and behavioral performance in the context of brain function and dysfunction can make a tremendous difference to understanding and admitting an infant's or young person's restrictions. Parents and teachers sometimes have problems understanding the particular alterations in epileptic children. It also makes it possible to determine which psychological or rehabilitative treatments are likely to be the most appropriate.

FACTORS ASSOCIATED WITH STATUS AND COGNITIVE PROGNOSIS IN EPILEPSY

Prognosis of epilepsy, understood as the total control of seizures, is usually better in boys than in adults. In long-term follow-ups, a remission of the crises can be seen in 70% of patients; however, the course of development may show deterioration in 16% of the boys. The components that are most determinedly associated with a better cognitive state and prognosis of epilepsy are the lack of other underlying neurological disease and early crisis control. On the other hand, crisis resistance to the pharmacological procedure and the reality of a vast metabolic or structural disease are involved with a worse prognosis.

Given the multiplicity of probable intercurrent components in the course of epilepsy, cognitive development and the occurrence of specific problems could be enormously variable, greatly limiting the likelihood of making a neuropsychological long-term prognosis. These components will be examined later.

Etiology

The underlying neurological disease is probably one of the most relevant changes in cognitive development. Patients with idiopathic epilepsy tend to show better development than those with underlying structural or metabolic alterations.

The existence of a basic genetic variation is not in itself a predictor of cognitive development. However, certain alterations in the genes coding for sodium channels, such as febrile plus seizures or Dravet syndrome, are associated with greater cognitive problems and a greater possibility of intellectual disability.

Other etiologies, such as an infectious disease that causes a picture of meningitis or encephalitis can lead to secondary epilepsy whose prognosis will depend on the developed epileptic syndrome and its response to the procedure. One of the most common is herpetic encephalitis due to herpes simplex virus infection,

that although it begins with a picture of decreased degree of consciousness, later it may expose striking behavioral alterations such as hypomania or Klüber-Bucy syndrome, presumably due to inflammation of the inferomedial temporal lobe and the limbic system; the sequelae in surviving patients are likely to be severe and associated with high likelihood of intellectual disability and memory impairments

On the other hand, epilepsies secondary to a structural injury - called symptomatic- make up a rather heterogeneous set in relation to their clinical protests. These wounds are likely to be caused by an atypical malformation or proliferation of neuroblasts or glia, by deficiencies in migration, or by abnormal organization of the cortex. The different wounds of neurodevelopment are usually called cortical dysplasias, cortical dysgenesia, heterotopias, or malformed parts of cortical development. Similarly, central nervous system tumors (the firm tumors most common in children) have the potential to be equally epileptogenic or coexist with another lesion that is. Given the etiopathogenic variability of structural injuries, their effects on cognitive development are likely to be quite variable.

Neurodevelopmental wounds have the possibility of being classified in their expansion functionality as focal, hemispherical or generalized, and are the most common injuries in pediatric epilepsy. Generally, more focal or circumscribed injuries tend to have less detrimental effects on cognitive development than those involving large areas of the brain.

The generalized wounds comprise lysencephaly, pachygyriria and heterotopia in band and laminar, being at the same time alterations of the migration process.

Lysencephaly is based on a loss of the common grooves and turns of the cortex and an abnormal lamination with 4 layers, and in more severe cases it runs with a severe psychomotor delay and a reduced essential prognosis.

The paquigira is a moderate way of the previous one, being its cognitive and behavioral protests less severe, although the intellectual disability is still recurrent, especially in front of the appearance of infant contractions.

The term heterotopia is used to refer to the existence of ectopic grey substance; in the situation of laminar heterotopia is under the crust resembling a double cortical aspect while band heterotopia is under the cortex being separated by areas of white substance. At this end of the spectrum, mild to moderate intellectual disability is common, correlating the severity of the condition with the expansion of the lesion and the type of associated epileptic syndrome.

In the middle of the hemispheric wounds is hemimegalencephaly, which is supported by the abnormal increase of all or part of a cerebral hemisphere, and can manifest itself alone or as part of a syndrome that associates hypertrophy of the ipsilateral hemibody.

The most limited wounds in their expansion include focal cortical dysplasias, polymicrogiria and subpendymal or nodular heterotopaths. However, it should be considered that we have grouped them here for clarity in the exposition, but there are indeed quite varying degrees ranging from a focal and well-located lesion to more extensive wounds with less well defined parameters.

Polymicrogyria is supported by a disproportionate number of shallow grooves in one area of the cerebral cortex; Slight intellectual disability is recurrent, but the level is dependent on expansion.

Nodular or subependymal heterotopias consist of small nodes of neurons around the wall of the lateral ventricles; patients tend to have a common intellectual degree and develop epilepsy mostly, with a high number of children with learning disabilities

FREQUENCY OF CRISES

Once in the course of epilepsy clusters are generated in which they have the possibility to expose some weekly or daily is expected an altered cognitive and behavioral state. A history of recurrent and severe seizures is associated with high likelihood of poor cognitive development, as a result, children with seizures refractory to procedure tend to show with freedom from etiology especially since they are very common and happen at a young age; It should be borne in mind that if crisis control has not been achieved within 4 years the possibility of subsequent control is considered to fall to 10%. The remote inhibition mechanism has been postulated to describe how repeated epileptic activity could cause long-term cognitive effects by creating a prolonged inhibition of brain surfaces that, although distant, are connected with the epileptogenic focus

In the situation of onset of epileptic status (an emergency condition in which a crisis extends well over 30 min, or crises follow without recovery of consciousness) the possibility of cognitive consequences is greater in younger children, once the duration of status is greater than 24 hours, or with previous status precedents.

However, it should be considered that even the most subtle efforts which are likely to appear in boys initially of epilepsy tend to persist all the time, also against an optimal crisis control. We will immediately observe components involved with the principle of pathology.

AGE OF ENTRY

In general, once the onset of epilepsy is created in both first years of an infant's life, the possibility of developmental delay or subsequent cognitive problems is greater. The impact of early vulnerability -especially in this age- must be increased as, in population terms, there is a greater number of epilepsies with a structural-lesion origin. In addition, in

this stage of brain development is more likely the presentation of generalized seizures, generalization of seizures and epileptic contractions, with an important greater complexity for pharmacological control. All of these are components that we have previously classified as having the worst prognosis, but if a reasonable crisis control is achieved it does not involve a serious cognitive variation.

Indeed, it has been seen that the age of onset as a prognostic element of cognitive development loses its predictive cost in patients with well-controlled epilepsies, thus creating a relationship impact between crisis control and the age of onset. Thus, the possibility of intellectual disability 9 years later than the onset of epilepsy is high in those patients who debuted at less than 3 years and showed resistance to the pharmacological procedure. On the other hand, with freedom from the age of onset, more than 80% of the boys with good initial control present in the long-term follow-up an IQ greater than 80 (mean IQ of 95, conditioned in most patients by attentional problems).

BASAL COGNITIVE LEVEL

The degree of development achieved initially in epilepsy is strongly related to the underlying disease, so it may be an indicator of future development patterns in the sense that it is an indicator of the whole brain. Thus, repeated neuropsychological evaluations in boys with localized or generalized epilepsy have found that, being at the beginning a difference with healthy controls, that difference tends to remain at all times and that the basal cognitive degree tends to be lower in generalized epilepsies, once other changing ones are controlled. For this reason, the evaluation of the baseline at the moment of diagnosis enables not only the probability of future comparisons, but also to have a prognostic element in itself in cases where efforts are evident from the beginning of the pathology.

ANTIEPILEPTIC DRUGS

As we have noted, the early control of seizures is the primary purpose in patients with epilepsy, and to a large extent the next development will depend on the achievement of this goal. For this, the optimal adjustment of the procedure for each special infant should also take into account the likely adverse effects associated with it, since any antiepileptic drug can potentially impair cognitive functionality, behavior or learning. The need sometimes to make procedure in polytherapy increases the possibility of experiencing this kind of adverse effects, as well as with a high dose or serum levels or against an immediate titration.

Compared with traditional or first-generation drugs, long-term use of phenobarbital has been associated with partially reversible decreases in IQ, as well as problems in attention, fine motor skills and drowsiness. While no effects on IC have been found in patients treated with phenytoin, they have the possibility to further develop previous care efforts; similar effects are less frequently associated with carbamazepine. Valproate or valproic acid belongs to the most used first-line drugs, with fewer adverse effects, although there is recurrent motor clumsiness and sometimes irritability; There is also preliminary evidence that long-term use may be associated with reduction of the cortical thickness in the parietal lobe.

EPILEPTIC SYNDROMES

An epileptic syndrome is an epileptic disorder characterized by a group of signs and symptoms that usually occur together. This group of signs and symptoms refers to electroclinical properties, age of onset, type of crisis, neurological involvement, prognosis, etc.

Commonly, once the syndrome is associated with structural cerebral malfunction or metabolic alterations it is estimated "lesion" or structural-metabolic, in which if there is no lesion or malfunction it is estimated "idiopathic" or genetic (a genetic defect is implied); in those cases where not

an injury is not tested and there is no evidence for its etiology is estimated to be "cryptogenic" or of unknown cause.

1. Idiopathic syndromes

a) Benign Epilepsy with Centrotemporal Tips

It is more famous as Rolandic Epilepsy, because an important part of the center-temporal waves that appear in the EEG are located in the rolandic zone. It is possibly the most recurrent epileptic syndrome, accounting for between 25 and 35% of each childhood epilepsy. It has usually been classified as an idiopathic syndrome, although in the new categorization of ILAE it is categorized as having an unknown cause. The age of debut is between 3 and 14 years, with a peak in its appearance between 7 and 10, harming to a greater extent the males. Seizures are usually brief and predominate throughout the night (especially during N-REM sleep) or upon awakening.

b) Epilepsy with childhood absences

It is a type of generalized epileptic syndrome characterized by absence crises in commonly healthy boys. The age of onset ranges from 4 to 10 years, with a peak between 5 and 7 and is more recurrent in girls. Its incidence is around 7/100,000 in epileptic boys under 16. Seizures are usually characterized by being brief (about 10 seconds) and common (tens), with sudden loss of consciousness, muscle tone being preserved. By means of hyperventilation they have the possibility to cause seizures, which allows the diagnosis. The ictal EEG is characterized by generalized 3Hz tip-wave discharges of abrupt onset and termination. The prognosis in most cases is good, with previous remission at age 12.

c) Juvenile myoclonic epilepsy

It belongs to the epileptic syndromes in which greatest genetic load test exists. Usually appears between the ages of 12 and 18, commonly in healthy young people, most often affecting women. Its incidence is 0.1-0.2/100,000, with an expected prevalence of 18% of idiopathic generalized epilepsies. It is characterized by seizures with sudden, bilateral (single or repetitive), irregular and arrhythmic myoclonic shocks, predominantly of the arms, which occur

shortly after waking up. Half of the cases also have the possibility to expose generalized tonic-clonic crises and in a third of the cases also remain typical absences. Seizures are likely to result from sleep deprivation, fatigue or excessive alcohol intake. Short-lived point-wave, polypoint-wave complexes appear in the EEG.

2. EPILEPTIC ENCEPHALOPATHIES

Epileptic encephalopathies are those in which the epileptic activity by itself can help a severe cognitive and behavioral impairment, beyond what is expected from the mere underlying disease, and that can aggravate over time. These patients usually undergo refractory treatment using common FAEs, so it is not uncommon for other possibilities to be considered, such as the use of other FAEs, ketogenic diet, immunomodulatory therapies, surgery, etc.

a) West's syndrome

Known as infant contractions syndrome. It is a type of age-dependent epileptic syndrome that occurs in infants between 4 and 10 months of age, and occasionally occurs after 2 years. The incidence is 2.5/10,000, affecting males to a greater extent. It is characterized by a triad of indications: infant contractions, hypsarrhythmic electrical tracing (unorganized tracing, with irregular high-voltage wave-tips extended throughout the cerebral cortex) and arrest and/or regression in psychomotor development.

The etiology is varied, may be linked to neurological malformation, cortical malformation, neurocutaneous syndromes or genetic alterations, although up to a third of cases are idiopathic. The prognosis is inconvenient and usually linked to the underlying cause, with better prognosis in these cryptogenic versus symptomatic cases.

b) Lennox-Gastaut syndrome

It is an epileptic syndrome of childhood, which usually appears between the ages of 3 and 5 years old, being rare its appearance after 8 years, but cases have even been described in adults. Its incidence is about 2/100,000 appearing in a subtly pre-eminent percentage in boys. It is characterized by a triad of indications: various tonic crises

asymmetric, atonic and atypical absence crises; cognitive impairment and behavioral variation; Diffuse slow wave-tip discharges and generalized interictal intercritical immediate activity. The most common symptom at first (although it is not pathognomonic) are "sudden falls" secondary to tonic or atonic crises. Its etiology is varied (malformations in the cortical development, tuberous sclerosis, metabolic pathologies, acquired cerebral malady, etc.) being about 25% of the cases of unknown cause.

c) Encephalopathy with continuous tip-wave state in slow sleep It is a type of epileptic encephalopathy whose presentation is linked
slow sleep N-REM. Age-dependent, appearing in boys between 3 and 14 years old, with a spike between 4 and 7 years old, being subtly more recurrent in males than in females. It is thought to involve 0.5-1% of childhood epilepsy. For its diagnosis 2 requirements are necessary: EEG plotting in continuous wave peak mode in slow sleep and cognitive and behavioral alterations similar to such activity. At the beginning they have the possibility to manifest unilateral convulsions, motor focal crises, generalized tonic-clonic crises and atonic crises. This chart does not show tonic crises, so its presence would pose the diagnosis of another epilepsy.

The discharges are usually diffuse bilateral, although they have the possibility of being unilateral and even focal. At the beginning it was considered that a 85% point-wave amount in the EEG plot was essential for diagnosis, although this criterion has been made more flexible due to the fact that smaller proportions have also led to cognitive impairment.

The prognosis is variable, it has been stipulated that the greater the duration of the continuous point-wave case, the deterioration will be greater and less possible to recover even reversing the clinical case.

d) Landau-Kleffner syndrome

This spectrum is known as "acquired epileptic aphasia". It is grouped into "idiopathic" syndromes. There are no epidemiological data, but one in Japan puts it at 1/1,000,000. Usually started between the ages of 3 and 10 in normally healthy boys, with

habitual purchase of the language they begin to develop a verbal agnosia (difficulties in listening comprehension, becoming deaf for words), auditory agnosia (not recognizing sounds), an impossibility to create speech sounds (aphasia) and then a universal regression in language.

Language alterations have the potential to remain as consequences even after the normalization of the EEG plot. The prognosis is generally bad, in very few cases the complete recovery of the language functionalities is achieved. Non-verbal cognitive abilities remain subjectively preserved. Children with LKS have the potential to develop behavioral disadvantages such as hyperactivity, attention problems, aggressiveness, social adjustment problems and autistic aspects.

3. Epilepsies Symptomatic O Probably PARTIAL SYMPTOMATIC (FOCAL)

a) Epilepsy of the temporal lobe

The incidence is much lower than in adults, where epilepsy is commonly more prevalent. In the pediatric population involves 30-35% of each of the childhood epilepsies. In temporal lobe epilepsy we have the possibility to differentiate primarily 2 subtypes, in function of the area of origin of the crises, the mesial and lateral-neocortical. The constructions involved in the mesial integrate the amygdala, the hippocampus and the entorhinal cortex (more involved in mnestic tasks), in which the lateral neocortical, as its own name suggests damages the temporal lateral cortex, which has greater involvement in linguistic functionalities. The most common injuries similar to this type of epilepsy in childhood are low-level tumors, focal cortical dysplasias, perinatal malady and, at a lower level, hippocampal sclerosis.

In small boys the crises have the possibility of having tonic, clonic or myoclonic elements, and since 4 years complicated partial crises predominate. Crises are usually preceded by an aura (epigastric, olfactory, fear sensations, etc.) and the existence of oral automatisms, deviation of the gaze and transient variation of language is recurrent.

Language alterations are very ordinary, with a predominance of variation in the designation and receptive vocabulary (more referential with neocortical surfaces), as well as learning disadvantages. Similarly, the frequency of psychopathological alterations is high. Temporal lobe epilepsy in boys usually occurs with behavioral alterations (oppositional defiant disorder and attention deficit hyperactivity disorder.

b) Epilepsy of the frontal lobe

It is the most recurrent partial or focal epilepsy in childhood after temporal lobe epilepsy, accounting for 20-30% of partial epilepsies. The average starting age is 4.6 to 7.5 years. Crises tend to be basic partial, complicated partial and secondarily generalized, the duration is short, appearing mainly more frequently throughout the night, and the semiology is variable in functionality of the affected area, (orbitofrontal, frontopolar, dorsolateral, opercular, motor cortex, additional motor area and cingulate gyrus) although the motor element and automatisms are highlighted. The etiology is mostly cryptogenic. The injuries with which it is most commonly associated are focal cortical dysplasia, cerebral infarction (but not hemorrhages) and low- and high-level tumors.

In behavioral alterations related to ELF the most recurrent is Attention Deficit Disorder with/without Hyperactivity. Impulsive and perseverative behaviors are more common in such children, having greater complexity to plan and inhibit distractors which can cause serious problems in social adjustment.

c) Epilepsy of the Subsequent Cortex

It is much more recurrent in boys than in adults, the incidence is still much lower than other focal epilepsies, accounting for 6% of focal epilepsy in surgical series. In relation to the etiology, the most recurrent cause is malformed parts of cortical development and to a lesser extent tumors. Parietal onset crises are difficult to diagnose, especially in boys, because they are very variable in their semiology and have a personal character (in several cases a vestibular and somatosensory element). The parietal lobe is the center of multisensory incorporation, so it is

highly connected with other areas, which could describe that in the EEGs of such patients the intercritical activity appears diffuse and it is more complex to establish an ideal location.

Since the parietal cortex has several eloquent surfaces, its involvement is linked to various alterations: problems in noticing and integrating spatial data, contralateral neglect, variation of the body's scheme.

CHAPTER 3
MORE DISORDERS FREQUENT. AUTISM SPECTRUM DISORDERS

Introduction

TEA ("autism spectrum disorder" (ASD)) comprised five subtypes: autistic disorder, Rett syndrome, child disintegrative disorder, Asperger syndrome and generalized non-detailed developmental disorder (TGD-NE). The World Health Organization remains in a general category of generalized developmental disorders, with numerous subcategories still to be found. However, in today's DSM-V these subcategories have disappeared to encompass them in an exclusive one, called TEA. We will follow the categorization of the latter.

In this new categorization, ASD encompasses four of the five subcategories found in generalized developmental disorders. However, in this new categorization Rett syndrome is left out of the ASD category.

This categorization should also specify, first of all, whether:

- It follows whether or not intellectual impairment (also using unlimited non-verbal tests of time to see the potential strengths of people with limited language).
- Whether or not there is a deterioration in language.
- It is associated with a well-known medical or genetic condition or environmental element.
- It is associated with another neurodevelopmental, mental or behavioral disorder.
- With catatonia.

In the second place, it is also necessary to specify the severity of the present symptomatology disorder, with the recognition that severity may change according to environment and age. The severity of social communication efforts and repetitive and restrictive behaviors are the two cardinal axes of the disorder and must be evaluated separately, with 3 different levels of severity for each axis.

Severity levels of -	Spectrum Disorder -	Autista
Level of severity	**Social communication**	**Restricted and repetitive behaviour**
Level 3 They require a support very important	The serious deficits in the skills of verbal communication and non-verbal cause serious deterioration in the operation, very limited initiative of interactions social issues and responses to the minimum social proposals from others. For example, a person with a few words from intelligible speech that rarely starts Interaction, he or she only performs some approximations unusual for satisfy your needs, answers only to approximations very direct social issues.	Behaviour inflexible, extreme difficulty in coping with changes or other behaviors repetitive/restricted strongly interfere with with the operation in all areas. Great distress/difficulty in the change of focus or action.

Level 2 They require a support substantial	Marked deficits in skills communicative both social and economic verbal as not verbal, deficiencies social evident even with supports, reduced initiative of the interactions social issues and responses rare or foreign to the proposals of the others. For example, a person who uses sentences simple, whose interaction is limited to special interests very restricted, and who has a marked strange communication not verbal.	Behaviour inflexible, difficulty in facing the change, or other behaviors repetitive/restricted appear with the sufficient frequency to be obvious to the observer and interfere in the operation in a variety of contexts. Distress and/or difficulty in changing focus or action.

Level 1 Need support	Without support additional, the deficits in the social communication cause deficiencies perceptible. Difficulty on the initiative of social interactions, and clear examples of atypical responses or without success to social propositions from others. Can they seem to have a reduced interest in the interactions social. By example: a person who is able to speak with complete sentences and that fits into the communication but they have problems for maintaining the fluidity of a conversation it requires a exchange of ideas, their attempts to make friends are strangers and frequently fail.	The behaviour of inflexible causes a significant interference in the operation of one or more contexts. Difficulty in change between activities. The problems in the organization and planning prevent the independence.

DIAGNOSTIC CRITERIA OF DSM-V10

A. Persistent deficits in social communication and social relationship in various settings, present or past, as shown by:

1. Deficits in social and emotional reciprocity, which include, starting from an abnormal social approach and failures in the collaborations in the conversation; to a limitation of shared interests, emotions or feelings; or failure in the beginning or response to social partnerships.
2. Deficits in non-verbal communicative behavior used for social interrelations, which include, based on a misincorporated verbal and non-verbal communication; abnormalities in eye contact and dioma of the body or deficits in the understanding and use of gestures; total lack of facial expressions and non-verbal communication.
3. Deficits in the development, maintenance and understanding of collaborations, ranging from problems in adjusting behaviour to different social environments, to problems in shared imaginative play or making friends; the lack of interest in equivalents. Severity is based on deficiencies in social communication and restricted and/or repetitive behaviour patterns

B. Restricted and/or repetitive patterns of behavior, interests or occupations that have occurred currently or during history, shown in at least 2 of the following:

1. Motor movements, use of objects or repetitive or stereotyped speech (for example: basic motor stereotypes, forming lines with toys or offering turns to objects, ecology).
2. Insistence that everything is equal, inflexible to routines or ritualized verbal or non-verbal patterns of behavior (For example: extreme discomfort at small changes, problems with transitions, hard thinking patterns, greeting ritual, require doing the same itinerary or route or eating the same food every day).
3. Extremely restricted and obsessive interests that are anomalous in magnitude or concentration (for example: intense fixation or restlessness over unusual objects, overly circumscribed or persevering interests).

4. Hyper- or hyperreactivity to sensory information or unusual interest in sensory points of the scope (e.g., apparent indifference to pain or temperature, adverse or hostile response to specific sounds or textures, excessive tendency to smell and touch objects, or visual fascination with lights or movement).

C. Cues have to be present in the early development period (but may not be fully present until social demands exceed limited skills or are likely to be masked by later-learned tactics).

D. Evidence causes clinically relevant deterioration in the social, occupational or other relevant areas of present performance.

E. These alterations are not best argued for an intellectual disability (see Intellectual Development Disorders) or universal developmental delay. Intellectual disability and ASD often co-occur; to make the diagnosis of comorbidity of ASD and intellectual disability, social communication should be below what is desired for its overall level of development.

RELATED CHARACTERISTICS SUPPORTING THE DIAGNOSIS

The cognitive performance of people with autism spectrum disorders encompasses a wide range, from profound mental retardation to preeminent wisdom. Although people with autism spectrum disorders have the potential to teach high skills, a huge percentage of those diagnosed with autism show cognitive impairment. Even those with medium or high wisdom have an irregular skill profile. The difference in the middle of intellectual abilities and capacities of useful habituation is constantly vast.

Similarly, several individuals also show language impairment (for example, slowness in dialogue, understanding of language may be inferior to production).

Characteristic that for the DSM-IV was key and at the same time a distinguishing feature between autistic disorder and Asperger syndrome, because the latter did not show a clinically important delay or deviation in the purchase of language.

There are several rules of complexity in the imitation of motor movements. Motor and displacement abnormalities have been recognized in childhood in home video clips on some occasions, but in other terms more important in those children who also of autism show developmental delays. These include strange gait, clumsiness, knee bending, posture and other abnormal motor signs (for example, tiptoe walking). certain individuals develop a motor behavior as catatonic (slowing and blockages or freezes in the middle of the action), but these are not often of the same intensity as a catatonic episode. Yes or yes, it is feasible that people with ASD experience a marked deterioration in motor signs and show a complete catatonic episode with signs such as mutism, adapt strange positions maintained or put grimaces. The danger span of congenital catatonia seems to be greatest in youth.

Self-harm (e.g., hitting one's head or biting one's wrists) is likely to occur, and disruptive/challenging behaviors are more common in boys and young people with ASD than with other disorders. Young people and adults with ASD are susceptible to anxiety and depression.

On the other hand, there is a high co-occurrence rate with epilepsy and attention disorders, including ADD, as well as other externalizing disorders. In addition, similarities and overlaps have been found with Tourette's syndrome, especially where it is related to echolalia, perseverations and stereotyped movements.

In addition to properties such as hypersensitivity to sounds, tactile stimulation or smells.

PREVALENCE AND INCIDENCE

Cases of autism spectrum disorders in the 1960s have had an estimated prevalence range of 4 to 5 cases per 10,000 births; with changes in diagnostic criteria and increased awareness of autism spectrum disorders, the incidence for the whole spectrum in 2005 has been between 1 and 2 cases per 1000 births and the prevalence between 4 and 6 per 1000 individuals.

According to DSM-V, the frequency of ASD is believed to be 1% in the general population, with similar estimates in both boys and adults samples, and it is diagnosed 4 times more in men than women.

ETIOLOGY AND HAZARD COMPONENTS

Once it has been described for the first time, attributions of parenting style were made as a causal component. However, it is now identified that there is a biological basis and significant heterogeneity among people with autism; The severity also changes. These differences support the initiative of the disorder in a spectrum. It has been suggested that the importance of genetic, epigenetic and environmental influences is elementary. After all the etiology of autism is still unknown.

Influences of the environment

Among the components of the environment of danger that have the possibility to discover, it is estimated that in some cases autism is thanks to a dissolution of the habitual brain development (for example: prenatal viral infections or bleeding at midterm).

Exposure to thalidomide, a drug currently used for the multiple myeloma procedure and against complications related to leprosy. The analysis by Stromland and Helpers suggested a prevalence of between 4% and 5% of ASD related to thalidomide exposure, although it seems a low percentage, is 50 times greater than the overall population prevalence at the time of analysis.

Valproic acid is used in the procedure of seizures, manic and bipolar disorder and for migraines. Valproic acid, by the way, has been successfully used to generate an animal model of rodent autism, in which rodents that were exposed to valproic acid at 12,5 days of gestation showed a sequence of behavioral and neuroanatomical similarities to cases with human autism.

Similarly, a variety of non-specific hazard components, the advanced age of fathers, and low birth weight may contribute to the ASD hazard.

Genetic and epigenetic influences

Estimates of ASD heritability range from 37% to more than 90%, and among monozygotic twins, there is a concordance rate between 82% and 92%.

No unique biological or clinical marker for autism has yet been discovered, nor has any gene responsible for its expression been found. Once the etiology is genetic, autism spectrum disorders are considered to be due to mutations in genes that control brain development.

Currently, up to 15% of ASD cases appear to be associated with a well-known genetic mutation; however, even once an ASD is referent with a successful genetic mutation, it does not appear to be fully penetrating.

Autism spectrum disorders are considered to be polygenetic, with a higher number of 5 to 20 genes involved; the polygenetic basis of autism spectrum disorders can describe variations among autism spectrum disorders. In addition, others have recognized genetic mutations that make up "non-syndromic" or "syndromic" versions.

Eventually, certain genes have been recognized as "vulnerability genes" with increased potential danger, but they do not remain directly associated with autism spectrum disorders as such.

In addition, the phenotypic expression of the disorder changes widely, including in monozygotic twins, proposing a mixture of gene and environmental components.

The organic predisposition theories of autism propose that genetic predisposition makes the subject vulnerable; However, it is the relation of the subject's vulnerability to specific environmental and psychosocial stressors that produces the disorder.

THEORETICAL PERSPECTIVES

Three huge theoretical models have been postulated that have the possibility of describing ASD.

Theory of the mind

The "theory of mind" (ToM) interacts with the ability to understand and guess other people's behaviors, knowledge, intentions, and beliefs. The principles of the ToM criterion are thanks to the work of Premack and Woodruf in trying to show how chimpanzees could understand the human mind.

Among the most relevant cognitive models that attempt to describe the Theory of Mind, are: modularity theories, simulation theories, executive accounts and theory of

Theories of modularity

Modularity theories postulate that the development of the theory of mind is driven by a congenital neural mechanism dedicated to the state of mind argument. Although the experience may be fundamental in triggering this mechanism, it cannot change the elemental nature of the mechanism. Leslie and her assistants propose a theory in which the core is that a congenital module of mind theory is doing work from the second year of life and that further age-related improvements in the performance of mind theory in childhood are driven by inhibitory selection processes, that they are becoming increasingly capable of handling the executive requests for ToM tasks.

Theory of simulation

Simulation theories propose that children (and adults) rely on direct entry into their own psychological states to make attributions to the state of mind. In understanding the minds of others, they project themselves into each other's "shoes" and then read what they would experience in the relevant case. Simulation theories tell the story of ToM's expanded argument development from early understanding of erroneous beliefs to the subsequent triumph of more difficult ToM tests that need more complex simulation.

Theory of Theory (Bonus)

The theory of theory postulates that reasoning over mind consists of theoretical constructions of specific domain and that radical conceptual changes drive the development of naive understanding of the state of mind of boys. According to this theory, the boys collect evidence about the relationship between mental states and action, just as the scientist collects data to inform the theory. In the extent to which such a test is incompatible with the theory of the present mind of boys, with the age there will be a conceptual change. This theoretical position indicates that the subjectively abstract theorizing on data collected from the whole social world forms a system of mental concepts; for that, the infant and his experiences play an active role in the formation of concepts.

NEUROPSYCHOLOGY OF AIDS

Regarding the neuropsychological inconveniences that individuals with autism spectrum disorders may be exposed to, an important part of them are able to know through the cognitive models that try to describe ASD (theory of mind, weak central coherence or executive management). As mentioned above, ASD is a heterogeneous condition in which the signs vary in severity from one subject to another, which is why there are discrepancies in the literature regarding the group of deficits referred to.

At the level of language, they often present problems in understanding emotional content, with pragmatics and in incorporating affective and cognitive points from a situation or talk. As in the understanding of satires, jokes or non-literal language. However, deficits are not restricted to the most social level of language. By the way, different phenotypes of language were determined within the spectrum, showing quite different profiles, from mutism, to verbal speech with quite slight language deficits. There are impairments in both comprehension and expression, and the rhythm and tone of speech are also altered

They also show practical problems, especially in the area of gestures and imitations with meaning and facial expressions that are typically inexpressive or consist of an unalterable smile.

One of the greatest drawbacks exhibited by all children with autistic spectrum disorders is the inability to change set (perseverance), indicating reduced cognitive flexibility. There is also evidence that, in the young age group, these boys show deficits which require verbal skills, dual execution of various operations and complicated language and memory skills.

Similarly, youth and adults with autism spectrum disorders tend to have complexities in the organization and effective use of tactics. In an analysis with adults with autism spectrum disorders, deficits remain evident in working memory and organizational areas.

In another analysis with high-handling autistic children, the results were that they performed better in perceptual argument and especially in free motor tasks, as well as in verbal comprehension tasks compared to working memory and processing speed. Together with the results of other studies, Mayes and Calhoon concluded that the cognitive profile showed weaknesses in attention, Graphomotor programming and processing speed in children with high-handling autism while verbal and non-verbal knowledge should still be demonstrated.

Others have evaluated executive management in preschool children with autism compared to a control set; However, no significant differences were found in the results of executive management, anyway, the boys in the autism set showed less social relationship. These results remain in opposition to the executive dysfunction conjecture of autism.

It has been postulated that deficits in executive management in autism originate, at least partially, from the inability of people with autism to use internal speech for self-regulation of behavior and feelings. This same internal language could be responsible for working memory deficits.

The elements of social cognition are often damaged in autism spectrum disorders. These include vision taking, agency sense, shared attention, mentalization or mind theory, and eye contact. These deficits in social interrelations are likely to be present even among people with cognitive or, at least, verbal abilities. It is in unstructured frameworks that the deficits become more evident in the theory of the mind and the impossibility of presupposing what is feasible to happen and what is expected in terms of behavior to happen. Similarly, people within the spectrum have problems prophesying other people's behaviors or motivations. It should be noted that social deficits and similar pragmatic abilities continue to be evident in adults with high-performance autism or autistic spectrum disorders, with several norms that social deterioration gives way to deficits in pragmatic communication.

Boys with autism tend to do behaviors that are atypical, stereotypical and ceremonial. For example, boys with autism spectrum disorders have the potential to become hooked on a high frequency of self-stimulation behaviors, such as turning or swinging their human body or objects, or to be hooked on self-injurious behaviors, such as hitting their head; many times these behaviors become apparent between the ages of 3 and 5. They also have the ability to remain engaged in ceremonial behaviors, such as aligning objects or following

being in a strict specific and inflexible routine. The interruption of the behaviors of ceremonies or routines or the change of something in its scope can offer place to extreme emotions of irritation, anxiety or fury.

Lack of social interest or strange social relationships (for example: pulling people's hands without any attempt to look at them), strange patterns of play (for example: bringing toys around but not playing with them), and strange communication patterns (for example: knowing the alphabet but not responding to its own name) along with other deficits have the possibility of causing functional sequelae, which hinder their sovereignty and social life. At home, for example, the insistence on routines and aversion to change, as well as sensory susceptibility, have the potential to interfere with food and sleep and make routine care radically difficult (e.g.: haircuts, going to the dentist). Throughout adulthood, such individuals have the possibility of having problems in establishing freedom and paid work thanks to continuous rigidity and efforts with novelty. The functional sequelae in old age are not known, however social separation and communication disadvantages (for example: reduction of help finding) are likely to have sequels for health in adulthood.

Mastery	Specific deficit
	Below average majority or with intellectual disability
Language	Deficits in internal discourse Deficits in understanding (may be lower than output) Deficits in expression Alteration of prosody Deficits in pragmatics Ecolalias
Gnosias	Deficits in face recognition/discrimination even though object recognition/discrimination is relatively intact

Sensory perception	Hyper- or hyperreactivity to sensory information
Praxias	Deficits in understanding and using meaningful gestures Grafomotor deficit Difficulty in imitating motor movements
Processing speed	Slow
Executive function	Deficits in planning and organization Impairment in cognitive flexibility and set change (Perseverations) Deficits in working memory Deficit in generativity (fluency)
Attention/ Concentration	May be inflexible and unable to shift focus
Motor patterns	Strange gait, clumsiness and blockages Persistent, repetitive and stereotyped behaviour patterns
Socio-emotional behaviour	Difficulties in the self-regulation of behaviour and emotions Deficits in attention and shared imaginative play Deficits in empathy, mentalization or theory of the mind, taking perspective Lack of eye contact and facial expressions less social interaction
Other stereotyping	Highly restricted and obsessive interests Inflexible adherence to routines
Functional consequences	Difficulty in establishing independence and paid work

CHAPTER 4:
MORE DISORDERS FREQUENT. ADHD AND RELATED DISORDERS

Introduction

The TDA-H is the paradigm par excellence of a biopsychosocial disorder that leads to crucial questions about the interactions between genes, biological components and the environment. Just as dyslexia became "fashionable" some 30 years ago, today the terms "hyperactivity, inconveniences of attention and impulsivity" remain in vogue and arouse the interest of scholars and clinicians from different expert environments such as psychiatry, neurology, psychology, pediatrics, pedagogy, speech therapy, teaching or neuropsychology. Hence, an intensive review of this disorder is basically impossible. The interest of integrating the chapter on TDA-H in this book lies in understanding its interaction with neuropsychology and especially with the frontal lobes, executive functions and other disorders.

It can be assured that the neuropsychologist interprets behavior from the brain and this is the differential nuance in relation to other psychological assessment systems. The neuropsychological study goes beyond psychometric diagnosis or the study of mental functionalities, it continues to know the interrelations behavior/ emotions brain.

In this chapter, after exposing the behavioral protests, examining the reasons and explanations of the disorder, we will focus on assessment, differential diagnosis and associated disorders and try to protect that "not everything is TDA-H", to conclude by making a number of therapeutic suggestions.

TDA-H DEFINITION, PREVALENCE AND PROPERTIES

ADHD is the most commonly diagnosed disorder in childhood. It affects 3-10% of the student clientele and is 3 times more recurrent in boys than girls. Their first clinical signs usually appear around 3-4 years, but it is access in the academic field that causes the explosion of disruptive behaviors, learning efforts and/or socio-affective inconveniences.

In DSM IV4 the TDA-H is included in the table of disturbing disorders with oppositional and behavioral disorders. According to DSM IV, there are 3 subtypes of ADHD-H, depending on whether the boys present a hyperactive-impulsive predominance, an inattentive predominance or a mixed condition. The DSM V refers to "predominances" rather than subtypes and includes adulthood in the specification of the disorder.

• DSM IV- Diagnostic Criteria of Attention Deficit and Hyperactivity Disorder:

- It is a behavioral disorder, commonly diagnosed in childhood.
- Usually between 2 and 7 years of age
- It is characterized by:

1- lack of attention: details are avoided, it is difficult for him to keep his attention, he seems not to listen, does not follow the rules, does not finish what he is doing, it is harder than other boys to organize, he does not know by

where to start, prevents sustained effort of the mind, is forgotten, loses student material, toys, is distracted by the flight of a fly, does not maintain the same level of commitment in tasks as other children, is neglected in daily occupations.

2- Impulsivity: responds hastily to questions, answers before completing the questions, it is difficult for him to respect shifts, interrupts others, meddles in conversations.

3- motor concern (hyperkinesia): moves too much hands and feet, leaves his seat in class, runs or jumps in inappropriate situations, has trouble playing calmly, acts as if he was "roped", talks too much.

These signals usually appear linked, although probably in different frequency and magnitude and to diagnose the existence of ADHD-T they have to remain for at least 6 months. As well as have to be presented in at least 2 common environments/contexts of the individual

Attention deficit disorder is classified in the part of "other behavioral and emotional disorders that usually appear in childhood", however, its signs are not described in ICD 10.

ADHD persists in youth in 50-80% of cases and even in 30-50% of adults from the initial Barkley sample.

Also, according to Dr Barkley, having ADHD is a dangerous component that involves exposing learning problems, poor academic performance and high rates of student helplessness. It also constantly involves poverty in social relationships and is associated with the development of inconveniences of behavior, being able to demonstrate criminal behaviors or drug addiction. In addition, it has a greater propensity to have accidents and infringements on the road. In adulthood, there are greater failures of marriage and instability of work.

Beyond these considerations, it is also interesting to stress that since children with ADHD usually exhibit associated learning disorders, they are constantly referred to private clinics where they make up a fundamental percentage of the clientele. As a rule, the diagnosis should be confirmed in neurology or child-juvenile psychiatry; however, it is the neuropsychologist who can best assess the effect of attention deficit and/or executive dysfunction on learning or socio-affective development. Conversely, sometimes from the neuropsychological clinic or educational environment, a TDA-H is found and then the situation is referred to neurology or psychiatry to confirm the diagnosis and obtain a pharmacological procedure.

ETIOLOGY OF ATTENTION DEFICIT HYPERACTIVITY DISORDER

Neurological hypothesis

Investigations in electrophysiology, optical imaging and biochemistry provide different causal premises to ADHD-H.

TDA-Hseems to be associated with biochemical components (dopamine), cortical hypo-activation, diencephalic dysfunction (thalamus and hypothalamus) and crosslinked formation, as well as a maturation delay or frontal lobe dysfunction, with variation of the regulatory function of the frontal cortex (in the central grey nuclei).

Neuropsychological hypotheses

Neuropsychology has also contributed to a better understanding of TDA-H. In this sense, Mattes' analysis is quite interesting because it synthesizes each of the properties of the disorder in childhood and youth (impulsivity, tendency to distraction, bad idealization, lack of self-evaluation...) and compares them with similar signs or behaviors observed in patients with frontal injuries. After further examining the conjectures of neuro-anatomical or neuro-chemical etiology, Mattes concludes that the terms "attention deficit and hyperkinesia" are quite restrictive for the range of signs shown by the disorder and suggests replacing them with "frontal lobe dysfunction".

Based on Mattes' premise, Chelune and assistants demonstrate significant differences in performance and development trends in tasks that measure the totality of frontal lobes among boys with TDA-H and controls.

From these results, several authors use neuropsychological tests to confirm the value and role of the frontal system in the expression of ADHD. It is in this view that Barkley suggests his well-known model.

TDA-H and FE: BARKLEY EXPLANATORY MODEL

Barkley belongs to the authors that most research and is cited in the field of ADHD-H. For this reason, we will discuss his explanatory model, which precisely establishes an interaction between disorder and executive functionalities.

In 1997 Barkley presents his theoretical model of the TDA-H in which he integrates data from neuropsychology and executive functionalities. For Barkley, executive functionalities and most of all inhibition would allow generating a movement from external control of behaviors to a control secured by internal representations of information.

This minimizes or suppresses sensory stimulation and motor behaviors that are unnecessary for the execution of a goal. This inhibition is generated throughout the execution of complicated motor responses generated by executive functionalities to reach a goal. During such execution, the working memory preserves the last response and the new one at the same time, in order to change or adjust the following responses, thus building error sensitivity, so that once a distracting stimulus breaks this chain of behaviors, a "normal" individual will be able to interrupt himself momentarily in order to respond to the distraction and to resume the succession of ongoing activity, continuously oriented towards the goal, because it will have remained "sustained" in the working memory, Which does not happen constantly in TDA-H.

According to Barkley, the primary deficiency of TDA-H is a deficit of inhibition, which in parallel leads to the loss of effectiveness of the next functionalities:

- Verbal and non-verbal working memory that could involve impossibility to retain events in the mind, reduced ability to emulate complicated sequences, ineffectiveness in event recovery and its foresight, reduced self-awareness, inadequacies in the behaviour governed by standards (generation), drawbacks of temporary organization.
- Self-regulation of affect, motivation, vigilance: immaturity in the self-regulation of affect can lead to: reduced self-regulation of affect, less social vision/objectivity, little motivation by self regulation, poor self-regulation of arousal in the service of targeted action.
- Inner language: The delay in the internalization of speech can cause: limited capacity for meditation, weak ability to solve problems (self-questioning), deficiencies in behavior governed by rules (instruction), less positive generation of rules/goal, a lack of reading comprehension, a delay in moral knowledge.
- Reconstitution: to have affected the processes of reconstructionmay involve: reduced and synthetic study of behavior, limited verbal and behavioral fluency, less creativity and plurality in behavior directed at a goal, delay in the ability to synthesize behaviors.

The effect of the above processes correlates with the reduction of motor control, creep and synthesis, ie with:

- Disinhibition of behaviour irrelevant to the work
- Limited goal-oriented responses
- Decreased ability to persist
- Insensitivity to feedback
- Behavioural inflexibility
- Reduced ability to re-engage between work interruptions
- Poor self-control from the internal representation of information

In ADHD, inattention is characterized by a deficit of selective and focused attention, whereas in ADHD-H sustained attention is most affected. The boys of the inattentive subtype are described as self-absorbed, in the clouds, lethargic, hypo-active, passive, which recalls the profile of the dorso-lateral frontal syndrome or excess inhibition, whereas the profile of the impulsive or mixed would be more similar to orbito-frontal syndrome or lack of inhibition. For all these reasons, the inattentive subtype would be poorly explained by this model.

SUMMARY OF EVALUATION AND TESTING

Universal cognitive assessment (intellectual functions)

In the evaluation, it is important to consider the intellectual management of the infant since it helps to decide whether it shows a specific neuropsychological disorder or a more universal involvement of numerous neuropsychological functionalities. In order to make a differential diagnosis of different developmental disorders, it is essential to implement the discrepancy between performance in specific environments and universal intellectual grade. In the ADHD-H situation, wisdom is usually preserved, but care must be taken not to penalize lack of attention and/or impulsiveness in the evaluation of intellectual functionalities.

Perceptual and attentional functions

The totality of the social surfaces of the sensory cerebral cortex is essential for an adequate visual, auditory and tactile perception. It is common to integrate in a neuropsychological assessment the evaluation of perceptual functionalities (visual, auditory and tactile), identifying probable agnostic protests that limit the child's learning function, the tactile recognition of objects, as well as auditory recognition of verbal stimuli (phonemes) and non-verbal stimuli.

Attention is another basic requirement for convenient cognitive management. It is well known that a number of children with attentional disabilities have a reduced ability to store information, with the consequent impact on their academic performance. This is why it is essential to make a good assessment of care skills (sustained, selective

and divided) in both visual and auditory modes. A number of tests which may be useful in assessing the attentional (and executive) processes are briefly discussed below.

Memory functions

Memory is one of the most susceptible functionalities to neurological and psychological inconveniences of any kind. A proper study of memory impairments is a substantial component in neuropsychological assessment. The purpose of memory evaluation is not to assure or deny the existence of memory disorders: it aims at deciding what is the deficient factor in memory processes.

In the selection of memory tests, those which assess different types of memory have to be integrated: instantaneous, short-term, working and long-term, as well as evaluating the head and the learning curve of new information in both visual and verbal modes.

In the TDA-H it is essential to evaluate the working memory. However, the working memory is not an exclusive composition, but it is composed of 3 elements (central executive, phonological loop and viso-spatial agenda) so its variation can correlate with drawbacks in a specific functionality and have others intact.

Executive function

"Executive functionalities" is an expression that designates a sequence of cognitive operations involved in the achievement of a behavior aimed at achieving a goal. We are talking about a group of functionalities constantly compared with "the conductor" of the brain because it regulates the other cognitive functionalities.

These include the skills of orientation, stimulus selection, organization-planning, working memory, abstraction, conceptual flexibility and self-control or inhibition, as well as monitoring-judgment or self-assessment.

Motor skills

Alterations in the motor abilities of an infant may reflect cerebral immaturity linked to a developmental problem or may be the manifestation of a brain injury. Commonly, the former, as in the ADHD-H situation, will be reflected as minor or soft neurological signs, whereas in the latter case they are seen as larger neurological signs.

The greatest changes in these capacities are observed in the first years of life and; Therefore, for young boys the development of gross motor skills is a fundamental symbol of neurological wholeness, whereas for older boys more specific points are addressed by deciding on the existence of minor neurological signs. The evaluation of motor skills changes considerably in functionality age and it is essential not to forget it in TDA-H.

Language and laterality

Language is a cognitive functionality that, due to its enormous transcendence, continuously needs a specific section in the neuropsychological assessment of the infant. In the assessment of language it is essential to know the levels of language development expected in an infant according to his age. It seeks to determine whether the levels of expression and oral and written comprehension are within the usual parameters for the age and intellectual capacity of the infant. One should look at the level of handling of the 4 levels of language: phonoarticulatory, morpho-syntactic, semantic and pragmatic.

In the TDA-H situation, it is also essential to evaluate executive points such as verbal fluency, entry into the lexicon or organization of oral and written speech.

Affective-social area

In the neuropsychological evaluation, it is essential to specify the emotional and social behavior of the infant. The interest in this part is to know, in addition to behavioral properties

and emotional of the infant, the efforts in social, student and family adjustment that he or she faces.

There are 2 ways to obtain this information: one is the implementation of the observation procedure throughout the evaluation sessions and the second, the implementation of forms to be answered by parents and teachers with the intention of obtaining data about the behavior of the infant at home and in school.

In addition, in child assessment, the work of drawing interpretation techniques can also provide effective information about cognitive processes as well as the affective-emotional and relational environment. In this sense it is also essential not to misinterpret the impulsivity and poor control of the fine motor gesture commonly associated TDA-H, with affective components. Depending on the age of the patient, it is also essential to assess literacy and numeracy skills.

DIFFERENTIAL DIAGNOSIS AND ASSOCIATED DISORDERS

Developmental stresses and disorders are diagnosed in the functionality of dimensional criteria with poorly defined parameters that often overlap with each other. Hence the value of making a good evaluation, intense and intensive, which makes it possible to conclude on a differential diagnosis.

In Attention Deficit and Hyperactivity Disorder we were able to find patterns of behavior that access the patterns of autistic spectrum disorders or patterns of Behavioral Inconveniences or Oppositional Defiant Disorder (TOD), such as: Disadvantages in the social relationship; Language disorders; Stereotyping; Obsessions; Low quality non-verbal communication, failure to comply with standards, out-of-tone and out-of-place replies, etc.

To fully understand these issues and decide whether we are talking about Attention Deficit Hyperactivity Disorder, of autism spectrum disorders or TOD or autism spectrum disorders plus Attention Deficit Disorder and Hyperactivity Disorder or Attention Deficit Disorder and Hyperactivity Disorder plus TOD, as comorbid problems,

should be able to simplify the basis of these disorders. If we therefore understand that a case of autism spectrum disorders impairs communication, sociability and restricted interests, that Attention Deficit Hyperactivity Disorder involves a problem of behavioral and emotional self-control and that TOD is associated with some intention to transgress, we will be faced with 3 different questions, which, when joined together, cause extended clinical pictures.

The clinical experience shows us that the indications which give rise to the reason for consultation are not always the real cause of the problem. In addition, the identification of the nuclear disorder is commonly difficult for experts due to the viable presence of other comorbid or similar inconveniences or alterations, This is why we then detail the primary inconveniences diagnosed in childhood that are commonly associated with Attention Deficit and Hyperactivity Disorder:

Language disorders

Once the tiny infant does not understand speech, he will hardly respond to his name, look into his eyes when spoken to, label objects with their term, etc. By appearing to be inattentive once what he actually suffers as a nuclear problem is that he does not understand. For this reason, usually in young children, inattention with or without hyperactivity is commonly conditioned by a serious problem of comprehension of oral language and more precisely with receptive dysphagia.

Also, children with hearing impairments, presenting different degrees of hearing loss, also often present at an early age, restless and careless behaviors. For this reason, the ORL study is indispensable in those cases where probable auditory perception defects are assumed.

Autism spectrum disorder (ASD) or communication disorders:

The reasoning of oneself and others is marked by 5 evolutionary phases that usually appear especially damaged in autism spectrum disorders. However, because of the similarity of their

properties with temperamental or linguistic points such warning signs are commonly confused with language delays or inconveniences of attention, they usually go unnoticed until 3 years, once the interaction problem is already quite evident:

1) From the first months of life, babies have a sense of their own human body as an active entity in the environment around them.
2) From the second month and in parallel with the appearance of the social smile around 6 weeks, social dialogue and intersubjectivity are born linked to face-to-face exchanges with the adults who care for him (protoconversations and imitative games).
3) Between 2 and 7 months, babies begin to develop social expectations of their interpersonal interactions.
4) Around the ninth month, the first joint care protests appear: babies begin to explore the mature's attitudes towards an environmental object or fact. This phase marks the beginning of social exchanges proper, which are increasingly reciprocal and intentionally initiated by the infant himself, but also referential to objects and events in the environment. Babies then start pointing.
5) Finally, 18 months ago, the co-consciousness of oneself and others emerges: the theory of the mind that opens the door to symbolic thought and makes it possible to enter the cultural world (symbolic and quite verbal) of the mature. This last phase is based on the function of representing the perceptions and beliefs of others and on formal education.

Learning disabilities, high ability, disability

Sometimes certain children/s with varying degrees of mild mental retardation and limited intellectual capacity have the potential to be mistaken for Attention Deficit Hyperactivity Disorder. Once we are with a child/s with a low intellectual quotient (IQ) that goes to an academic center in which its complexity and mismatch is not taken into account, it is recurrent that signs of inattention appear, dismotivation and loss of interest that do not necessarily correspond to an attention deficit disorder.

In addition, neglect can be observed in highly skilled children/ers once they are placed in academically unstimulating or boring environments.

Children/s with academic difficulties in reading, writing, calculation and comprehension are constantly mistaken for attention deficit children, because the efforts and academic errors of these children sometimes coincide with the efforts seen in Attention Deficit and Hyperactivity Disorder, and it is therefore essential to make concrete and differential diagnoses.

In addition, several children with Attention Deficit Disorder and Hyperactivity show, as a characteristic linked to the disorder, learning problems, in which those related to reading occupy a prominent place: are penalized for their instrumental weaknesses of working memory and executive functionalities both in the decoding process (which is based on the receiver converting the signs that come to him from a sender into a message) and in the lexical processing of the language (identification of words). These children often make mistakes in advance, omission and substitution of letters or words. We have the possibility to look, therefore, a gigantic coincidence with the most common types of error in visual dyslexia. However, although the errors are similar, they are not continuously made in the same reading tasks, nor is their causal specification the same.

In addition, various disorders or inconveniences doctors have the possibility of presenting by present or nuclear signs of Attention Deficit and Hyperactivity Disorder which makes it difficult to identify the disorder. This complexity increases once some of these disorders remain associated or are comorbid to the Attention Deficit and Hyperactivity Disorder itself (anxiety disorders, sleep disorders, environmental stress, worry, cognitive immaturity, etc.)

The primary complexity at the time of detecting the Attention Deficit and Hyperactivity Disorder correctly part of the lack of knowledge about the disorder.

Behavioural disorders and challenging oppositionists

Subjects with negative behaviors have the ability to resist doing work or student tasks that require personal dedication through their refusal to admit the demands and rules of others. In this situation the differential diagnosis can be complicated once certain subjects with Attention Deficit and Hyperactivity Disorder show secondary negative and opposing reactions towards the analysis or the various responsibilities.

Behavioral disorder (TC) is defined by the DSM IV as a group of repetitive and persistent behaviors in which the primary rights of others or social rules corresponding to the individual's age are not respected. Diagnosis requires the existence of at least 3 criteria in the following 4 categories:

- attacks on people or animals
- devastation of property
- fraud or theft
- serious violation of rules

Behavioural disruption should significantly change social, student or professional management. Generally if the behavior disorder starts in childhood before age 10, it will be mainly more lasting. Usually persists in adulthood. Its prevalence seems to have increased in recent years and is greater in boys (6-16%) than in girls (2-9%).

The DSM IV does not say anything about the organic basis of the behavioral disorder, but it states the probability of a double etiology: genetic or environmental.

The other category of behavioral disorder could be much more similar to the juvenile delinquency psychopathology described by DSM IV. It is generally best explained by external or environmental causes (parental rejection, serious affective deficiencies, inappropriate educational practices: excessively rigid or lax, dysfunctional relatives, early integration into institutions...). In this category

of the disorder continuously there is a certain intentionality in disruptive behaviors, which is not at all in this way in the situation of TDA-H. In the situation of psychiatric behavior disorder -while behavioral protests have the potential to look very much like those of the impulsive hyperactive TDA-H profile- there is presence of intentionality: the devastation of property and violation of rules is deliberate, The children voluntarily provoke hostility and show behaviour of intimidation, as well as generally poor empathic capacity (absence of guilt).

Excessively permissive or unstructured environments also provide room for disorganized behavior, lack of habits and rejection of rules and responsibility in work. Subjects with disocial disorder and serious inconveniences of behavior (illicit behaviors, lack of respect for the rules, devastation of property, disruptive behaviors and/ or aggressive...) also have the possibility of being confused with symptomatology of Attention Deficit and Hyperactivity Disorder, especially in youth.

Non-flattering environments

Inattentive or hyperactive symptomatology may sometimes be observed once high-wisdom children remain in academically unstimulating, disorganized or chaotic environments (lacking parameters and norms), or overly firm (with applications not suited to their capabilities) or excessively demanding environments.

Such educational environments have the potential to cause stress, anxiety, agitation and inconveniences of attention and organization that are commonly confused with demotivation, vagrancy or Attention Deficit Hyperactivity Disorder.

GENERAL THERAPEUTIC GUIDELINES

• Confirmation of the diagnosis in infant and juvenile neurology or child psychiatry and occasional need for pharmacological procedure.

Cognitive rehabilitation of the most damaged functionalities, mainly: attention, working memory and executive functionalities

and other associative problems (literacy, numeracy, mathematical inconveniences).

• In cognitive rehabilitation it is also advisable to consider:
- Impulsive cognitive style
- Universal information processing.
- Lack of cognitive flexibility.
- Complexity to process several stimuli at once.
- Complexity to differentiate important information from irrelevant.
- Lack of attention.

o The student defeat:
- Critical specific areas of complexity.
- Problems in the field of written language.
- Problems in the area of mathematics.

o Behavioral points and self-esteem:
- Behavioral points: Inattentive behavior, less accentuated hyperactive behavior
or impulsive behaviour.
- Disorganization and lack of sovereignty.
- Disadvantages in the relationship with colleagues.
- Self-esteem.
- Low self-esteem.
- Depression.

• Training in management of emotions and emotional regulation and/or HHSS to feel good in a set: knowing how to respect the rules, assertively expressing a criticism or personal feeling....

• "Be alert" to the relevant acquisitions or problems that have the possibility of appearing in each evolutionary or curricular period, then a brief summary is shown which can serve as a work guide for the clinic:
- In Early Childhood Education: sensory-motor and linguistic development, sensory adhesion, lecto-writers pre-requisites and the VSP argument.

- In primary education: strengthening sensory-motor development, sovereignty of housing and class routines, systematic learning of lecto-writing and calculation.

- From 3rd EP: be able to organize and plan, habit of analysis, use reading-writing to write and learn other subjects.

- End of Primary, know how to organize, content management and analysis times (with help and external supervision), know how to learn only despite continuing need for supervision, begin to be independent.

- In the: have a base of curricular contents of Primary in relevant subjects and know how to learn: administration of contents and times of analysis, make schemes, continue motivated, be happy despite youth (emotional management).

• Give a structured and predictable environment: with rules, agreed rules and schedules constantly in view. Setting specific hours for specific tasks and drawing attention to schedule changes.

• Position yourself in a quiet place (no distracting objects around you) and around the instructor. At home, choose a quiet space for homework without distracting objects.

Maintain eye contact.

• Grant common and regular breaks: implement tasks involving displacement (stretching limbs, erasing the blackboard, distributing notebooks) between tasks involving concentration. This kind of work can promote self-confidence.

• Teach you to be patient and think before acting and equip you with procedural tactics to face the many academic tasks through self-instruction (steps to solve problems, to write a paper, to understand it...), work with typical exercises until you automate the method.

• Offer tactics to "learn to learn": I have to be attentive, have the aim of learning to look for a plan, arrange the information in categories (by transcendence, alphabetical order, looking for tricks), and most of all I have to repeat, repeat, repeat and if I can explain it to someone else, use visual aids (pictos) or auditory aids (recorders) to carry out the progressively autonomous execution of these tactics by means of self-instruction.

• Monitor less structured occupations, such as simple housing routines or times of analysis. Identify specific situations of greater complexity in order to implement a strategy for action.

• Work the internal control of time, make the physical time: sequence tasks, assign a time for each thing, that the infant plans how long he thinks it will take him to perform the work and see if it fits the scheduled time. If not, make it see because it has not adjusted. Use clocks, alarms, chronometer calendars, schedules, idealization sheets... so that the child realizes the time it takes to do each activity. Children with ADHD have the possibility to lose the idea of time in a simple way.

• Promote playful and useful/active learning, which reads for fun, to gain information or attention: Use daily life occupations to improve both reading and writing (use different materials to read: stories, magazines, books, posters, newspapers, internet, tablet, visit the library united, enjoy choosing and taking out good books for areas in which they show interest) as calculation (purchase, currency changes, pay) and organization of information to reach a final goal (market together with a list and a budget, send invitations and accommodate an event, plan the area and housing works together...)

• Praise many times and use positive reinforcement to reinforce desired behaviors.

• Conduct behavioral control systems with systematic and proportionate negative rewards and/or sequels. Try to constantly implement the same type of consequences against a certain conduct: there should be a total agreement on the type of positive and negative reinforcement that will apply after the emission of a defined behavior. Just as there should be an absolute agreement on the type of behavior that should be addressed and not. Otherwise, there could be a growth in the production of disruptive behaviors.

• It is of enormous therapeutic significance that the emotional environment surrounding an infant with this profile is as stable as possible. Bearing in mind its complexity for emotional self-regulation, an environment that does not meet this characteristic would acquire a reactivating character on the symptomatology.

• Emotional equality is also, in a way, to promote

the purchase and maintenance of simple life habits and routines (they seem to be clichés; however, they are not and even less in TDA-H):

- Sleep: it is essential that the quality and proportion of sleep are adequate. As a guideline: children 12h, primary 10h. If previous 20-30 min of waking child agitated, grumpy or tired, it is quite possible that the quality/quantity of sleep is not ideal. Tips: do not take exciting drinks 4 h before rest, do no motor or cognitive occupations of a certain magnitude 2h earlier, Put rules and clear parameters in relation to sleep habits generate routines prior and relaxing (tale, relaxation).
- Food intake: ensure balanced food intake (e.g., correlation between ferropenia and DA). Make an optimal breakfast (carbohydrates, vitamins and minerals and dairy), if the infant does not have breakfast, change schedules, take it when entering school.
- Physical exercise: moderate but various days/week, advantages: allows the supply of oxygen to the brain, optimization attention and therefore also the other changing cognitive

CHAPTER 5:
EVALUATION NEUROPSYCHOLOGICAL OF INFANTS

Introduction

The assessment process does not begin with the application of tests or examinations, but begins from the moment we know the infant. Good interaction is important. In the first sessions it is essential to explain to him that we are not "healers" but we know a sequence of "tricks" or "tactics" that will be able to assist him in his day-to-day life, however to know what might be best for him we have to work together. This approach of "teamwork" implies that the child/adolescent will have an active role throughout the entire process of evaluation and mediation, feeling involved in its improvement and thus increasing their commitment to change. He will be the one to tell us (sometimes with our help) if the "tricks" work or not, so that we can find other more effective alternatives. Therefore, it is quite advisable to give numerous sessions to work this therapeutic union. A way to do it and that also helps us

to know your moment of development and your skills in a more ecological environment, is to ask you to bring your favorite toys or games/ video games, such as analyzing why you have chosen them, how you play, how you explain the game, if you use effective tactics or how you react in the face of defeat or victory we will be able to start making our first assumptions. We ourselves will also have chosen "our favorite toys" which we will have selected in functionality of the query foundation and we will play sometimes to "their" games and others to our own.

Without losing sight of the fact that the child's brain is not a miniature mature brain, but is in full development and dynamic we do not have the possibility to forget the beginnings of development both at the extent of the assessment as well as at the time of initiating and designing the mediation programme.

Then a theoretical tour is made by the models of evaluation neuropsychology children that are thought to be most important: the transactional model and the cognitive model of evaluation premise.

The transactional model developed by Samerof, and subsequently continued by Semrud-Clikeman, has its origins in the Bronfenbrenner model, and exposes development as an active process that includes the value of the ecological point of view. Taking these concepts as an allusion, the transactional model is presented as an integrative model that combines neuroscience, behavioral neuropsychology, clinical and evolutionary neuropsychology, neurobiology, social, systemic and behavioral psychology. This model focuses on how developmental disorders interact with the environment. It also examines how disorders evolve throughout time in gravity functionality and principles. In the end, based on the model suggests how to evaluate disorders of the nervous system, neurodevelopment and acquired, to obtain the elementary information for their proper mediation. Therefore, the transactional model is an integrative model that emphasizes the dynamic interaction between the infant and the environment at all times. The relationship of functional neural systems causes behavioral, psychological and cognitive protests.

This model proves that the infant is not an island in the middle of the sea, but that in terms of assessment as well as mediation, it has to be taken into account as one more component of the system so all elements of it must participate: family, set of equivalents, school, community...

Another model that will be emphasized is the cognitive conjecture evaluation model, which makes it possible to examine the behavior of the child/adolescent in the constraints of the environment, using a problem solving methodology. This model is useful because of its comfortable and procedural nature, because following the steps it suggests allows and guides the evaluation process. The steps proposed by Hale and Fiorello have been adapted based on the transactional model. The process is made up of 13 steps that the evaluator should pass, taking into account the scope of the infant, its development history and its genetic predisposition (adapted from Hale and Fiorello)

Evaluation process

1) From the theoretical knowledge of neuropsychological development, propose why the problem has appeared.
2) Create a premise by relating cognitive-emotional behavior and functionality.
3) Maintain interviews with the family nucleus, the school and equivalents, collecting data on the development history of the infant and his past and present behaviour, relationships in the various environments, while using the neuropsychological tests chosen.
4) Neurocognitive interpretation of the results obtained from both interviews and standardized tests.
5) Identification of weak and strong neurocognitive and emotional aspects relating them to the theoretical point of view.
6) Based on the profile obtained, confirm the initial conjecture or reformulate it according to these data.
7) If you have formulated a completely new conjecture, choose new and more concrete evidence to support it. In addition, if it is essential, interviews or visualizations will be made again, both in the family and student environment,

raising more specific questions based on this new premise, with the aim of redefining the constraints and abilities of the infant.

8) Re-integrating data and interpretation from new applied tests.

Process of participation

1) Based on the requests received and the results obtained, present an initiative for participation to the actors involved: school, family, equivalent and child/adolescent. In case according to the offered measures will be continued with point 2.
2) Carry out the mediation project based on evidence and to be viable included in day-to-day routines, selecting the measures that will be used and the time at which they will be applied to assess their effectiveness. It is essential not only to use personal tests, but also to integrate ecological measures; that is, to evaluate how the relation of the infant with its field is.
3) Effective systematic participation and data collection throughout the process,
4) Examine whether the programme is being effective based on the criteria set out above.
5) If mediation is not effective return to steps 1-4 to develop other mediation tactics.

The concatenation of the two models is extremely useful, so that its implementation is advised to achieve an integral evaluation of the subject.

WHAT ARE THE GOALS OF NEUROPSYCHOLOGICAL ASSESSMENT?

Neuropsychological assessment is not limited to cognitive processes only, we have to take into account the development processes, relatives, social and emotional; that is, all those points which have the possibility of being affecting or hindering its development. We then list some of the goals that we consider most significant, adapted from Capilla and Pérez-Hernández:

- Identify the sphere of affected performance or cognitive maturation instant in order to make a drawing of the most complete feasible cognitive profile of today's infant development.
- Detect or define the extent of a viable brain injury in the infant and how it harms him in his daily life.
- Early detection of deviations from the typical prior development that may harm other processes or trigger problems such as student defeat.
- Identify the strong and weak points of view by relying on the most developed points at the time of intervention.
- Know the tactics and moment in which you use them, effectiveness, type and temporal consistency.
- Learn the internal and external components that are affecting infant behavior.
- Estimate the level of motivation of the infant, as well as the metacognition of its restrictions. For that, it is essential to look at the reaction he shows in front of his problems.
- To know the expectations of parents and the student center about the behavior of the minor and its viable evolution.

ASPECTS TO CONSIDER IN THE EVALUATION PROCESS

The assessment process is not based on a lengthy test protocol but, as indicated above, the neuropsychological assessment is a constant process of conjectural contrast. In this way, the professional should be active generating conjecture of the probable problems of the infant, with the aim of defining the reason for the efforts he shows and that affect his development. After a first evaluative approach, extra evidence is sought to review or object to the premises that have been formulated. For that, it is necessary to examine the different apparatuses accessible, and choose them in functionality of the history of the infant, the existing data, and the interaction "predominant" brain-behavior in the developing brain.

Attention should be paid to this test selection process because it will be determinative and guide the achievement of results. In this way, since, it has to be exposed evidence that varies in

functionality of its difficulty, from the simplest to the most complex, its degree of understanding, from the most related to the novel, and the number of possibilities evaluated, from an exclusive modality to some sensory possibilities. On the other hand, tests constructed in such a way as to enable the meticulous evaluation of the same cognitive functionality will be applied; in the case of the viable, tests that are adapted and calibrated will be chosen.

Questions to be asked in the selection of tests

- Do the subtest requests in relation to access, processing and output of information remain evaluating that which I am tempted to evaluate? (Validity)
- Does the subtest have the right technical properties to evaluate the process in which I am interested? (content validity)
- If the infant has used a specific plan, is the subtest evaluating something different for that reason? (Sensitivity)
- Did a change in my relationship style with the child or in the management of the test impair the results in any way? (Therapeutic relationship)
- Could the infant's behavior before, during or after receiving help to solve the task describe his performance? (Self-Regulation)

Possible explanatory scenarios depending on the behaviour observed.

	Behaviour that manifests	Possible explanatory scenarios
Strategies utilizadas	Persistence of strategies not effective.	Deficit in memory of work. Deficiency in inhibition of response. Lack of supervision of the conduct.

Interruptions	Successive disruptive interruptions during evaluation.	Response inhibition deficit. Decreased motivation. More difficult perception of the subtest. Deficit awareness. Internal distractors.
Language	External language during subtest execution.	Economizar recursos cognitivos. Perception of subtest difficulty. Language as self-instruction to improve performance del test.
Errors	Skip errors at the end of a cancel task.	Poor visual tracking strategy. Sustained attention deficit. Decrease in commitment to the task.
Type of stroke	Trace is unstable.	Impulsivity to complete the task as soon as possible. Difficulty and lack of control in fine motor skills. Low motivation for the task.

Time spent	Excessive time spent on the task.	Difficulty in understanding instructions. Difficulty in the evaluated process Reflective and analytical style. Tendency towards perfectionism and a high level of self-demand. Decreased motivation. Fatigue. Lack of information processing speed.

SELECTION OF TESTS FOR THE CREATION OF A NEUROPSYCHOLOGICAL EVALUATION PROTOCOL

Bearing in mind that the brain functions as a unit using different pathways, and therefore it is quite difficult to isolate certain specific areas of performance; In this section we will highlight a selection of tests used in the neuropsychological evaluation of children. For that, they have been organized into the predominant area of functionality evaluated and then given some details of them in order to serve as a guide to the reader for their application. It is recalled that only some of the existing evidence is presented.

Neuropsychological and cognitive development assessment batteries	**Age of application**
Neuropsychological Evaluation NEPSY - II	3 to 16 years
Children's Neuropsychological Maturity Questionnaire, CUMANIN	3-6 years

Reynolds Intelligence Scales and Brief Intelligence Test Reynolds, RIAS and RIST	>3
Wechsler scale Preschool and primary intelligence, WPPSI-III	2 years 1⁄2- 7.3 years
Wechsler Intelligence scale for children, WISC- IV	6-16.11 years
Non-verbal Wechsler scale of intellectual aptitude, WNV	5-21.11 years
Revised Merrill - Palmer Development Scales, MP-R	1 month- 6 years 1⁄2

Evaluation of motor behaviour

Evaluation of motor behaviour	**Age of application**
GroovedPegboard (perforated panel with slots)	> 5 years
MABC-2, Movement Assessment Battery for Children	4-16 years

Assessment of care

This section will present some of the evidence that is available on the market to assess care in children and adolescents.

Tests to assess care

Assessment of care	Age of application
Care test D2	> 8 years
Revised CARAS-R difference perception test	6-18 years
Test of words and colors, Stroop	7-80 years
Five-digit test, FDT	> 7 years
Test sustained care in childhood CSAT	6-11 years

Test AULA Nesplora	6-16 years
Conners Kiddie Continuous Performance Test, K-CPT V.5	4-5 years
Conners Continuous Performance Test II Version 5, CPT	> 6 years
Simple Visual Tree Discrimination Test (DIVISA)	6-12 years

Evaluation of language

The following is a selection of some tests that may be of interest for an initial general assessment of language in children and adolescents

Evaluation of language	Age of application
Inventory of communicative development, MacArthur	8-30 months
Peabody Image Vocabulary Test, TVIP	2 years 1⁄2-90 years
Revised reader process evaluation battery, PROLEC-R	6-12 years
Evaluation of the reading processes in pupils of the third cycle of primary and secondary education - PROLEC - SE	10 to 16 years
PROESC. Writing Process Evaluation Battery	8-15 years
CELF Preschool 2 – Spanish	3-6 11 years

Evaluation of memory

The following are the main features of a series of tests designed to assess memory

Evaluation of memory	Age of application
Spanish-Complutense children's Verbal Learning Test, TAVECI	3-16 years
Memory and learning test, TOMAL	5-19 years and 11 months

Complex figure of King-Osterreith. Phase of recovery	> 4 years
Benton visual retention test	> 8 years
Clinical Evaluation of Memory, ECM	6-80 years

Evaluation of executive functions

From the available evidence, four tests have been selected to assess executive functions in childhood

Evaluation of executive functions	Age of application
Matching test of known figures MFF 20	6-12 years
Neuropsychological evaluation of executive functions in children, ENFEN	6-12 years
BRIEF Behavioral Evaluation of Executive Function	5-18 years
Brief-P Behavioral Evaluation of Executive Function - Version Childish	2-5 years

Evaluation of behaviour

A number of questionnaires have been selected to assess the child's behaviour in various contexts, providing information about his or her behaviour, emotions and feelings.

Evaluation of behaviour	Age of application
Screening for emotional and behavioral problems in children, SPECI	5-12 years
BASC Behaviour Assessment System for Children and Adolescents	3-18 years

SENA Evaluation System for Children and Adolescents	3-18 years

PREPARATION OF THE NEUROPSYCHOLOGICAL REPORT

The preparation of the report is the last step in the neuropsychological assessment process. We are talking about a file which contains all the important information, both qualitative and quantitative, gathered during the evaluation process; It includes the conclusions to which it gave rise. The neuropsychological report should be as complete as possible and contain all the necessary data to enable it to be checked by other experts.

Once all this information is available, the report can be written. This should first contain all the patient's personal information: full name, date of origin and age, address and contact phone number, studies done, manual dominance, development history and assessment date. The reason for the consultation is then explained by setting out the objective of the evaluation, describing the events which give rise to the evaluation and who makes the claim.

Then, the previous relatives and individuals must be explained, including the clinical history related to motor development, cognitive, language, emotional and social, academic performance and pathologies or disorders suffered. To conclude, in this section we have to integrate previous relatives that are related to the disorders of the infant or young person.

The following section should evaluate recent pathologies or disorders, including the first indications and describing the results found in other clinical reports, as well as previous treatments or interventions.

In the section of neuropsychological assessment, the tests and examinations applied must be specified, with reasons for their choice and the components that may have influenced the infant's performance.

Then, the cognitive skills will be evaluated as a result of the results found in the application of the assessment tests. This section will include information, both qualitative and quantitative, related to performance, best skills and their elements, disadvantages encountered, type and severity, tactics used, retained abilities; describing if we are talking about strong points of view, in order to rely on them for viable participation. It is indicated to accommodate this section of the best skills in:

- Attention system: attentional breadth, degree of selective, sustained, alternating and divided attention.
- Speed of information processing.
- Perceptive and constructive skills by evaluating their accuracy and effectiveness, including the tactics used.
- Fine and gross motor skills and praxias. as well as their control, impulsivity and accuracy.
- Memory skills, such as: instant memory, short- and long-term memory, learning curve, sensitivity to interference and tactics used.
- Language skills: expressive and receptive language, literacy.
- Executive functionalities, such as working memory, planning, goal setting, flexibility of mind and metacognition.

Subsequently, the behavioral and emotional points seen throughout the evaluation process have to be explained. in this way, the reaction shown by the infant or boy during the assessment process, behavioural changes, emotions expressed with regard to his or her vital spheres, such as: his or her family, set of equivalents and student environment, the awareness of the deficit and the level of daily involvement. Important information obtained from parents and teachers will also be included in this section, such as considerations that the examiner himself has seen by viewing the video clips and/ or studying the notes taken.

Finally, the conclusions drawn from the performance of the cognitive system, emotional, behavioral, taking

as an allusion to typical development. In this way, a neuropsychological profile will be established with precise suggestions and establishing a viable programme of participation.

The above is the general composition that should be contained in any child neuropsychological assessment report. However, certain particularities will be established in the functionality to whom it is addressed: the return of information will not be carried out in the same way once the recipient of the information are the parents, the child/adolescent or other health or educational experts. Thus, first of all, it should be considered that the content and language will be adapted to the functionality of its recipient; For example, if the report is directed to a neuropediatra it will put more emphasis on cognitive processes than if it was directed to a teacher in which there will be more emphasis on proposals for participation in the classroom. Be that as it may, once the written report has been delivered, it is proposed to make a brief explanatory session both in consultation with the parents and the infant, and at school with the teachers. This explanatory session will provide examples of the day-to-day implications of the efforts encountered.

WHEN TO REFER THE NEUROLOGIST?

Observation throughout the evaluation process is significant because it can provide valuable information. Thus, in the face of any manifestation indicative of a neurological problem, an instantaneous derivation will be carried out with the intention that its neurological functionality is evaluated. Protests have the potential to be different.

The following are some of the most common:

An infant may exhibit sudden motor awkwardness, unilateral or bilateral motor exhaustion, or involvement in the mouth, tongue, eyes, or face muscles. This event may be reflecting an involvement of the cranial pairs that innervate these regions.

However, severe headaches (often morning), sometimes accompanied by vomiting and/or high fever, are likely to indicate inflammation of the meninges or encephalitis; Therefore, the urgent action of a medical professional may be essential to prevent this pathology from getting worse.

There are more common types of epilepsy in the child population, so that, faced with the existence of rapid blinking, gaze fixed on the void, aura or visual absence or other perceptual modality, should be derived quickly; because it is quite likely that one or more foci of epileptic activity will be seen on a neurological examination.

The explanation of visual or olfactory hallucinations may be indicating the existence of underlying neurological malfunction, not Thus if the hallucinations were auditory that could indicate a psychotic disorder, less common in the child population. In the face of doubt, criticism from another professional is not a bad thing, so a referral will also be made.

However, if in the precedents there is the existence of an unstudied cranioencephalic trauma, it is essential to make a complete medical analysis to exclude any type of cerebral malady.

In the end, although the analysis of better cognitive functionalities such as memory, attention, language, executive functionalities or perception are central to neuropsychological analysis; In the face of any sudden change or unexplained decline in performance in a job that measures such functionalities, a neurological examination is required with the intention of making a differential diagnosis with probable diffuse impairments or tumors. A standard neurological examination would consist of review of the infant's fundamental and developmental history, assessment of his state of mind, assessment of the servible capacity of the central and peripheral nervous system, as well as the evaluation of motor systems and sensory functionalities.

It is estimated that neuropsychological evaluation is interdisciplinary, and therefore not only the

participation of neurologists, but if necessary other experts such as speech therapists, physiotherapists, occupational therapists or therapeutic pedagogues should be consulted not only in the initial assessment but also in the follow-up assessments.

CONCLUSIONS

In this chapter we have presented an approach to the neuropsychological evaluation of children, starting from the transactional model. Therefore, it is considered essential to have a universal perspective that evaluates the child/adolescent as a product of his influences with the environment and the conditions surrounding him. We are talking about an active being which, while being influenced, influences its own development and behaves according to inherited biological properties; as well as participating in their own cognitive abilities. To facilitate the evaluation process, the steps offered by the cognitive premise assessment model have been adapted and included in the transactional design, guiding both throughout the neuropsychological evaluation process and subsequent participation.

During and after the evaluation, the interpretation of data will focus not only on quantitative points but also on qualitative ones; that provide as much or more information about the child's behaviour and the probable reasons which continue to influence his maintenance. Therefore, it is proposed to film in video clip the execution of the tests, prior parental consent, to enable their viewing and subsequent analysis.

Once the testing has been completed, the evaluation process continues with the writing and interpretation of the results report. This file should contain all the information gathered, as well as likely mediation proposals. These proposals will not only focus on neuropsychological points, but, starting from an interdisciplinary concept, each of the vital areas of the minor will be evaluated, excluding probable neurological injuries in case of consideration. At the end, a step that should not be forgotten, is the return of data and its interpretation to whoever is primordial, adapting the language in functionality of our interlocutor.

In short, the evaluation process is dynamic and of enormous relevance because it is not dependent on a definite moment but is constant and preserved throughout the whole participation.

CHAPTER 6:
TECHNIQUES OF NEUROIMAGING USED

Introduction

Advances in neuroimaging in the last decade have brought several findings in attention deficit/hyperactivity disorder (ADHD). The rapid technological development, together with that of genetics and neurochemical investigation, indicates a dysfunction of the frontoestriatal circuit involving the prefrontal cortex and its interaction with the nuclei of the base, thalamus and cerebellum as the pathophysiological basis of this disorder, Several studies have therefore focused on this circuit. It is clearly these data that may help to characterize the cognitive models underlying Attention Deficit Hyperactivity Disorder.

Although the development of neuroimaging in Attention Deficit and Hyperactivity Disorder is promising, both structural techniques -magnetic resonance (MRI)- and functional - positron emission tomography (PET), Exclusive photon emission computed tomography (SPECT), RM usable, spectroscopy, magnetoencephalography-, there is a huge dispute about its usefulness

diagnostic or therapeutic in this disorder. We do not know how to integrate these novel techniques into a diagnosis and procedure that is basically inspired by the clinic. Currently, neuroimaging is not indicated in common clinical practice, except to rule out certain medical and neurological disorders that have the possibility of either emulating or being comorbited with ADHD.

However, it is feasible that, in the near future, neuroimaging will be complementary to clinical evaluation, favoring more accurate diagnoses, identifying subtypes and even the procedure modality and its monitoring. With the recent technological and methodological requirements, its future usefulness as a screening instrument in Attention Deficit and Hyperactivity Disorder seems complex, even more so with the life of economic and fast devices such as scales or ecological registers, which have proved to be very useful in this section.

The achievement of this diagnostic-therapeutic objective will only be successful by minimizing the inconveniences that are affecting the investigation in this field: methodological differences between the various studies concerning the measurements of the multiple constructions studied, the interference of the medical procedure with the results (especially conflicting situation), the age and gender of the patients in the samples or related comorbidities.

MODALITIES OF NEUROIMAGING

Structural neuroimaging

Structural MR, through studies on brain morphology (volumetric studies), cortical thickness, or promising techniques by diffusion tensor (identification of white substance tracts), is an interesting instrument for investigation.

Different studies in children with Attention Deficit and Hyperactivity Disorder have documented alterations in the frontal lobe, in

Especially in the prefrontal cortex, as well as in the corpus callosum splenium, caudate nucleus and cerebellum. The total brain volume is 5% smaller in boys with ADHD than in controls at the expense of a decrease in cortical thickness in these areas. Large sample sizes are needed to show these differences with statistical significance, since the volumetric discrepancies in these areas are commonly manifest in the general population and the common brain development is markedly dynamic in childhood. The volumetric results in interaction with the white substance are different in the multiple publications and it will probably be the diffusion tensor technique that provides more data on this.

Although it has been described that such volumetric reductions are observable in the 4 brain lobes, several sets have published reductions in the volume of the prefrontal cortex, mostly in the right hemisphere, with the characteristic loss of frontal asymmetry, particularly damaging to the prefrontal and premotor surfaces. These morphometric differences have been demonstrated in naïve patients, for which they are doubtless likely to be attributable to the effects of the medication.

Regarding the basal ganglia, studies with large population samples have reported a decrease in the volume of the right and/or left caudate nucleus, but not of the putamen and doubtless of the pale. Diffusion tensor techniques have confirmed abnormalities in the caudate nucleus of patients with Attention Deficit Disorder and hyperactivity at controls. Several other areas that could suffer a volumetric decrease in the Attention Deficit and Hyperactivity Disorder are: bilateral retrocallosa zones, right frontal medial gyrus cortex retroesplenial and human corpus calloso in its previous and/ or subsequent amount, where the above amounts correspond to the crossing into the other hemisphere of the prefrontal cortex fibers and the subsequent amounts correspond to the crossing of the parietooccipital fibers.

The cerebellum could also expose a universal or partial volume decrease, especially damaging to the vermis. In what the brain volumetric changes seem to be related to a poor

inhibitory control, the changes in the cerebellum would be more related to the modulation of the activity of the frontoestriatal circuit.

Children with ADHD had a universal thinning of the cerebral cortex, most in the preeminent and medial prefrontal area. The boys with the worst prognosis had a higher initial thinning of the left medial prefrontal cortex than the group with the best prognosis and that the control group. The evolution of cortical thickness development did not vary significantly between ADHD and control, except for right parietal cortex, producing a normalization of the cortical thickness in the better-predicted set, which could suggest a compensatory cortical change. The boys with the worst prognosis showed a persistent thinning of the left medial prefrontal cortex.

Functional neuroimaging

Currently some people think that the techniques of servible image are the most correct to generate medium-term results in the functioning of ADHD, since the low impact sizes observed in structural studies make it ineffective from a clinical perspective. Commonly, functional studies have been designed using average equipment statistical analytical techniques. Since such studies are limited in identifying robust and reliable results in individuals, the study tactics have consisted of recomposing image data in a standardized anatomical location and equating results between samples of Attention Deficit Hyperactivity Disorder and healthy controls or with other neuropsychiatric pathologies other than the Disorder for Attention Deficit and Hyperactivity. Such average cluster studies may be useful in the analysis of pathophysiology and the impact of the procedure, but not adequate to support diagnosis, as these techniques would require the function of correctly differentiating usual findings from anomalous ones in particular patients.

Techniques based on radioactivity

SPECT and PET.

SPECT.

SPECT is done after individual injection or inhalation of radiopharmaceuticals such as xenon-133, iodine-123 or technetium-99m, which are distributed in the human body and brain by emitting a unique gamma flash once they break down. The most active brain surfaces receive more blood flow and more radioactive tracer, which is detected by the SPECT camera. Although initial studies showed limited blood flow in the striatum, the low spatial resolution of this technique and ethical restrictions have displaced it.

PET.

Works similarly by injecting or inhaling radiopharmaceuticals such as oxygen-15, carbon-11 or fluoride-18. Once they break down, they emit positrons detected by the PET camera. Some PET procedures are flow-dependent, while others measure brain metabolism ratios. These techniques are still being displaced by the RM available, thanks to its greater spatial and temporal resolution and the lack of radioactivity, with the implications that it entails from an ethical perspective. However, PET is still used to learn receptor characterization, to measure levels of the dopamine transporter and to quantify extracellular dopamine, and it is feasible that in the future some of these studies will be able to serve from a clinical perspective.

Initial studies suggested a reduction in universal metabolism in patients with Attention Deficit Hyperactivity Disorder, although later the results were contradictory. PET makes it possible to quantify the effects of different drugs in a dynamic way on personal subjects. As an example, methylphenidate appears to increase metabolism and perfusion of the frontoestriatal zones

estriatal dopamine transporter receptor after a single dose of quick-acting or osmotic methylphenidate, with subjects taking osmotically released methylphenidate persisting under the effects of the drug for 7 hours after ingestion of the drug, Meanwhile, the recipients' occupation returned to baseline within 3 hours of ingesting the immediate-release methylphenidate.

In relation to the quantification of DAT1, although an initial analysis by IPI of the use of carbon manager 11 altropano showed that patients with Attention Deficit and Hyperactivity Disorder had 70% more of estriatal DAT1 , Further studies using different ligands and techniques have found fewer impact sizes and, in some cases, even less DAT in Attention Deficit Disorder and Hyperactivity Disorder patients. At present, it is difficult to draw conclusions, given the methodological differences between

Techniques not based on radioactivity

Spectroscopic MRI.

We are talking about an MRI that quantifies different chemical markers that indicate the reality or not of neuronal totality, rupture of the myelin, etc. There are few studies that value the usefulness of this test in Attention Deficit and Hyperactivity Disorder, and again the results are very diverse, but a priori it seems promising in the identification of chemical anomalies typical of the disorder.

The two most important studies in adults with Attention Deficit Disorder and Hyperactivity, despite the poor population size studied, revealed, on the one hand, a low concentration of N-acetylaspartate in the left dorsolateral prefrontal cortex and a reduction of the glutamate/creatine index in the right anterior cingulate cortex in adults with Attention Deficit Disorder and hyperactivity compared to the control set.

RM helpful.

This technique exceeds previous ones concerning innovation. Servible MR uses the general principles that closely relate neuronal activity to metabolism and blood flow. It can record cerebral hemodynamic changes that accompany neuronal activation and enables the helpful evaluation of sensory, motor, cognitive and affective processes in habitual and pathological brains. It is not invasive (does not require injections or inhalations) and is radioactive, and can be repeated many times in the same individual, which allows prospective studies in the same patient using different tasks on different constructions and brain networks. The great spatial and temporal resolution allows for greater flexibility in job designs. Arterial staining techniques can be used to scan subjects at rest and can provide measurements of cerebral blood flow. The magnetic fields associated with specialized cognitive activation tasks are capable of generating robust results in personal subjects, which makes it possible to characterize pharmacological effects and examine variability between patients.

MRI shows local abnormalities in brain activation, especially in the frontal lobe and, to a lesser extent, in the striatum, accompanied by an abnormal activation of large brain areas in the management of cognitive functionalities in Attention Deficit Hyperactivity Disorder, which indicates the different deficit associated with this disorder.

Magnetoencephalography.

Magnetoencephalography is a technique that makes it possible to record the magnetic fields caused by the flow of intracellular electric current through the dendrites of pyramidal neurons, offering an outstanding temporal resolution and a high spatial resolution. Records, from the cranial area, the magnetic field created by brain neural sources and establishes direct cortical neuronal activity without distortion, with a temporal resolution of 0.1 ms and spatial resolution of less than 1 mm. The fusion technique with a high-resolution brain resonance image

makes it possible to locate the dipoles and look at the cerebral bioelectric propagation and its deviations in cases of Attention Deficit Disorder and Hyperactivity. Like other techniques, this may be effective in improving understanding on several neurobiological points of ADHD.

FUNCTIONAL NEUROIMAGING IN EPILEPSY

Progress in biomedical technology has allowed an improvement in the assessment of patients with epilepsy, not only in relation to the location of the epileptogenic focus, for the purpose of surgical resection; but in an improvement in the reasoning of the physiological process of many epileptogenic wounds. A review of available imaging tools for the assessment of patients with epilepsy follows.

The identification of wounds by means of such diagnostic procedures may represent advantages in terms of prognosis, therapeutic alternatives, as well as follow-up. It is of enormous significance to be quite careful in the correlation of the imaging findings with the neurophysiological findings, since not precisely each of the structural wounds identified are epileptogenic. We then examine the primary functional radiological tools that are applied in the assessment of patients with epilepsy.

Spectroscopic magnetic resonance (MRS)

The use of MRS makes it possible to assess the totality as well as the capacity of neurons by measuring the metabolite N-acetyl aspartate (NAA), a common product of neuronal cell metabolism. NAA is an indicator of neuronal dysfunction, not just cell loss. Other metabolites that may be measured using this technique are creatine, choline, lactate, GASA, glutamate and glutamine. Abnormal profiles of these metabolites are likely to be found in temporal lobes that are traditional in MRI, as well as in about 50% of patients with a structural abnormality of one of the hypocarpos, indicating that the EMR could be quite sensitive to disease detection.

MRS is much more effective than volumetric MRI studies in lateralizing the epileptic temporal lobe in those patients with atrophy of the two hippofields. The functionality of MRS to identify abnormalities (83%) is similar to the function of MRI to identify volume-to-degree loss in the hippocampus. Once the two procedures are combined, detection capability grows to 93%. Eventually, the use of MRS has been extended to investigate the multiple mechanisms of action of new antiepileptics.

Magnetic resonance imaging (FMRI)

FMRI is a technique that enables the purchase of images in as little as 20 milliseconds. This diagnostic instrument makes it possible to map different brain areas, measuring the useful brain activation, based on the detection of changes in the signal thanks to changes in the concentration of deoxyhemoglobin, which is a paramagnetic substance.

FMRI could be used to assess specific brain areas along motor occupations, hearing, perspective, taste, olfaction, language production, and other cognitive functionalities.

Currently the FMRI could be used to lateralize language, as well as for detection of epileptogenic foci once this technique is used throughout the convulsive episode or for mapping of Anterictal spikes.

Diffusion resonance (DWI)

DWI is a series of MR in which water movements in the brain are identified and quantified. The boundaries used are diffusivity and fractional anisotropy. Growth in diffusivity correlates with neuronal loss and gliosis, where fractional anisotropy is linked to fluid displacement. The movement of fluid is restricted to the neural axis or myelin sheath. Once a neuronal defect exists, fractional anisotropy decays as the fluid moves freely. Using this procedure makes it possible to detect epileptogenic surfaces, which are not identified by means of

the use of conventional sequences. This sequence is effective in status epilepticus.

Exclusive photon emission tomography (SPECT)

The SPECT is analogous to an immediate photo of blood flow at a definite instant, after injection of a radioactive marker, which is mainly 99Tc-HMPAO, or other markers that are susceptible to cerebral blood flow, as different central grade benzodiazepine receptors.

This technique makes it possible to map the area of the brain involved in the generation of seizures or the so-called "epileptogenic focus". The marker is injected along a convulsion (iclal SPECT), and then along an interictal seizure (interictal SPECT). A "hot spot" will be seen representing the hyperperfusion of blood along the ictal span, in which an "icy focus", or hypoperfunded region, will be seen in the interictal succession. By matching the two sequences of tomography, we are going to have an initiative of the localization of the epileptogenic focus.

This technique is even effective once the electroencephalographic record is not effective at the location of the epileptogenic focus, especially in patients with extratemporal epilepsy.

Once SPECT is combined with co-recording techniques, one can "map" the sector of the brain involved in the generation of convulsions.18 Co-recording has to do with overlaying the image obtained by SPECT on an magnetic resonance image; there are programs (software) that can enable this, the most popular being the so-called SISCOM.

The constraints of its resolution at the time may lead to the image being observed as the secondary dissemination sector, rather than the primary focus. SPECT is more accessible and cheaper than PET.

Positron emission tomography (PET)

Positron emission tomography (PET) is a quantitative diagnostic technique. Due to the availability of a variety of ligands, measurement of glucose metabolism, benzodiazepine central receptors, various subtypes of opioid receptors and dopamine receptors is feasible.

18F - f1uorodeoxiglucosa PET, which is the most used technique, allows obtaining images in which the glucose metabolism is evaluated. The existence of hypometabolism of glucose is a sensitive yet unspecific marker of brain dysfunction. Regional hypometabolism passes in about 90% of patients with temporal lobe epilepsy. Focal or diffuse hypometabolism passes in about 30-50%of patients with neocortical epilepsy.

The existence of hypometabolism, not only suggests neuronal loss, but also a metabolic abnormality. The level of hypometabolism, including correlates with postoperative prognosis in temporal lobe epilepsy. The limitations of this analysis are mainly: high price, exposure to radiation, reduced accessibility and its semi-invasive nature (because for quantitative studies, arterial cannulation is elementary).

Magneto encephalography

Magnetoencephalography (MEG) is a subjectively new technique in neurology and epilepsy. MEG studies magnetic fields caused by electrical activity passing through the brain. In the situation of epileptic discharges, the magnetic fields caused by them, are orthogonal to the electric currents of the EEG and follow the so-called "right lamano rule", these magnetic fields together with the EEG records, allow a correct location, and in some cases stricter than the use of EEG only. Magnetic field maps have the possibility of being extrapolated and coregistered into resonance images, which is known as magnetic source display, and thus allows a much greater spatial resolution than EEG, and generally than any other diagnostic tool.

MEG is a technique that is still in the experimental stages, but it is increasingly being used clinically.

The clinical use of MEG in recent years has focused on the location of vital areas, such as somatosensory, motor, visual, auditory, language cortex, and even memory location protocols; is also used in the location of epileptogenic foci.

The MEG, thanks to its locator capacity of electric shocks in the brain, which is used for the location of epileptogenic foci, combined with its non-invasive ability to locate essential cortex, make it a fairly fundamental instrument in the pre-surgical assessment of patients with epilepsy.

CONCLUSION

The application of neuroimaging in the clinic, as diagnostic procedures, allowed us to obtain increasingly descriptive information about functionality and indirectly about the anatomy of the brain. This has made it possible to detect subtle wounds of the development of the cortical mantle, incipient acquired brain injuries and obtain a better characterization and information about other injuries. For the above reasons the use of functional neuroimaging became the diagnostic procedure of choice in the analysis of patients with epilepsy. Advances in these different techniques promise to be very useful in the analysis of patients with epilepsy.

NEUROIMAGING IN THE STEM

Structural neuroimaging: Studies with structural magnetic resonance

Magnetic resonance imaging (MRI) structural neuroimaging studies complement neuropathological findings. In the 1980s, they described the existence of hypoplasia in the lobes VI and VII of the vermi and in the cerebellous hemispheres in patients with autism spectrum disorders, after this discovery is replicated in other

jobs. The viable interaction between the frontal lobe and cerebellum suggested by neuropathological studies is also described by Carper and Courchesne, with structural neuroimaging. These scholars find a correlation between the volume growth of the frontal lobe and the level of cerebellar variation.

In addition, other studies detail bilateral growth of the size of the amygdala and hippocampus. Several studies document a reduction in callus body size. This discovery is also in patients with autism spectrum disorders in which an increase in volume is also detected in the temporal, parietal and occipital lobes.

Several neuro-imaging studies report an increase (5 to 10%) in brain volume in boys with autism spectrum disorders. Therefore, there would be an anomalous regulation of brain growth characterized by overgrowth in early and middle childhood, followed by an abnormally slow increase.

However, in late childhood, youth and adulthood the results are contradictory, with no increase in brain volume or differences in brain volume compared to the control set. Despite the objectivity of evidence on increased cranial circumference, weight and brain volume in patients with autism spectrum disorders, the underlying biological mechanisms remain undetermined. Studies of total brain volume in boys with autistic spectrum disorders provide indirect evidence for atypical structural connectivity in autism. Redcay and Courchesne, do a meta-analysis combining the data from the measurements of the cranial perimeter, the MRI and the post-mortem cerebral weight. They have a common or limited brain size at birth, followed by a rapid brain growth rate and later an abrupt cessation of brain growth between the ages of 2 and 4. This rapid early increase interferes with the usual development of cortical connectivity. By the way, the period of overgrowth basically coincides with the period of apogee of the processes of synaptogenesis, apoptosis and myelinization. This altered increase is most pronounced in the frontal lobe, where synaptic connectivity patterns of pyramidal cells mainly take years to mature. Because of which, the long-distance cortical and cerebellar connections

remain altered due to this disruption of the regular time scale, producing a sub-connectivity between fundamental areas of the brain.

Tissue grade alterations in brain volume are reflected by regional differences (increase and reduction) of white substance (SB) and gray substance (SG) compared to the control set. In addition to the differences in the cortical head of certain grooves, located primarily in the frontal, temporal and parietal zones,

Studies with voxel-based morphometry

Voxel-based morphometry (VBM) structural studies provide data on the decrease of SB volume in the callus body and in the two cerebral hemispheres, primarily in the left hemisphere, including the preeminent Temporal Gyre and the Broca sector. The reduction in the volume of SB in the callosum human body indicates the reality of a diminished interhemispheric neural connectivity in frontal, temporal and occipital zones. Other studies show a decrease in OS volume in the frontal lobe, limbic system, basal ganglia, thalamus, insula, temporal and parietal zones, brain stem and cerebellum. However, there is also an increase in the volume of OS in areas of the frontal, temporal, parietal and subcortical lobes in both hemispheres, involved in language and social relationship processes. From the perspective of development, the fact that the two process teams share a common anatomical substrate indicates that the purchase of language and social cognition would be related.

Cortical thickness studies

In age functionality, patients with autism spectrum disorders show significant differences in cortical thickness on frontal, temporal and parietal surfaces. This event indicates that cortical dismaturation is not restricted only to childhood, but encloses all life. In adult patients with autism spectrum disorders, reductions in cortical thickness are observed in the inferior frontal gyrus, inferior parietal lobe and preeminent temporal groove.

There is also a reduction in cortical thickness in the prefrontal cortex, and in the temporooccipital gyrus. These findings are consistent with alterations in the volume of frontotemporal SG and SB in the human corpus callosum.

Both voxel-based morphometry and cortical thickness studies report structural differences in brain surfaces involved in social cognition, communication, and repetitive behaviors.

Studies with diffusion tensor

Diffusion tensor studies (DTI, diffusion tensor imaging) allow to find out the composition of BS and directly evaluate brain connectivity. Most studies show a reduction in fractional anisotropy values in the corpus callosum SB, as well as in the frontal, temporal, parietal and occipital lobes. Especially in the prefrontal cortex, orbitofrontal cortex, anterior cingulate gyrus, preeminent temporal groove, preeminent temporal gyrus, amygdala, frontotemporal pathways, temporoparietal connections, Thalamocortical connections, preeminent and inferior longitudinal fascicle, formica, uncinate fascicle, frontooccipital fascicle, arched fascicle and inner capsule.

In addition, a reduction of fractional anisotropy is explained in the preeminent and middle cerebellar peduncles, as well as in the short intracerebelar fibers; studies also reveal a lack of connectivity between the cerebellum and the neocortex.

Especially, the significant decrease of fractional anisotropy in the human callosum body is related to a loss of left asymmetry and a reduction of interhemispheric connection in patients with autism spectrum disorders. This event indicates alterations in long-distance corticocortical connectivity involved in language processing and social cognition.

Despite the inconsistencies in the findings with DTI in boys with autism spectrum disorders of younger age, the general trend is that in older and younger boys there is a decrease in the totality of SB related to the subjects of the control set. This decline persists in adulthood, probably constituting the biological basis for the reduction of connectivity in adult patients with autism spectrum disorders.

Useful neuroimaging: MRI studies with spectroscopy

The most consistent finding, when learning brain metabolism in patients with autism spectrum disorders by MRI with spectroscopy, is the decrease of the concentration of the neuronal marker N-acetyl aspartate (an indicator of neural density and viability). This reduction is found in various brain areas such as the hippocampus-amygdala complex and the cerebellum, frontal, parietal and temporal zones, the cingulate gyrus and the thalamus. These data suggest neuronal hypofunction or immaturity in these areas.

It also explains a decrease in levels of other brain metabolites such as creatine (creatine and phosphocreatine), choline (choline and elements containing choline), myoinositol and glutamate in cortical and subcortical constructions. Decreased concentration of choline in the temporal lobe, anterior cingulate gyrus and thalamus. Decreased creatine concentration in the thalamus, human caudate core body, occipital SG, frontal and parietal SB, as well as in human callosum body. Decreased concentration of myoinositol in the caudate nucleus, insula, occipital zone, frontal and parietal SB, and callosum human body. In addition, low concentrations of N-acetyl aspartate and creatine in the amygdala are associated with greater severity of early development.

On the other hand, an increase in the concentration of certain metabolites is specified. Exemplifying, an increase in the concentration of N-acetyl aspartate, creatine and choline in the prefrontal lobe, as well as elevated levels of N-acetyl aspartate/choline ratio in the anterior cingulate gyrus and N-acetyl

aspartate/creatine, choline/creatine and myoinositol/creatine in the hippocampus-amygdala complex. It also explains the growth of creatine and choline levels in the caudate nucleus, as well as myoinositol and choline in the anterior cingulate gyrus and striated nucleus. Increased choline/creatine ratio is associated with the severity of autism signs. The methodological plurality of these studies complicates the interpretation of results.

Studies with exclusive photon emission tomography

Decreased cerebral blood flow is a discovery studied in patients with autism spectrum disorders using exclusive photon emission tomography (SPECT). This decrease in perfusion is located in various areas of the frontal, temporal, parietal and occipital lobes, as well as in the cerebellum, thalamus, basal ganglia and limbic system. Both in the insula and prefrontal areas. These alterations are more pronounced in the left hemisphere, a fact that would support the life of a dysfunction of the left hemisphere in patients with autism spectrum disorders. In this sense, referring to alterations in the development of language and communication, deficits in cognitive development, as well as disturbances in perception and response to sensory stimuli.

Studies with positron emission tomography

Positron emission tomography (PET) provides evidence of brain metabolic dysfunction in patients with autism spectrum disorders. There is a head of hypometabolism in the thalamus, frontal and temporal lobes, associative auditory cortex (upper temporal gyrus) and adjacent multimodal cortex (upper temporal groove).

During the execution of a verbal auditory stimulation, an inverse hemispheric dominance is received (less activity in the preeminent left temporal gyrus and more on the right). These findings suggest the conjecture of temporal lobe dysfunction, as well as atypical language dominance in patients with autism spectrum disorders. In another study, they found a correlation between

hypoperfusion of the preeminent left temporal gyrus and a greater severity of autistic disorder. Hypometabolism is also detected in the nucleus caudate, putamen and thalamus. This result is consistent with a deficit of the anterior cingulate gyrus-ventral striated nucleus-anterior thalamus pathway related to working memory.

Studies with magnetic resonance imaging

Studies with servable magnetic resonance imaging (fMRI) describe atypical neural activation patterns on various brain surfaces involved in certain functionalities, such as language, executive functionalities, working memory, social perception, recognition of faces and facial expressions, joint attention, empathy, social cognition and theory of the mind. Also, a decrease or variation of the servible connectivity is received.

Several studies with fMRI reveal atypical activation patterns in the brain surfaces causing language of patients with autism spectrum disorders throughout the execution of various linguistic tasks.

In the sphere of social cognition, deficits in the perception of faces and feelings remain associated with a decrease in neural activity in the fusiform gyrus, the subsequent gyrus gyrus gyrus, the cuneus, inferior occipital lobe, the pre-eminent temporal groove and the amygdala.

Especially, the complexity for face recognition is related to the hypoactivation of the fusiform area, as well as a tendency to teach greater activation in brain areas more in relation to object recognition (lower temporal gyrus).

Alterations in the mirror neuron system may play a role in the social and communicative deficits of patients with autism spectrum disorders. The premise of a dysfunction in the mirror neuron system in patients with autism spectrum disorders is studied with fMR. Several studies with fMRI identify patterns of

subconnectivity useful in neural networks of medium and long distance between front and back surfaces in patients with autism spectrum disorders.

The head of subconnectivity is achieved by doing certain tasks (response inhibition tasks, phrase comprehension tasks, working memory tasks, spatial processing and language comprehension tasks, mind theory tasks, cognitive control tasks, visuomotor tasks, verbal fluency tasks, speech recognition faces)

It is essential to note that a servible subconnectivity is also explained in patients with autism spectrum disorders at rest (default neural network, default mode network). This makes it possible to measure the servible connectivity between different brain areas spontaneously. The majority of resting studies report a deficit of servile connectivity between pairs of frontal and posterior surfaces (preeminent frontal gyrus, medial prefrontal cortex, anterior and subsequent cingulate cortex, precuun and inferior parietal cortex).

In addition to the head of reduction of front-back servible connectivity, there are also detailed findings of servible connectivity deficit among other pairs of zones, although these results are less consistent. In this sense, there is a lack of useful connectivity between the amygdala and the temporal and frontal zones, between the anterior cingulate gyrus and the frontal ocular fields, between the primary and supplementary motor surfaces, the anterior cerebellum and the thalamus, between the prefrontal cortex and the premotor and somatosensory crusts.

Electroencephalography in ASD: EEG activity

The electroencephalogram (EEG) makes it possible to record and evaluate the cortical electrical activity of the brain. It allows the capture of spontaneous brain activity. Spontaneous EEG activity is considered a good measure of the physiological state of the brain. Brain waves or EEG activity are recorded by means of electrodes located in a standardized way.

These waves reflect the synchronous activity of millions of pyramidal neurons in the cerebral cortex. Because neurons have inherent electrical characteristics and that neural connections remain mediated by electrochemical processes in the synapses, It follows that these neurons propagate electrical potentials which have the possibility of registering a certain distance from their sources of origin. These potentials work as dipoles (two charges of identical intensity and opposite polarity).

EEG activity is produced primarily by postsynaptic potentials. These potentials have a longer duration than the action potentials and concern a preeminent membrane expansion, for this reason they have the possibility of adding, both in time and space degree.

EEG activity corresponds to extracellular secondary currents so they are transmitted by the outside of the neurons throughout the brain volume. It should be noted that the pyramidal neurons of the cerebral cortex are aligned perpendicular to the area and with the dendrites in parallel.

Then the synaptic activation of a set of these neurons is created in well-defined and synchronized layers, causing the activation of dipole layers. EEG activity is broken down into 4 sets according to the frequency of potentials: delta (0.5-4 Hz), theta (4-7 Hz), alpha (8-13 Hz) and beta (13-35 Hz).

With regard to the frequency criterion, it is defined as the number of times a process is repeated in one second. Measured in hertz (1Hz = 1 period per second). In the EEG these waves have an amplitude to degree of microvolts (μV).

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