

THE PHYSICAL THERAPEUTIC PROCESS, THE MEMORY AND ELECTRICAL FUNCTION OF THE BRAIN HOW PART SPORTING TRAINING IN THE BOXING (Review)

**El proceso físico terapéutico, la memoria y la función eléctrica del cerebro como parte del
entrenamiento deportivo en el boxeo.**

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ABSTRACT

This paper job presents an approach to therapeutic physical process and its link with determining physiological functions for the optimal development of sports training in boxing, such as: electrical memory and brain function. Fundamental concepts such as tolerance to the load, and the concept of biologization, which will determine the basis of its methodology, will be imposed by the analysis of the so-called adaptation law is assumed. Fundamental concepts of rehabilitation are taken over and an analytical approach to the dialectical relationship groups principles of rehabilitation and sports training is done, hefting that within this complex process, the overall result of the lies higher cortical functions in a proper function of the process memorization, where this vital activity is one of the most important identifying the human species as a rational species.

Key words: physical therapeutic process , memory, electrical funtion, brain, boxing.

RESUMEN

El presente artículo expone un acercamiento al proceso físico terapéutico y su vínculo con funciones fisiológicas determinantes para el óptimo desarrollo del entrenamiento deportivo en el boxeo, como lo son: la memoria y la función eléctrica del cerebro. Se asume

concepciones fundamentales como la tolerancia a la carga, y el concepto de biologización, que determinará que las bases sobre su metodología, estará impuesto por el análisis de la denominada ley de adaptación. Se retoman conceptos fundamentales de rehabilitación y se realiza un enfoque analítico sobre la relación dialéctica grupos de principios de la rehabilitación y el entrenamiento deportivo, sopesando que dentro de este complejo proceso, el resultado integral de las funciones corticales superiores radica en una adecuada función del proceso de memorización, donde esta vital actividad es una de las más relevantes que identifica a la especie humana como una especie racional.

Palabras claves: proceso físico terapéutico, memoria, función eléctrica, cerebro, entrenamiento deportivo, boxeo.

INTRODUCTION

The relationship of therapeutic physical sports training process, in light of what founded by Weigneck, J. (1988) in his book *"Optimal Training"* part of the essential concepts of tolerance to load, and the concept of "biologization" so the training stress intolerance expresses a physical need the body experiences, alert signals that result in turn demands attention or physical therapy clinic.

It states: *"Today, sports training has been invaded by a biologization in its methodology; not for nothing is widespread definition that sports training is generally a permanent process of adapting to the workload ... "for this reason many authors consider that the starting point of any study on the methodology of sports training will imposed by the analysis of the so-called "Basic Law training"; although such controversial argument is recognized for those who give it greater importance to other aspects of this process as it is the technical, tactical and development of skills and abilities.*

Moreover, Araujo, G. R. and C.R. Barroto. (1994) suggest that training involves subjecting the athlete to repeated morfofuncionales which ultimately produces changes in organ systems that make their work more efficient sport.

This biological invasion which Forteza refers is given, among other elements, the relevance of the physiological activity of exercise takes to the motor manifestations of the skills and capabilities, in order of biological hierarchy is prioritized action from more primary structures of matter (cell) to ensure responses to the demands of the sport to side and macro-functional levels that matter; These levels of hierarchy are result of a systemic dialectics,

that this vision or approach to help understand the changes and trends that arise in different systems.

DEVELOPMENT

The bioadaptación.

Concerning the process bioadaptación athletic highlights several studies such as those by Harre, D. (1988), Forteza-Ranzola (1989), Arnold-Porter (2002) and Betancourt, N (2004); these direct their attention to addressing the theoretical approach based on the foundations of Exercise Physiology, which occupies a high level of relevance; so much so that in regard to the historical evolution of the process of sports training, said researchers insist on biologicista character training, which has been neglected in many occasions by specialists (high incidence of morphological and functional imbalances and injuries) to prioritize other dimensions as the technique and tactics in order to better results, without adequately considering the crucial role of physiological processes.

In this sense, authors like Betancourt, N. (2004) by emphasizing the transit times of this process (athletic training) and specifically the pre-scientific period, it does trying some important contributions, which says, "deserve to be highlighted "; these contributions the leading sports physiology as theoretical basis underlying the dynamics of training and physical-therapeutic actions.

It is essential without underestimating the contributions of authors like Harre, D; Mozo, D and Weineck talking about the theoretical basis of training; emphasizing the relationship between the principles of sports training, systemized by Forteza-Ranzola (1998) and the cardinal principles of rehabilitation described by Moore, J. (1980) which is considered the points made by Sentmanat. A (2003) in the adaptation of these principles specifically for neurorehabilitation, which contains the essentials of a process of physical-therapeutic care.

The relationship of these sets of principles is dialectical character as it is established on physical-motor identities that seek physical and spiritual development and fulfillment of goals that make man to reach high levels of human development. Such principles theoretically contain elements of mutual correlation, given that both groups of substances are the physical manifestation the patient (or in this case the boxer) takes in an organic and cohesive function with predetermined purposes and homologues; achieve increasingly higher biological, psychological and social states.

These principles are stated as follows:

1. Route work to higher achievements.
2. Apply the load progressively increasing.
3. continuity of the process must be achieved.
4. The load must be applied with wavelike change.
5. Keep in mind the cyclical nature of the training.

Moreover, Sentmanat, A. (2006) notes that both training and rehabilitation meet stages of complexities in its application and its design, which guide the proper development and standard of physical exercises so that they have favorable effects on human being.

In relation to addressed here, the basis of these principles raised by Moore, J (1980) are the cardinal points that support the rehabilitation system, which are taken up by Sentmanat, A (2003), as aspects that can contemplatively not relate but dialectically.

These are declared as:

1. Prevention of sensory deprivation.
2. Promoting active patient participation.
3. They must repeat the exercises with and without variation.
4. Achieve convinced how useful activity.
5. Achieve patient motivation.
6. Follow the law of development cervical cerebrospinal -Flow.
7. Take into account the integration of nerve functions.
8. Consider the process of facilitation and inhibition.
9. Show patience and sensitive and caring patient care.
10. Forcing the process.

The latter principle (Forcing the process) is not taken into account in the process of neurological restoration in these boxers, in assessing the physical-therapy exercises to be performed are free active character, for what is considered its application in early stages where no chronic diseases manifest themselves as such, if no alterations that can be the beginning of these diseases in the CNS; hence the prophylactic nature of these exercises.

In addition, the link of these principles for the purposes of rehabilitation, it is important to bear in mind the theory of "neuroplasticity" raised by Young, R. and P. Delwade (1992), in which the adaptive system responses arise nervous. It is important to state that the consequences can be treated for three physiological pathways in the process of physical-therapeutic care boxers; these are defined as:

1. The global, direct and multilateral effect of exercise on the body.
2. The dynamic exercise of higher nervous activity.
3. The autonomous stimulation (vegetative) nervous for-cortical control of brain electrical activity.

For these systemic effects it is that accepted that the action of physical exercises performed boxers as part of its program of general and special physical preparation, although not with therapeutic intent, its action involves a multilateral and systemic effect as of They can indirectly control the accelerated activation of CNS diseases, in what can be considered as a type of "naive prophylaxis".

This hypothesis can be accepted if one takes into account the observation made two groups of active and retired boxers, in studies of Martinez, O (2008); active boxers under the influence of physical-sport steadily, and retirees outside the context of permanent physical activity by setting the observations found that the latter have a higher prevalence as to the consequences of cortical type found, appreciating an exacerbation of these manifestations in the withdrawal phase boxer.

This suggests that the Therapeutic physical process to reduce these consequences during the active life of these boxers, is undoubtedly a normo-compensating action, but its prophylactic character forward in time, to have a favorable effect for the solution and attenuation of this scourge in the sport.

General memory and the electrical behavior of the brain as physiological processes.

According to dissimilar approaches addressed in human physiology in works of Luria, Goderich, Gythou, Hall and Roca (all in the period of 1976-1999) among others, within the dissimilar higher cortical functions, it is emphasized in memory and You recognize that any problems in this field becomes more difficult to treat these complex biological gears. Thus, it is very clear that the exact neural mechanisms in the higher mental processes that have attempted to explain for decades are unknown, especially regarding memory; however something is much more visible, and that the memories are physiologically caused by variations of synaptic transmission from one neuron to another, which in turn, enable new ways of neural connections or "facilitated pathways" for propagation are created effective information in relations with traces calls memónicas located in the cortex of the brain.

According to these studies by Svietskova, L (1981) and others as referring Trápaga et al. (S.A.), the memory capacity is related to the connotation of negative experiences that are rejected by the brain, hence most of the human memory is "negative memory"; given by the brain's ability to select the relevant and necessary information with the establishment of ranges priority; otherwise, the brain is awash in seconds from a wealth of information that is irrelevant to the memory functions.

Moreover as reflected Svietskova, L (1981), working memory or working memory consists of several subsystems, namely: one (the central government) supervisory system and two specialized secondary stores verbal information (the loop articulatory) and visual or spatial (visuospatial agend).

The Central Executive coordinates system resources and distributes them across different stores, called slaves, according to the function you want to perform. It focuses, therefore, on active control tasks on the passive elements of the system; in this case, the information stores.

The articulatory loop or phonological loop described by Luria, A. (1982), is responsible for the passive storage and active maintenance of spoken verbal information. The first process causes the loss of information in a short time, while the second (repeat) allows to refresh the temporary information. Furthermore, it responds to the automatic language transformation of visually presented to its phonological form, so, for practical purposes, all processes verbal information.

This is demonstrated when trying to remember a list of letters presented visually or aurally: in both cases, a list of words with similar sounds is more difficult to remember than one in which they are not so similar. Also, the storage capacity of the "articulatory loop" is not constant as previously thought, but decreases as the words to remember are longer.

Visuospatial agenda is the system store that works with elements of visual or spatial character. As above, your task is to save this information. The storage capacity of elements in the visuospatial sketchpad is affected (as in the loop articulatory) by the similarity of its components, as long as it is not possible to translate the elements to his verbal code (for example, because the "loop articulatory" is busy with another task). Thus, it will be harder to remember a brush, a pen and a pencil than a book, a ball and a pencil.

These selective memory mechanisms, are essential theoretical pillars, which are ultimately the way to justify achieving positive results in the treatment of this important physiological function, which in boxers is affected, based on the self-awareness of the process rehabilitator, key in the need to join a process of vital importance, as is the neurological restoration.

Therefore memory classifications proposed Gythson-Hall (1996) according to their physiological function in space and time in which enduring memories stored are assumed, which is the most general classification.

They are between them:

1. Short-term memory, which includes memories that last seconds or at most minutes; unless it is transformed into longer-term memory.
2. Memory intermediate-term, lasting days or weeks; but ends up losing.
3. Long-term memory, which once stored can be remembered for years, even a lifetime.

As Martinez, O (2013) states, physical activity in this direction stimulates metabolic processes that construct new vesicles for release of neurotransmitters and keep the functional biochemical basis in the propagation of nerve impulses to the memorization process.

In this sense, the overall result of higher cortical functions is a proper function of the memorization process where there have been several contributions to this vital activity that identifies the human species as a rational species.

The contributions made by Paul Broca (1861) and Carl Wernicke in (1876) respectively, are the most successful in establishing locations thereof in the cortex of the brain, which are validated with experiments in the field of neurosciences proposals. The combination of a number of complex patterns such as intelligence and thought are connected with memory through a close working relationship with the rest of the ANS (Fig.5)

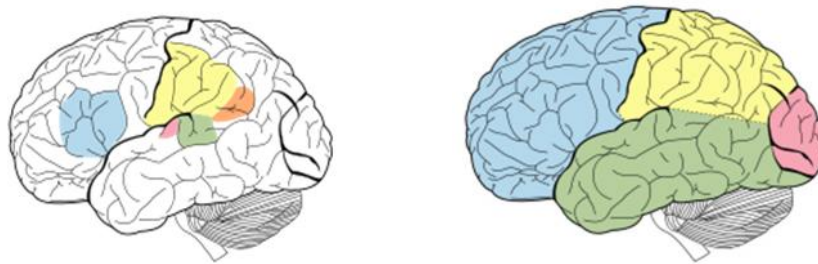


Fig.5

Similarly, the components of the higher functions of the cortex are largely reflected in the other functions, which are expressions of what is known as behavioral and emotional patterns of men and responsive to the hypothalamic centers their nervous control.

Meanwhile, the physiological bases of the brain are established largely on the activity of nerve cells in the potential called action, in the transmission of nerve impulses from neuron to neuron, for the development of excitatory processes and inhibitory, ensuring adequate systemic activity of the central components; without which the rest of higher cortical functions such as memory, language, learning, behavior and thinking, can not occur.

Hence becomes the importance of this activity, which consists essentially of the complex exchange of information from various neuronal groups through its basic mechanism; the synapse, which is in turn influenced by functional mechanisms, Summation and facilitation.

Synapse occurs in the period presynaptic electro-chemical and other post-synaptic activity is recorded; if this condition is not created, the phenomenon is not specific synapses; in that sense this physiological event due to the "law of all or nothing" (12) which consists of the nerve impulse occurs or does not occur; ie there is no middle ground. These conditions to

which reference is made may explain why athletes studied in this research, are declared in term "absolute" which have alterations-cortical electrical activity (sequelae) or not present.

Similarly, in said synaptic activity, ionized neurotransmitters are released with chemical base, whose termination load causes the activation of specific receptors which, in turn, generate other chemical-electrical responses, each neuron communicates at least with a thousand other neurons and can receive simultaneously up to ten times more connections of other (Fig. 6)

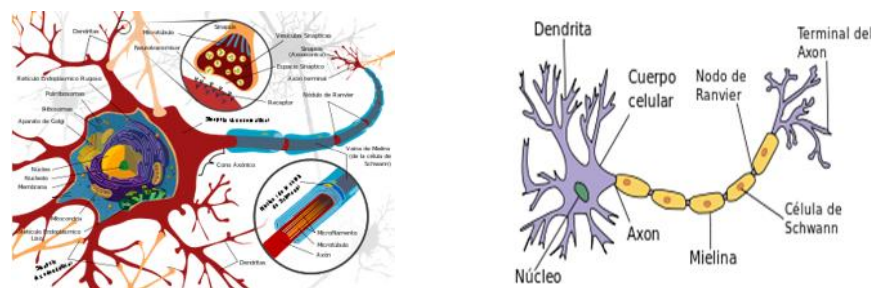


Fig. 6

It is also estimated that in the adult human brain there are at least 1014 (the fourteenth) synaptic connections (approximately between 100 and 500 billion) in children reaches 1000 billion; this number decreases over the years, leveling off in adulthood.

Synapses allow neurons of the central nervous system form a network of neural circuits, which are crucial to the biological processes that underlie perception and thought. They are also the physiological system by which the nervous system connects and controls all body systems.

In this sense it can commit to a significant extent the process of synaptic connections, if somehow interferes pathways neurotransmitter release and uptake by postsynaptic or presynaptic membrane; This phenomenon often occurs in the Boxing as a result of traumatic shock action, causing a type known as "axonal injury" injury; where the axon of the neuron is unable to transmit the nervous impulse, and therefore adequate release of neurotransmitters, affecting in this way the optimal neurocortical activity.

The modification of synaptic parameters can affect the behavior of neural circuits and the interaction between the different modules that make up the (modal) nervous system; such changes are encompassed in a phenomenon known as neuroplasticity.

CONCLUSIONS

1. The importance of this activity is essentially in the complex exchange of information from various neuronal groups through its basic mechanism; the synapse, which is in turn influenced by functional mechanisms, Summation and facilitation.
2. The physiological basis of the brain are established largely on the activity of nerve cells in the potential called action, in the transmission of nerve impulses from neuron to neuron, for the development of excitatory and inhibitory processes, ensuring adequate systemic activity of the central components.
3. The action of physical exercises performed boxers as part of its program of general and special physical preparation, although not with therapeutic intent, its action involves a multilateral and systemic effect as indirectly can control the rapid activation of disease SNC.

BIBLIOGRAPHIC REFERENCES

1. Araujo, G.R. y C.R. Barroto. (1994). El problema de la determinación del proceso salud-enfermedad. Análisis crítico para su evaluación. Bol Ateneo Juan César García. España, 2 (2-3):14-24.
2. Betancourt Alvelaez, N. (2004). Génesis y evolución histórica del proceso del entrenamiento deportivo. Disponible en: [www:// Google.com](http://www.google.com). Consultado el 25 de octubre del 2012.
3. Broca, P. y col. (1861). Sur le siège de la faculté du langage articulé. Bull. Soc. Anthropol, 6.
4. Guyton, A; J. Hall. (s.a). Fisiología de la actividad Física; adaptaciones en el ejercicio. Ed. Mac Graw-Hill Interamericana. Philadelphia, Pennsylvania. t3. p. 1165.
5. Harre, D. (1988). Teoría del entrenamiento deportivo. La Habana, Ed. Científico técnica
6. Luria, A. (1982). Las funciones corticales superiores del hombre. La Habana, Ed. científico-técnica. p. 52.

7. Martínez, O. (2013). Metodología para reducir las secuelas neurológicas de tipo cortical en boxeadores. Tesis de doctorado en ciencias de la Cultura Física. Universidad de ciencias de la Cultura Física y el Deporte “Manuel Fajardo”.
8. Sentmanat, A. (2006). Ejercicio Físico y Rehabilitación. Sistema de neurorehabilitación multifactorial intensa. La Habana, Ed. *Deportes*. p. 232.
9. SvietKova, L (1981). Rehabilitación en lesiones focales del cerebro. La Habana, Ed. Pueblo y Educación.
10. Weigneck, J. (1988): Entrenamiento Óptimo. Barcelona, Ed. Hispano Europea. S.A.
11. Young, R.R and. Dewale P.I(1992). Principles and practice of restorative Neurology. Betterworth-Heinnemann,Oxford.