NEUROSCIENCE OF HYPNOSIS: A NEUROPHYSIOLOGICAL VIEW OF HYPNOTHERAPY

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ABSTRACT

Objective: This narrative literature review is intended to briefly clarify the history and concepts of hypnosis, history, scientific advancement in the field and therapeutic applications. The theme will have greater contextualization regarding the neurophysiology of hypnosis.

Methods: In this bibliographic review (databases, websites and specialized journals) studies were selected seeking as keywords "Hypnosis", "Neurobiology", "Hypnotic Response", "Historical", "Research", to approach these concepts in the clinical area and research in the health area, in order to seek greater grounding on the concepts and neurobiological mechanisms involved in hypnotherapy. The databases evaluated were MEDLINE, GOOGLE ACADEMIC, PUBMED, SCIENCE DIRECT, SciELO and LILACS.

Results: In the selected studies on the theme, the concepts on hypnotherapy and history are addressed. Hypnosis, recognized as a psychobiological process, modifies brain activity, affecting areas such as sensory cortices, the dorsal anterior cingulate gyrus, and the prefrontal cortex. This neurocognitive alteration influences perception, making hypnosis an effective tool in the modulation of various clinical conditions in a way that complements conventional therapy.

Conclusion: The neurophysiology of hypnosis is a field in constant evolution. Although the exact understanding of the neurophysiological processes underlying hypnosis is not yet fully understood, advances in neuroscience reveal insights into the hypnotic response. The progress in new neuroimaging technologies and methodologies may provide clearer answers about the mechanisms involved in hypnotherapy, as well as proving the effectiveness of its application.

Keywords: Hypnosis, Neurobiology, Hypnotic Response, History, Research.

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NEUROCIÊNCIA DA HIPNOSE: UMA VISÃO NEUROFISIOLOGICA DA HIPNOTERAPIA

RESUMO

Objetivo: Esta revisão narrativa de literatura propôe-se a esclarecer de forma breve a história e os conceitos sobre hipnose, histórico, avanço científico na área e aplicações terapêuticas. O tema terá maior contextualização no que tange à neurofisiologia da hipnose.

Métodos: Nesta revisão bibliográfica (bases de dados, sites e periódicos especializados) foram selecionados estudos buscando-se como palavras-chave “Hipnose”, “Neurobiologia”, “Resposta Hipnótica”, “Histórico”, “Pesquisa”, para abordagem destes conceitos na área clínica e de pesquisa na área da saúde, de forma a buscar maior embasamento sobre os conceitos e mecanismos neurobiológicos envolvidos na hipnoterapia. As bases de dados avaliadas foram MEDLINE, GOOGLE ACADÊMICO, PUBMED, SCIENCE DIRECT, SciELO e LILACS.

Resultados: Nos estudos selecionados sobre o tema, os conceitos sobre a hipnoterapia e histórico são abordados. A hipnose, reconhecida como um processo psicobiológico, modifica a atividade cerebral, afetando áreas como os córtices sensoriais, o giro cingulado anterior dorsal e o córtex pré-frontal. Essa alteração neurocognitiva influencia a percepção, tornando a hipnose uma ferramenta eficaz na modulação de diversas condições clínicas de forma complementar à terapêutica convencional.

Conclusão: A neurofisiologia da hipnose é um campo em constante evolução. Embora a compreensão exata dos processos neurofisiológicos subjacentes à hipnose ainda não estejam totalmente esclarecidos, avanços na neurociência revelam insights sobre a resposta hipnótica. O progresso em novas tecnologias de neuroimagem e metodologias poderá fornecer respostas mais claras sobre os mecanismos envolvidos na hipnoterapia, além de comprovar a eficácia de sua aplicação.

Palavras-chave: Hipnose, Neurobiologia, Resposta Hipnótica, Histórico, Pesquisa.

1 INTRODUCTION

The technique of hypnosis has been sophisticated in recent centuries, consisting in an induction of a hyper-focused state and full concentration.

Hypnotherapy is versatile psychotherapy. Used in mental health therapy, it has been applied in the treatment of emotional disorders and psychosomatic diseases, by promoting hyper concentration and altered state of consciousness (Wofford et al., 2023; Cheseaux et al., 2014). It is recognized in the promotion of intense relaxation and in the expansion of concentration (Cheseaux et al., 2014).

Hypnotic processes are defined in neuroscience using brain imaging and in psychology using social, cognitive, and dissociative theories (Delestre et al., 2021). Hypnosis is used in psychotherapy and is used interdisciplinary, with techniques from psychology, Neurolinguistic Programming (NLP), narrative medicine and storytelling, collaborating with other conventional techniques and can be applied as complementary therapy (Garba; Mamman, 2020), when indicated in psychobehavioral treatments and based on medical nosologic diagnosis and psychological evaluation.

This article aims to briefly elucidate the history and concepts of hypnosis (altered state of consciousness or hyper-focused state of concentration), history and concepts, scientific advancement in the area and therapeutic applications. The theme will have greater contextualization regarding the neurophysiology of hypnosis.
2 METHODOLOGY

A literature review was conducted in the MEDLINE, PUBMED, SCIENCE DIRECT, SciELO and LILACS databases. The searches were conducted using "Hypnosis", "Neurobiology", "Hypnotic Response", "Historical", and "Research" as keywords to identify the pertinent online literature. The studies that best described the topic addressed were included. No specific periods of publication or restriction were established regarding the design of the study, and original articles were selected in Portuguese, English and Spanish.

3 RESULTS AND DISCUSSION

3.1 Hypnosis: Exploring Your History and Concepts

Hypnosis is a technique that involves an altered state of consciousness, in which patients are guided by a therapist who helps them focus their attention on a personal experience, a pleasant memory or with suggestions for relaxation, leading the individual to a state of greater receptivity to suggestions (Cheseaux et al., 2014). Throughout history, this practice has evolved, often shrouded in mysteries and misunderstandings. As an initial explanatory form, its background and fundamental concepts will be explored.

Hypnosis has been mysterious and controversial for hundreds of years and the legacy of this story is still with us (Weinberger; Brigante; Nissen, 2022). Despite different historical trajectories and socio-cultural contexts, hypnosis and meditation originated as attention and self-regulation practices aimed at alleviating suffering (Jensen et al., 2017). Hypnosis has deep roots in human history. Although the use of hypnosis for treatment goes back to the early human history used by people such as the Egyptians, Greeks, Chinese and Hindus, who practiced trance and suggestion forms incorporated into the rituals performed by priests and healers, the practice of medical hypnosis is typically considered to have arisen in the 18th and 19th centuries (Geagea et al., 2023; Bastek; van Vliet, 2023).

It was in the 18th century that the Austrian physician Franz Mesmer introduced hypnotherapy to medicine as "animal magnetism", claiming that the diseases were the result of blockages in the flow of a supposed magnetic fluid in the body. He used techniques that resembled hypnosis to treat his patients (Bastek; van Vliet, 2023). His techniques were widely criticized, as he stated they were a form of 'sixth sense' and could only be experienced, undefined or explained'. Despite criticism, his so-called "mesmerism" was used by several surgeons as the only analgesic technique with very positive results (Bastek; van Vliet, 2023).

Later, James Braid, a 19th-century Scottish surgeon, renamed the concept "hypnosis" (derived from the sleep god in Greek mythology, Hypnos). He realized Mesmer's technique emphasizing that hypnotherapy was based on relaxation in combination with greater patient suggestibility and not due to magnetism (Bastek; van Vliet, 2023). Then Emile Coué (1857-1926) stated that hypnosis was a technique that could be taught to almost all patients (Bastek; van Vliet, 2023).

Around 1887, the physician neurologist and psychiatrist Dr. Sigmund Freud used hypnotic suggestion as artifice in removing some symptoms reported by his patients (Kluft, 2018). In the 19th century, hypnosis began to be used in medical practice for anesthesia and pain control during surgical procedures, before the advent of modern anesthesia (Spiegel, 2013). Subsequently, with the advancement of psychology and psychotherapy, hypnosis was incorporated as a therapeutic tool to treat a variety of psychological and emotional problems (Wawrziczny; Buquet; Picard, 2021).

In the 20th century, American psychiatrist Milton H. Erickson revolutionized clinical studies of hypnosis by improving clinical hypnotherapy and popularizing its practice and, as a
consequence, divided it into two schools: classical hypnosis and ericksonian or modern hypnosis (Garba; Mamman, 2020). In 1957, Dr. Erickson founded the American Society of Clinical Hypnosis, to spread the technique and bring together professionals from the field (Barker, 1986).

### 3.2 Concepts and Principles of Hypnosis and Hypnotherapy

The word "hypnosis" encompasses a broad spectrum of phenomena characterized by responses to suggestions to modulate sensations, images, behaviors, affections and meaning of the experience that the patient is living at that moment (Casula, 2018). Hypnosis promotes an altered state of consciousness in which patients are guided by a therapist who helps them focus their attention on a personal experience, a pleasant memory or with suggestions for relaxation (Cheseaux et al., 2014).

Clinical hypnosis is a patient-centered care approach that aims to help each one discover their internal resources and resilience (Casula, 2018). It involves focused attention and reduced peripheral consciousness, characterized by an increased ability to respond to suggestion" (Wawrziczny; Buquet; Picard, 2021). This state of consciousness, known as dissociative state, is a natural phenomenon that occurs in moments of distraction, daydreaming, or intense absorption in an activity (Wawrziczny; Buquet; Picard, 2021).

Hypnotherapy is defined as "the use of hypnosis in the treatment of a medical or psychological disorder or concern" (Wofford et al., 2023). A hypnotherapy session comprises an induction to enter a state of hypnosis, the trance itself during which the treatment is performed, and finally exit from hypnosis back to a normal state of consciousness (Cheseaux et al., 2014). Hypnosis, in turn, is a technique that can be used to access the subconscious and promote change and healing (Navon, 2018).

Hypnosis is the oldest Western conception of psychotherapy, but involves some recent understandings about the relationship between brain function and the individual's ability to control physiological processes, such as pain control, anxiety and the consequences of certain diseases (Spiegel, 2013). A hypnotherapy session comprises an induction to enter a state of hypnosis, the trance itself during which the treatment is performed, and finally exit from hypnosis back to a normal state of consciousness (Cheseaux et al., 2014).

In the process, it is offered the possibility of creating a strong therapeutic alliance between the caregiver and the patient, an alliance characterized by motivation, trust and collaboration (Casula, 2018). The motivation is based on the patient's desire to reach a comfort zone, to find their resources needed to face death; trust is achieved as soon as the patient experiences the benefits of hypnotic suggestions and self-hypnosis; Enhanced collaboration with the hypnotist is a natural response of gratitude and recognition that occurs also when the patient experiences the physical and psychological benefits of hypnosis (Casula, 2018).

In hypnosis, there is a change in basal mental activity triggered through an induction procedure, composed of verbal instructions and suggestions (Wawrziczny; Buquet; Picard, 2021). The patient experiences a decrease in spontaneous thinking and inattention to foreign stimuli and focuses on the procedure being conducted (Wawrziczny; Buquet; Picard, 2021). Induction of a state of deep relaxation and intense focus occurs. It is not a question of sleep, but rather of a state of altered consciousness, where the mind is more open to suggestions. There are several techniques to induce this state, such as gaze fixation, verbal suggestion and visualization (Spiegel, 2013). Suggestions may also contain implicit possibilities to respond effectively to life's challenges. Each suggestion invites patients to explore their internal resources, talents and capabilities to help them cope with life's difficulties (Casula, 2018).

As hypnosis becomes more active, hypnotist and subject collaborate on some rather distant ideas, with the hypnotist determining that the experiences are true and seeking to
document marginal experiences, thus showing hypnosis as a normative phenomenon. An unconscious need to be absorbed or become part of something beyond self may underlie some of the individual differences in hypnotization (Weinberger; Brigante; Nissen, 2022).

Neurobiological studies have shown that the state of dissociation triggered by hypnosis creates a breakdown in connectivity between executive and monitoring processes, thus allowing suggestions to bypass supervision processes and act directly on executive systems (Wawrziczny; Buquet; Picard, 2021). This access to unconscious resources allows changes to be made depending on the therapeutic goals set by the individual (Wawrziczny; Buquet; Picard, 2021).

Hypnosis has a few main components, described below.

- Absorption: tendency to be fully involved in a perceptive, imaginative or ideational experience (Vanhaudenhuyse; Laureys; Faymonville, 2014).
- Altered State of Consciousness: During hypnosis, the individual is in a modified state of consciousness. This can range from a slight sense of relaxation to a deeper state of trance, where the mind is more receptive to specific suggestions.

The altered state of consciousness induced by hypnosis is strengthened by patients' expectation of benefits. The greater the expectation, the greater the motivation and collaboration of the patients. In this state, the therapist's suggestions drive the exploration of internal resources and resilience, helping patients face the challenges of life (Casula, 2018). Hypnosis is known to induce changes in consciousness, manifesting itself through adjustments in aspects of phenomenic self-consciousness, such as increased mental ease (thoughts flowing effortlessly), absorption, reduced self-orientation, and automaticity (responses happening without conscious effort or deliberation) (Vanhaudenhuyse; Laureys; Faymonville, 2014).

- Suggestibility: It is one of the key elements of hypnosis. During the hypnotic trance, the subject's mind becomes more susceptible to suggestions. However, it is important to note that the person in a trance will not act contrary to his ethical or moral principles (Vanhaudenhuyse; Laureys; Faymonville, 2014).

In hypnosis, the goal is to measure how well people can respond experiential or behavioral to suggestive statements that aim to change their reality experienced in another way, by cognitive processes (e.g., memory) or behavior (Kallio, 2021). There is a kind of "contract of attention" in which the subject gives control of his attention to the hypnotist, in which hypnotic suggestion is a means of controlling that attention (MacLeod, 2021). There is responsiveness to social cues, leading to a greater tendency to comply with hypnotic instructions, representing a suspension of critical judgment (Vanhaudenhuyse; Laureys; Faymonville, 2014).

- Dissociation: mental separation of components of experience that would normally be processed together (Vanhaudenhuyse; Laureys; Faymonville, 2014).

### 3.3 Self-Hypnosis

In addition to professional-led hypnosis, self-hypnosis is a practice in which an individual induces a trance state on its own to achieve certain goals, such as relaxation or improved therapeutic performance (Spiegel, 2013). Hypnotic state can be achieved by listening to the instructions of a trained therapist, either spontaneously or after training with a therapist to perform self-hypnosis (Cheseaux et al., 2014).

Self-hypnosis is a useful ability to teach people how to deal with phobias and anxieties related to medicine. More intensive psychotherapy techniques involving group therapy and hypnosis improve quality of life, reduce pain, and can prolong survival in some pathologies such as cancer (Spiegel, 2013).
3.4 Therapeutic Applications

Hypnotherapy is a medical procedure that uses hypnosis as a predominant part of the therapeutic set (Wofford et al., 2023). The American Psychiatric Society has recognized the value of this unconventional therapy as a resource in psychiatric diagnosis and treatment, as well as in other medical fields.

A multitude of diagnoses are being addressed with non-conventional interventions (Wawrziczny; Buquet; Picard, 2021), which seek a greater capacity for suggestion that facilitates treatment, either by direct intervention or indirectly in the patient’s clinic through another state of consciousness, with full attention to health and not the disease. The evolution of hypnosis techniques has been demonstrating an effective contribution in the improvement of several clinical conditions (De Beneedittis, 2021; Wawrziczny; Buquet; Picard, 2021).

Hypnosis is often used to help in the treatment of various problems, such as pain control, anxiety control, phobias, addictions and other psychological disorders (Cheseaux; de Saint Lager; Walder, 2014) and patient care assistance in palliative care (Casula, 2018). Hypnosis offers the opportunity to get better body perception, relaxation, elicit personal resources and improve mood (Casula, 2018).

Clinical hypnosis is a patient-centered care approach that aims to help each patient discover their internal resources and resilience at critical times in life. The technique is recognized for its potential to help relax and calm the body, mind, heart and spirit of the suffering person (Casula, 2018). The hypnotist accepts the patient's suffering and distress, and returns compassion, participation and peace of mind in critical situations, such as in terminal illnesses (Casula, 2018). In some studies, hypnosis is a fast, cost-effective and safe therapy (Cheseaux; de Saint Lager; Walder, 2014). After suggestions, patients report feeling the body as a whole and experiencing pleasant sensations (Casula, 2018).

Hypnosis is a method of treatment considered effective on physical and psychological symptoms in certain contexts, such as obesity (Delestre et al., 2021), in emergency care, depression, anxiety, sleep disorders, chronic pain, cancer, as an adjunct during colonoscopy, substance abuse disorders, dermatology, and sexual dysfunctions (Wawrziczny; Buquet; Picard, 2021). In addition to these clinical conditions, hypnotic techniques have been used to treat trauma-related problems and disorders, such as post-traumatic stress disorder (Rhue; Lynn, 1991).

There is evidence in literature of psychotherapeutic practice to teach hypnotherapy interventions for coping with stress, such as hypnotic induction, deepening exercises, imaging exercises, and posthypnotic suggestions (Fisch; Brinkhaus; Teut, 2017). Several studies used post-hypnotic suggestions with the aim of improving immune function and activating resources by increasing alertness, energy and concentration, greater relaxation throughout the day, and greater understanding and retention of learning content (Fisch; Brinkhaus; Teut, 2017). Not only in these cases, but the technique has proved useful in teaching with induction of analogous self-regulation skills for younger children with asthma has shown a reduction in morbidity reflected in the decrease in severity self-assessment scores, fewer visits to the emergency room and fewer days lost from school (Kohen; Wynne, 1997).

Hypnotic treatment is widely used in medicine for pain control or for diagnostic or therapeutic medical procedures to reduce anxiety or pain, with decreased need for anesthetics in the intraoperative procedure time, postoperative pain and behavioral disorders (Cheseaux; de Saint Lager; Walder, 2014). Hypnosis may be done alone as treatment or in combination with sedation or local anesthesia (Cheseaux; de Saint Lager; Walder, 2014).

Some studies demonstrate that hypnosis can modulate affective or sensory components of acute and chronic pain and in emotional and cognitive processing of painful perception (Flower, 2014). In general, hypnotic techniques are very effective in modulating pain in patients.
with fibromyalgia (Flower, 2014) and classical etiologies of chronic low back pain, as well as proved to be beneficial in chronic low back pain caused by pregnancy, diabetes, and HIV neuropathy (Ruan; Chen, 2022).

3.5 Evolution in Psychotherapy and Scientific Research

Throughout the 20th century, hypnosis rose to prominence in the scientific community, with research exploring its mechanisms and clinical applications. Hypnosis has been used to treat traumas, phobias, addictions, and other psychological disorders, and has proved effective in certain contexts.

Current research on hypnosis is divided into two main areas of focus. The first is intrinsic research, which focuses on investigating hypnosis itself, without the influence of specific suggestions, called "neutral hypnosis" or "standard hypnosis". This area explores the neurophysiological mechanisms underlying the hypnotic experience in dynamic contexts (De Benedictis, 2015).

The second area is instrumental research, or extrinsic studies, which involve the use of hypnosis and suggestions to study a wide range of cognitive and emotional processes to investigate neurodynamic correlates of psychotherapy. In addition, hypnosis is used to create "virtual analogs" of neurological and psychopathological conditions, with the aim of better understanding their bases and eventually improving the way they are treated (De Benedictis, 2015).

Research in the neurophysiology of hypnosis continues to advance, using neuroimaging techniques such as functional magnetic resonance imaging (fMRI), positron emission computed tomography (PET Scan), fNIRS (near-infrared spectroscopy), SPECT (single photon emission computed tomography), CT (computed tomography), and electroencephalography (EEG) to map functional, metabolic, and structural changes in the brain during the hypnotic process (Wolf et al., 2022).

These studies help to better understand the underlying mechanisms of hypnosis and its therapeutic potential, but there is still much to be explored for a thorough and detailed understanding of these neurophysiological processes (Vanhaudenhuyse; Laureys; Faymonville, 2014). As the neurophysiological mechanisms underlying hypnosis and hypnotic phenomena are understood, we will also learn more about the basic brain functions and responses influenced by hypnosis, such as amnesia, hallucinations and delusions (Jensen et al., 2017).

3.6 Neurophysiology of Hypnosis

The neurophysiology of hypnosis is a field of study in constant evolution and subject to various theories and interpretations. The exact understanding of the neurophysiological processes underlying hypnosis has not yet been fully clarified, but research and studies offer significant insights into what happens in the brain during a state of hypnotic trance.

Hypnosis has been an elusive concept for science due to the lack of objective neurobiological markers of the trance state, but the relentless advances of neuroscience in recent decades (largely due to the introduction and refinement of sophisticated electrophysiological and neuroimaging techniques) have opened a "bridge of knowledge" between classical neurophysiological studies and psychophysiological studies of cognition, emotional and sensory systems, being the foundation of neurophenomenology (De Benedictis, 2015).

Hypnosis is also being increasingly recognized by the international scientific community as a viable, valid and reliable intervention for the control of discrete clinical syndromes, being recognized as a true psychobiological state and process, best explained by more comprehensive models that derive from biopsychosocial domains (De Benedictis, 2015).
Hypnotic alteration of perception is accompanied by marked changes in the relevant sensory cortices, as well as in brain regions that involve context monitoring (dorsal anterior cingulate gyrus) and executive function (DLPFC). Hypnosis alters the sensation itself, not just the response to sensory input, becoming a powerful tool in modulating pain as well as anxiety (Spiegel, 2013).

Hypnosis induces an altered mode of operation of the brain in which the so-called attractors (highly synchronized large-scale activity patterns) cannot develop and therefore the conscious experience of the symptoms cannot arise. Hypnosis inhibits this process by modulating multiple neurocognitive mechanisms in various cortical and subcortical areas of patients (Bastek; van Vliet, 2023). Hypnosis is associated with changes in brain metabolic activity and brain perfusion in different brain regions (Cheseaux; de Saint Lager; Walder, 2014).

Cognitive neuroscience supports this by showing that unconscious processes explain behavior or consciousness (Weinberger; Brigante; Nissen, 2022). Several authors have proposed that hypnosis can only be fully understood when biological, psychological, and social factors are considered patients (Bastek; van Vliet, 2023). They assert that hypnotization, patient expectations and motivation, absorption capacity, and attitude toward hypnosis play an important role in the hypnotic response. Likewise, the relationship between a patient and his therapist and the context in which hypnosis occurs are important social factors in the mechanism of hypnosis functioning (Bastek; van Vliet, 2023).

During hypnosis, an alteration in brain function is observed, mainly in areas associated with attention, consciousness, perception and cognitive control. A growing set of studies reveals that the magnitudes of different brain oscillation patterns are related to the response to hypnosis and associated suggestions. In particular, hypnosis is linked to an increase in oscillations, while the hypnotic response is associated with changes in the patterns of gamma oscillations. These changes may involve increases, decreases, or modifications in the time of gamma oscillations, depending on several factors, including the suggestions provided during hypnosis. Phase-locked gamma oscillations would be involved in registering and remembering declarative memory, the latter playing a crucial role in several hypnotic responses, indicating a connection between limbic and neocortical circuits (Jensen; Adachi; Hakimian, 2015).

Although activity in specific regions of the brain (e.g. anterior cingulate cortex, prefrontal cortex, and insula) is commonly reported in functional imaging studies of hypnosis, there are some discrepancies regarding the precise roles of these brain regions, which can be attributed to variations in hypnotic instructions, experimental context, study power, and/or other methodological sources (DeSouza et al., 2020). Some neurophysiological aspects of hypnosis include (Vanhaudenhuyse; Laureys; Faymonville, 2014; Wolf et al., 2022):
- Modulation of Pre-Frontal Cortex Activity: During hypnosis, there is a modulation of activity in the prefrontal cortex, a region of the brain involved in judgment, decision-making and self-awareness. This reduction may explain temporary suspension of critical judgment and increased acceptance of suggestions.
- Increased Functional Connectivity: Neuroimaging studies showed an increase in functional connectivity between different brain regions during the hypnotic trance. This suggests more efficient communication between brain areas, which may facilitate the response to suggestions and changes in cognitive processing.
- Changes in Sensory Perception and Pain Control: During hypnosis, there is evidence of modulation of sensory perception, especially in relation to pain control. Hypnosis can influence regions of the brain associated with pain perception, leading to a reduction in perceived pain intensity.
- Activation of Brain Regions Associated with Imagination and Motor Control: During hypnosis, the brain areas involved in imagination and motor control appear to be
activated. This may explain the ability of people in a hypnotic trance state to respond to suggestions to perform specific motor actions or view certain experiences.

Some lines of research have begun to clarify the different components of hypnotic suggestibility and neurophysiological and neuropsychological mechanisms involved. The neurotransmitter being pointed out as being primarily involved in hypnotic suggestibility is dopamine, while pharmacological studies with psychotropics suggest that serotonin may increase hypnotic suggestibility (De Benedittis, 2021).

The hypnotic response, on the other hand, would be mediated by glutamate, while gamma-aminobutyric acid (GABA), the inhibitory neurotransmitter dominant in the brain, would be associated with suggestibility. GABA is involved in hypnotic responsiveness, so that the more highly hypnotizable an individual, the higher the concentration of GABA (Desouza et al., 2020).

The evidence available regarding the action of oxytocin is still contradictory, although it is known to be involved in various psychological domains (e.g. social behavior, empathy) (De Benedictis, 2021). The complex interactions between neurotransmitters and neuromodulators and other variables (including poor quality of experimental designs), among others, are issues that impact the full understanding of the mechanisms of action involved in hypnosis (De Benedittis, 2021).

It is important to point out that the exact interpretation of these neurophysiological processes may vary between studies and is still subject to debate in the scientific community.

4 CONCLUSIONS

Hypnotherapy, although often surrounded by misconceptions, is a powerful tool that has been used over the centuries. Complementary to conventional therapies, it is used to promote change and healing. It is important to understand that hypnosis, when performed by skilled and ethical professionals, can be an effective tool to help people overcome a variety of challenges.

Hypnotherapy is a complex area involving psychological, cognitive, and neurological factors, and specific interactions may depend on the context and individual characteristics of the patient. Although there are hypotheses for the neurobiology of hypnotherapy, the relationship between the response after hypnotic induction, mechanisms, and neurotransmitters has not yet been fully clarified, and it is necessary to base hypnosis in order to relate it to the phenomena observed during psychotherapy and neurobiological mechanisms of the hypnotic response.

Scientific advances in the area have contributed significantly to the understanding of the hypnotic response, with future prospects that the advance in new technologies in neuroimaging and methodologies can bring answers about the mechanisms involved and prove the effectiveness of their use.

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