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Physiology of Reichian Repression: the role of Nitric Oxide (NO) in Mental Illness Etiology

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ABSTRACT

Wilhelm Reich thought that the mechanism of repression of emotions involved the contraction of muscles which formed an armour in the psychiatric patient. This paper identifies such an armour with Myofascial Syndrome, a pathology determined by alterations of Nitric Oxide, considered as the sexual agent about Feud and Reich speculated about.

The paper explains the physiology of repression taking into account the cortical and subcortical structures involved, which belong to the Emotional Motor System.

Finally is shown how Myofascial Syndrome and the alteration of Nitric Oxide determine the alteration of the main neurotransmitters involved in mental illness due to physiological, biomechanical and social stress.

Keywords: Reich, Repression, Nitric oxide, Mental illness, Stress, Emotional motor system, Psychiatry

INTRODUCTION

Wilhelm Reich thought that Mental Illness was caused by blocks in the flow of Sexual Energy in the body, due to Muscle Cramps which act as a brake in experimenting the sensations of sexual pleasure (Reich, 1968). He found that muscular tensions can inhibit a set of human emotions -e.g. rage, fear, sexual arousal-and that dissolving tensions caused such emotions to re-emerge along with the autobiographical events related to them.

I identify the Reichian muscle cramps with the Tendinous Myofascial Units (MFUs) which characterize the Myofascial Syndrome(Petrogalli, 2020a). Reich described the Myofascial Pathological Contracures as the somatic expression of Repression-i.e. the somatic mechanism through which the human body performs Repression creating a muscular armor that impairs both the perception of removed emotions (related to repressed episodes lived by the patient) and the experimentation of the orgastic sensation.

The molecule that determines the stasis of sexual energy is Nitric Oxide, which I identified as the sexual molecule (Petrogalli, 2020b) responsible for the occurrence of Myofascial Pathological Contractures (Petrogalli, 2020a).

My purpose is to describe the Physiology of Reichian Repression and to explain how Myofascial Syndrome leads to direct and indirect biochemical alterations in the arrangement of neurotransmitters and, as a consequence, to behavioral alteration in patients; both phenomena, as a matter of fact, characterize mental illness

TWO MOTOR SYSTEMS

In neurological practice, it is well known that patients suffering from certain cerebrovascular accidents interrupting the fibers from the face region of the primary motor cortex (BA 4) to the caudal brain stem are not able to show their teeth or move other mouth muscles on the contro-lateral side of the lesion. However, in the same patient a funny story or other positive emotional event produce a smile, making use of the same facial muscles that could not be moved voluntarily.

In the central nervous system there seems to be a difference in the voluntary control of the motoneurons in the muscles of the mouth and the emotionally-driven control of the same motoneurons responsible for activities such as smiling (Hopf HC et al. 1992) (Figure 1).

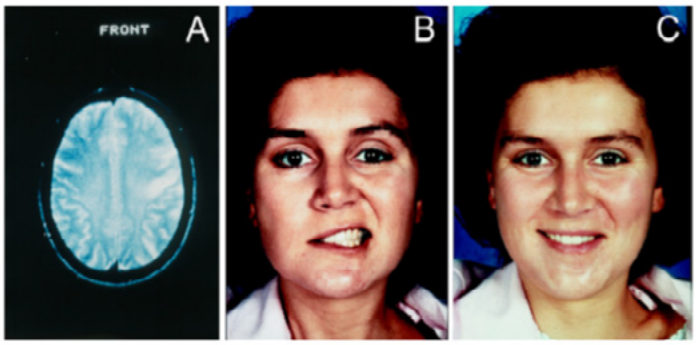

Figure 1: A lesion in the voluntary or somatic motor system, i.e. in the left motor cortex controlling face movements (A), results in the inability to show teeth on the right side (B); the patient is still able to smile (C) because the emotional motor system is still intact.

Moreover, the same clinical reports prove that these two different control systems do not use the same pathways to reach the motoneurons in the muscles of the mouth; in 1992 Holstege brought forward the concept of two motor systems (Holstege, 1992), a somatic and an emotional one, both making use of the same basic "hardware", i.e. the motoneurons themselves (somatic and autonomic) and their premotor inter-neurons.

The Somatic or Voluntary Motor System

This motor system consists of a medial and a lateral component. The medial component controls the motoneurons and inter-neurons of the axial and proximal muscles, including back, hip, trunk, shoulder, and neck muscles as well as the muscles in the external eye. The functions of the medial component are to maintain erect posture (anti-gravity movements), to guarantee the integration between body and limbs and the synergy of the whole limb and to assure the orientation of body and head (Kuypers HGJM, 1981).

Even in humans-although there is a corticospinal component taking part in this medial component-some important structures of the medial component are located in the brainstem. On the other hand, in the lateral component of the somatic (or voluntary) motor system the pathways originating in the primary and premotor cortex play the most important role, especially since brainstem structures such as the rubro-spinal tract seem to be less important in humans.

The Emotional Motor System

The Emotional Motor System (EMS) also includes a medial and a lateral component. The medial component of the EMS consists of pathways made up of neuronal cell groups that, in turn, project to all the parts of the spinal cord, gray matter or caudal brainstem (Holstege and Kuypers, 1982). Some examples are the caudal-raphe nuclei and the adjoining ventromedial tegmentum, which contain neurons using serotonin, leucine-enkephalin, P substance and many other neurotransmitters and neuromodulators (Holstege, 1991). The above-mentioned structures both compose of different cell groups, of which the caudal region (raphe magnus, pallidus and obscurus with adjoining tegmentum) projects caudally and the nuclei in the rostral raphe (raphe dorsalis and centralis) project rostrally in order to supply almost any part of the central nervous system with serotonin and several other transmitters and modulators. The same applies for the noradrenergic neurons in the locus coeruleus and other noradrenergic cell groups in the caudal brainstem, whose projection pattern is closely related to the raphe nuclei. For example, the neurons in the rostral part of the locus coeruleus project rostrally to mes-, di-and telencephalon, whereas neurons in the caudal part of this cell group project caudally to the caudal brainstem and the spinal cord (Holets et al., 1988).

Another example of the medial component of the Emotional Motor System is the dopaminergic A-11 cell group in the rostral mesencephalon which, similarly to the noradrenergic and the serotoninergic cell groups, projects to all parts of the spinal gray matter throughout the length of the spinal cord (Holstege et al. 1996). Because of the extremely diffuse projections of all these pathways, the raphe nuclei along with the adjoining tegmentum, the locus coeruleus and the A-11 neurons are not involved in specific motor activities; rather, they have a crucial role in regulating the general level of activation of all the neurons they have access to. This is the reason why the medial component of the EMS is called the "level-setting system" (Holstege, 1991).

The so-called descending level-setting system does not only involve the motor, but also the sensory system; as a matter of fact, its neurons also reach the dorsal horn, where they have an influence on incoming nociceptive information (Mason, 2006). The raphe nuclei and the adjoining areas-as well as other level-setting systems-are under strong control of the Periaqueductal Gray (PAG) and other higher limbic levels such as the medial orbito-frontal cortex.

The lateral component of the EMS consists of some pathways controlling specific motor activities related to emotions; a case in point are the projections from the PAG to premotor interneuronal cell groups involved in the regulation of blood pressure, heart rate, micturition, respiration and mating behavior (Subramanian et al., 2008; Holstege, 2014). Vocalization is another important example of a lateral component in the EMS. The PAG, in turn, receives strong projections from the central nucleus of the amygdala (Hopkins and Holstege, 1978), from the lateral bed nucleus of the stria terminalis (Holstege et al., 1985) and from the lateral hypothalamus (Holstege, 1987); in cats, such projections come from the infralimbic cortex (Kuipers et al., 2006), the feline equivalent to the anterior cingulate cortex in monkeys (An et al., 1998; Saleem et al., 2008).

Through their descending pathways, these limbic areas control the motor output in PAG but, in order to generate higher level of emotional motor output-not controlled by the PAG-these limbic areas also have their own access to the caudal

pontine and medullary lateral tegmentum, which contains the premotor interneurons projecting to the motoneurons of the chewing, tongue, facial, soft palate, pharynx and larynx muscles

PHYSIOLOGY OF REICHIAN REPRESSION

W. Reich described some patients referring that during childhood they performed such actions as holding their breath or contracting the abdominal muscles, which allowed them to remove vegetative sensations and to repress their feelings of hate, anxiety, love and sexual arousal.

Reich also noted that some patients kept a haughty expression which, once dismantled, proved to be a defensive attitude against fear, whereas other patients had a "thinker forehead" which revealed a childlike fantasy to be a genius. Reich stated that holding our breath and contracting the diaphragm is one of the first and most important actions in order to repress sensations of pleasure or anxiety in the abdomen and according to him that was a universal mechanism.

Reich also noted that dissolving a myofascial pathological contracture led patients to experience emotions related to the episode that caused them, but also that acting psychically on some emotions and attitudes could resolve the myofascial pathological contractures; in other words, the somatic symptoms could be eliminated by making conscious their psychic meaning.

Phenomenologically speaking, we can draw the following conclusions:

- The Myofascial System can protect the mind from considerable distress by storing the threatening thoughts or feelings in the form of energy;
- As a consequence, some Myofascial Units become chronically tense and eventually impaired in both function and flexibility;
- The consciousness of such rigidity and tension soon begins to fade, leaving most individuals without any awareness of their physical impairment;
- The release of the chronic myofascial tension is soon accompanied by the release of the stored emotional energy and thoughts; Reich noted that each myofascial pathological contracture contained the meaning of its onset and, vice-versa, the liberation of the affect is guaranteed by the dissolution of the chronic muscular attitudes

The physiological explanation of that is a malfunctioning in the Emotional Motor System, due to signals from upper limbic structures via the extrapyramidal motor pathway.

Specifically, the Hypothalamus serves as a neurological interface between emotions and the Myofascial System. Its function can be resumed as follows:

- The front part of the hypothalamus is connected to the parasympathetic system; its activation leads to a relaxation (extension or erection) of Myofascia mediated by Nitric Oxide (NO), followed by a chronic contracture of Skeletal Muscles, i.e. a Tendinous MFU;
- The rear part of the hypothalamus is connected to the sympathetic system; its activation leads to the contraction of Myofascia, followed by the slackening of Skeletal Muscle, i.e. a Granulomatous MFU

It is worth noting that the muscle contraction in Tendinous MFU is caused by the hyperactivation of α-motorneurons: such a phenomenon is not to be attributed, as one could suppose, to the somatic motor system, but rather to the emotional motor system. This fact explains all the phenomenological statements we described above.

The neuro-physiological mechanism behind Repression has already been analyzed in some papers (Anderson et al., 2004; Aybek et al., 2014). Specifically, it has been shown that during the forgetting of unwanted memories the neuronal activity in the hippocampus is reduced in response to an enhanced activity of the Supplementary Motor Area (SMA) and the Cerebellum, whose enhanced connectivity to limbic structures, e.g. the Amygdala, inhibits hippocampal activation.

Those findings support the thesis that the Emotional Motor System with its motor inputs to Skeletal Muscles is involved in the process of Repression, thus confirming Reich's theory about the etiology of mental illness. My important contributions have been deriving the same theory before knowing the existence of Reich's one and to have identified the role of Nitric Oxide as the sexual molecule (Petrogalli, 2020b). Promoting extraphysiological mechanical stresses in Fascia and Skeletal Muscle (Petrogalli, 2020a).

DIRECT BIOCHEMICAL ALTERATIONS

Myofascial Tensions are due to an alteration in Nitric Oxide (NO) levels, caused by the conformational changes in the structure of collagen within the extracelllular matrix (Petrogalli, 2020a). Nitric Oxide is one of the most important neurotransmitters (Philippu, 2016): besides being strictly related with Serotonin, GABA and dopamine, it also regulates the spatio-temporal orientation of nervous cells (Edelman and Gally, 1992) and processes like sexual arousal (Petrogalli, 2020b)-promoting vasodilation during the erection of the clitoris or the penis-and phlogosis.

The hypothesis that Nitric Oxide could be responsible for the etiopathogenesis of psychiatric disorders has been put forward in numerous papers:

- Das et al. 1995 and 1996, Akbarian et al. 1993ab, Hans-Gert Bernstein 2005 for Schizophrenia
- Yanik 2003 for Bipolar Disorder

- Oosthuizen et al. 2005 for post-trumatic stress disorder (PTSD)
- Bernstein et al. 1998 and Chrapko 2004-2006 for depression.

My theory provides a final explanation to these facts.

Alterations caused by Myofascial Syndrome affect the concentration of Serotonin-a very important neurotransmitter involved in mental illness.

Such modifications affect arousal. Takamori in 1977 stated that Serotonin could generate myopathies, while Cotel et al. in 2013 showed that Serotonin induces central fatigue by inhibiting action potential.

Myofascial Pathological Contractures are associated with the presence of P Substance in the extracellular matrix, a molecule which was identified by Bersani in 2003 as a very important biochemical agent for the etiology of psychiatric diseases (PD).

INDIRECT BIOCHEMICAL ALTERATIONS

Biomechanical Alterations

Arousal in mental illness is altered due to Myofascial Pathological Contractures, influencing the post-gangliar autonomous fibers that control the neurovegetative reactions. Since heart rate variability (HRV) is an index of the sympathovagal balance, evidences of homeostatic imbalance in patients with PD are shown in Kawachi et al. (1995) and in Yeragani et al. (1991-1993).

In psychiatric patients, breath is centrally altered and breathing muscles, Diaphragm in primis, are weaker. Since Diaphragm is a very important muscle in maintaining posture and in regulating respiration, homeostasis and lymphatic circulation, in 2016 Bordoni argued that functional alterations of this muscle could affect emotions. Since the movements of the Diaphragm also affect the Hypothalamic-Pituitary-Adrenal Axis, endocrine production is altered; eventually though, it is the brain that activates the Adrenal Glands to produce more Corticosteroids and Catecholamines. The Tongue, a homologous structure to the Diaphragm and the Pelvic Floor, can exert a pressure on the "palate spot" that directly stimulates the Locus Coeruleus and the endogenous production of Dopamine (De Cicco, Ferrante et al. 2007).

From a biomechanical point of view, proprioceptive alterations cause mentally disturbed patients to be weak and awkward in doing everyday tasks; for example, the Flexor Ulnaris Carpi usually glides on Fascia at its distal insertion and tends to be more tendinous at the proximal one, whereas in a mentally disturbed individual, due to impairments in using muscles, we can observe the opposite situation with the distal part of the muscle presenting a myofascial pathological contracture. Due to reduced proprioception and coordination, children are more likely to undergo physical trauma and, consequently, to have a surgical operation which can increase the risk to develop a myofascial pathological contracture.

Social Behavior Alterations

When children are affected by mental illness, both alterations of the arousal and structural myofascial imbalances and asymmetries affect their behavior, so that it is impossible for them to lead a 'normal' social life even at a young age; furthermore, positive-feedback mechanisms tend to make the social distress which they suffer even worse. Should somebody note this, in most cases he or she would think: "He is only a child"; at the worst (i.e. in patients with early developments of psychophysical diseases) he or she will say: "He is a problematic child", thus putting social stress and anxiety on him and also on his family. As a consequence, some internal conflictual situations that unconsciously stressed and stress the child, accentuated by abnormal and obnoxious habits of the infant, e.g. hyperactivity, insomnia, frequent crying, may arise.

It is reasonable to postulate that non-verbal communication as well is altered both by structural imbalances and a myofascial impairment, as further evidences of this assioma can show. In particular, when Myofascial Tensions affect facial muscles, mentally disturbed patients:

- Do not understand they have motor deficits in facial muscles, making it difficult to relate with other people
- Look very strange to other people even if no one is able to explain this fact

Myofascial Pathological Contractures at facial muscles generate hyperarousal according to Cannon's Peripheral Theory of Emotions, the weak form of which has been experimentally demonstrated: mentally disturbed people

experiment arousal alterations due to positive feedback mechanisms as facial muscles move in response to emotions. This phenomenon may generate biochemical central alterations leading to extreme emotions of any qualitative kind.

C-Tactile fibers (CTs) are unmyelinated low-threshold mechano-sensory nerves (McGlone, 2014) conveying information about Social Gentle Touch. Moreover, they are involved:

- In the development and functioning of the social brain, since social touch is crucial during development (Field, 2001) and even for cognitive processes (Leonard et al. 2014)
- In sexual pleasure and excitement, since the stimulation of CTs promote the release of Endorphins and Endogenous Opiates
- In pain control, as they project to the Inner Lamina II of the Spinal Chord's Dorsal Horn and form a CT-mediated Spinothalamic pathway signaling pleasant properties of

touch

Somatized stress in Myofascial Pathological Contractures alters the stimulation of CTs, due to the strictly physical relation between the skin and the fascial system through hypodermis.

With respect to social interactions, it is possible to identify two categories of pathological misunderstandings, namely:

- Psychosis, when a mentally disturbed individual negatively interprets the meaning of the actions or words of the non-disturbed individual
- Gaslighting, when the non-disturbed person misinterprets the meaning of the actions or words of the mentally disturbed person, e.g. because of altered Nonverbal Communications Skills, e.g. posture, intonation and tone of voice, which are functions strongly under the control of the Emotional Motor System

It is especially the latter that generates social distress, as the patient cannot express his intentions without being misunderstood or resulting obnoxious.

In the most serious cases-i.e. in Schizophrenia-emotional alterations generate misunderstandings when the patient interacts with the external and social environments: this is due to an altered functioning of both C-Tactile fibers and Mirror Neurons (MNs) (McCormick et al. 2012, Casartelli and Molteni, 2014); MNs in particular are altered by wrong patterns of movement and imitational social behaviors, that according to Feldenkrais are the same thing.

This is a plausible explanation of the negative symptoms observed in Schizophrenia, whose manifestations are strictly related to pathological Myofascial contractures by a biomechanical, kinesthetic, and social and biochemical point of view.

CONCLUSION

In situations of abuse of the endogenous and behavioral mechanisms of Reichian Repression to remove emotions, which leads to Myofascial Pathological Contractures, Nitric Oxide (NO) distribution in the tissues is first altered, causing other neurotransmitters such 5-HT, GABA, Dopamine and others to be altered in turn, due to direct and indirect biochemical alterations, these last divisible into Biomechanical and Social or Behavioral ones.

Such pathological condition leads to neurophysiological alterations of arousal and to psychotic episodes, in direct proportion to the overall stress level-resulting from the sum of internal somatized tissue stress, external, environmental and social stress.

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