

Perspectives in Pain Management: Physical Analgesia

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Abbreviations: IASP: International Association for the Study of Pain; TENS: Transcutaneous electro neuro stimulation.

Pain – Definition and Types

According the *International Association for the Study of Pain* (IASP) pain is one of the most frequent sensations, formed in the nervous system, with different functional characteristics [1]. By definition, pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. Pain is a subjective experience, provoked by nociceptive activation, by changes in sensory nerves and roads, or by cerebral centers – regulating of the stress, the affects and the motivation. Different factors (physical, chemical, psychological) can influence on the pain perception.

The biological significance of pain perception is the protection of the organism from negative external influences (*signal attention*). *The pain informs the organism and provokes a* reflexory defensive reaction of the individual. The French philosopher René Descartes explains the idea for the *defensive character of pain (baby fire, boy fire) and the capacity to unchain a reflexory reaction "pulling on a thread" (1662, 1664) [2].*

In 1959 Willem Noordenbos formulated a hypothesis for the multi-synaptic transmission of pain-signal: "One-synaptic transmission must be the exception rather than the rule in the nervous system [3]. Any nerve cell located in the anterior horn . . . could hardly be expected to synapse at higher level with one such similar cell only. It will probably send ramifications to many other locations, and in turn be acted upon by the ramifications

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of many other cells. . . Far from being a continuous chain of short neurons, these fibers must constitute links in an extremely complicated nerve net in which, within limits, everything synapses more or less with everything else."

In 1965 the collaboration between two individual investigators – the British physiologist Patrick Wall and the Canadian psychologist Ronald Melzack, generates the *theory of gate control* [4]. Their common article "Pain Mechanisms: A New Theory "was qualified like" the most influential ever written in the field of pain". Melzack and Wall suppose the existence of a controlling mechanism in the spinal medulla, which is closed in response to the normal stimulation of fast fibers of tactile sense, but is open if the slow fibers of pain perception transport numerous and intensive sensory signals. The gate is closed if these signals are interrupted by a new stimulation of the fast fibers.

There are different *types of pain: acute and chronic (persistent); nociceptive pain & neuropathic pain; others (central pain)*. A lot of authors consider that the combination of nociceptive and neuropathic mechanisms is one of the basic causes for our *therapeutic impotence* behind pain.

In rehabilitation practice we apply another differentiation of pain: in neurological conditions - *nociceptive or neuropathic pain*; in rheumatological diseases - *degenerative and inflammatory pain*; in orthopedical and traumatological conditions - *traumatic pain; fibromyalgia, myofascial pain; tendinopathy pain (ligamentar pain); phantom pain*.

The Declaration of Montréal of the International Pain Summit of the International Association for the *Study of*

Pain (IASP) identifies that chronic pain is a serious chronic health problem and access to pain management is considered as a fundamental human right.

Physical Analgesia: Methods and Mechanisms

Pain management is an important part of rehabilitation algorithms in clinical practice.

Physical analgesia is the application of physical factors for pain management. By our opinion the anti-pain effect of physical modalities is very important, with a high level of efficacy. Physical analgesia has not side consequences and may be applied in combination with other therapeutic factors.

In physical analgesia a lot of physical modalities are applied:

- **Preformed modalities:** Low frequency currents and low frequency modulated middle frequency currents (sinusoidal-modulated, interferential, Kots currents); Transcutaneous electro neuro stimulation (TENS); High frequency currents (*diathermy, ultra-high frequency currents, decimeter and centimeter waves*); Ultra-sound and phonophoresis with NSAIDs; Low frequency magnetic field; Deep Oscillation;
- **Natural modalities:** Kryo-factors (*ice, cold packs, cold compresses*); Thermo-agents (*hot packs, hot compresses*), Hydro- and balneo-techniques (*douches, baths, piscine*); hydro and balneo-physiotherapy techniques (*underwater massage, under water exercises, etc.*); Peloidotherapy (*fango therapy, thermal mud, sea lye compresses*); Physiotherapy techniques - stretching, post-isometric relaxation, manual therapy (traction, mobilization, manipulation); massages (manual and with devices; periostal, connective tissue massage, etc.);
- **Reflexory methods:** electrotherapy, thermotherapy and physiotherapy in reflexory points and zones; acupuncture, laserpuncture, acupressure, etc.

The formulation of the gate-control theory for explanation of pain deposited the base of a new epoch in the development of the orthodox medicine [4]. This was the introduction of the principle of the “contra-stimulation” – final effect reticence by stimulation of inhibiting systems or else final effect stimulation by embarrassment of inhibiting systems.

We propose our own theory for explanation of pathogenetic mechanisms of action of physical modalities on the nociceptive and neuropathic pain. Our hypothesis: The physical complexes may provoke an analgesic effect by the following mechanisms:

- *By influence on the cause for irritation of pain receptors* - consequence of stimulation of circulation, metabolism and trophy of tissues (by low and medium frequency electric currents, magnetic field, ultrasound, He-Ne laser; massages; manual techniques);
- *By blocking of nociception* (low frequency currents, including transcutaneous electrical nerve stimulation or TENS; laser therapy);
- *By inhibition of peripheral sensitization* (low and middle frequency currents, TENS; magnetic field; laser therapy);
- *By peripheral sympaticolysis* (low frequency currents like dyadinamic currents, peloids);
- *By stopping the neural transmission (by C and Aδ delta - fibers) to the body of the first neuron of the general sensibility* (iontophoresis with Novocain in the receptive zone – the region of neuro-terminals);
- *By input of the gate-control mechanism* (TENS with frequency 90-130 Hz and interferential currents with high resulting frequency - 90-150 Hz);
- *By activation of the reflexory connections: cutaneous – visceral, subcutaneous-connective tissue-visceral, proprio-visceral, periostal-visceral and motor-visceral* (classic manual, connective tissue and periostal massage, post-isometric relaxation and stretching-techniques);
- *By influence on the pain-translation in the level of posterior horn of the spinal medulla – using the root of activation of encephalic blocking system in the central nervous system* (increasing the peripheral afferentation) and *influence on the descending systems for pain – control* (TENS with frequency 2-5 Hz and interferential currents with low resulting frequency 1-5 Hz, acupuncture and laser puncture; reflexory and periostal massage, zonotherapy, acupressure, sudgok massage; preformed factors in reflexory zones /palms of hands, plants of feet, paravertebral points; zones of Head, of Mackenzie, of Leube-Dicke, of Vogler-Krauss/); *By inhibition of central sensitization* (laser therapy; peloidotherapy; physiotherapy);

- *By influence on the psychic state of the patient– the drug «doctor» and the drug «procedure».*

Physical Analgesia: Pros & Contras

We consider that physical analgesia is a natural treatment; without significant contra-indications, and without side-effects. This is cheap treatment; that can be combined with other types of analgesia = We must say that actually there is a *lack of sufficient evidence* (problem in the epoch of evidence based medicine and evidence based rehabilitation). In clinical practice an *interdisciplinary team* is needed (medical doctors – specialists in Neurology, Neurosurgery, Rheumatology, Orthopedics and Traumatology; Physical and Rehabilitation Medicine /PRM/, etc.)

During our modest clinical experience (of 20 years) we received significant results in patients with conditions of the nervous and motor systems [5]. We realized comparative evaluation between the efficacy of pure drug therapy, physical analgesia and combined anti-pain therapy (*drug and physical analgesia*) on different types of pain: *spastic pain; rigidity pain; hemiparetic shoulder pain; paravertebral (upper & low back) pain; radicular neuropathic pain; diabetic polyneuropathy pain; arthrosis pain; arthritis pain; scoliotic pain; post-traumatic pain; phantom pain.*

Algorithm of Pain Management

The influence of physical modalities on the interstitium (*'milieu intérieur'* of *Claude Bernard*) is the theoretical

base for a complex pain management program – combination between physical modalities and combination of drugs and physical modalities.

We consider that the *complex* algorithm for pain management must include: systematic drugs (and vitamins); rehabilitation complex, and patient education. The synergy between different physical modalities is the logical base for prescription of *complex PRM program*, including different physical modalities: *one or two preformed modalities; one thermo- or kryo-agent; one or two physiotherapeutic procedures* (including soft tissue techniques, e.g. massage, stretching, post-isometric relaxation; manual therapy; analytic exercises, etc.).

We could recommend our complex pain management program.

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