

The concept of proprioceptive neuromuscular facilitation and kinetotherapeutic interventions

Elena Căciulan

Kinetodema, Bucharest, Romania

Daniela Stanca

Kinetodema, Bucharest, Romania

Proprioceptive neuromuscular facilitation (PNF) represents a treatment whose basis have been set during 1940 – 1950, by Herman Kabat, a physician and neurologist who considers that any human being, including the one suffering from disability, owns an unexploited functioning potential.

At the beginning PNF has been utilized to treat patients suffering from poliomyelitis but as experimentation advanced, it has begun clearer that this type of treatment has effects upon the patients suffering from other affections (Kabat, & Knapp, 1944).

The notion of neuromuscular facilitation represents the simultaneous relief and the stimulation and acceleration of volunteer motor response, by stimulation proprioceptors of muscles, tendons, articulations but also through exteroceptors stimulations (Cordun, 1999).

The concept of Kabat is founded on the idea that engaging the proprioceptive system in triggering and perfecting movement can be decisive, considering its especially large distribution including muscular, tendons, capsular ligament structures of the articulation (Kabat, 1980).

Also Kabat emits the proprioceptive neuromuscular facilitation techniques which he defines as “methods of relieving the neuromuscular response by stimulating proprioceptors” (Kabat, 1980).

Other kinetotherapists emphasize (Voss, Ionta & Myers, 1985) that PNF represents an integrated approach, each type of treatment being addressed to the human being entirely and not just to a certain body part or specific issue.

On the other hand the therapeutic approach is always positive, using and perfecting what the patient can accomplish, on a physiological level so that the main purpose of the therapy

Corresponding author: Elena Căciulan; Daniela Stanca.

Phone number: -

E-mail address: elena_caciulan@yahoo.com; dananstanca@gmail.com

would be to help the patient obtain their highest functioning level.

At the beginning the proprioceptive neuromuscular facilitation received critiques regarding its applicability in neurological conditions, characterized by the presence of spasticity (Levitt, 1966). But studies have shown that using the procedure with a patient who can actively collaborate does not need opposing high resistance but only orienting movement, in the sense of facilitating it, with a rapid gain of results (Gracies, 2001).

Within the given context the neurophysiological structures of neuro-proprioceptive facilitation, as emitted by Sherrington, lay at the basis of procedure and facilitation techniques and consist of the following (Knott, & Voss, 1968; Adler, Beckers, & Buck, 2014):

- Reignition – represents the effect of applying a stimulus which is prolonged and after its stopping is directly proportioned with the force and time of stimuli action and determines the appearance of an increased force sensation, after maintaining static contractions;
- Temporal summation: summing up subliminal stimuli (under the excitability benchmark) which are inherited in a (short) period of time, determining action potential (arousal);
- Spatial summation: summing up subliminal stimuli simultaneously applied in diverse areas of the body, determining action potential (arousal) (Barlow, 1958);
- Irradiation: consists of spreading and increasing the response force, emerged when the number of stimuli or their force are increased and the response can be whether of arousal or inhibition (Schieppati, 1987);
- Successive induction: forced recruitment of a muscle or muscular group, immediately after the volunteer contraction of the muscle or antagonist muscular group. Successive induction is a provisory irradiation, while it is also triggered by a preceding reflex (Dufour, & Gedda, 2007).

Fundamental procedures of facilitation offer the kinetotherapist instruments through which he can help the patient gain efficient motor function and improve their motor control (Macedo, Saragiotto, Yamato, Costa, Menezes Costa, Ostelo, & Maher, 2016).

The purposes of using facilitation procedures are:

- Improving the patient's ability of moving and maintaining stability (Treleaven, 2008);
- Guiding movement through grips and applying resistance;
- Obtaining movement coordination within the temporal succession (timing);
- Improving patient resistance and preventing fatigue (Căciulan, & Stanca, 2011).

Valuing the concept of neuro-proprioceptive facilitation consists in using specific treatment techniques and procedures, along with establishing the following basic procedures (Adler, Beckers, & Buck, 2014): optimal resistance, irradiation and enforcement, manual contact

(grip), position and movement of the kinetotherapist's body, verbal command, visual stimuli, transiting and approximating (compressing), stretching, timing and movement patterns.

References

- Author, A.B., & Author, C.D. (2014). *The title of the book*. Location: Publisher.
- Author, A. B., & Author, C. D. (2013). The title of the chapter. In A. Editor, B. Editor & C. Editor (Eds.), *The title of the book* (pp. xxx-xxx). Location: Publisher.
- Adler, S., Beckers, D., Buck, M. (2014). *PNF in Practice: An Illustrated Guide*. 4th fully revised Edition. Publisher: Springer.
- Barlow, H. B. (1958). Temporal and spatial summation in human vision at different background intensities. *The Journal of physiology*, 141(2), 337.
- Căciulan, E., Stanca, D. (2011). *Paralizie cerebrală infantilă/Infirmitate motorie cerebrală – Evaluare și kinetoterapie*, Editura Morosan, București.
- Cordun, M. (1999). *Kinetologie medicală*. Editura Axa, București.
- Dufour, M. et Gedda, M. (2007). *Dictionnaire de Kinésithérapie et Réadaptation*. Editeur: Maloine, Paris.
- Gracies, J.M. (2001). Pathophysiology of impairment in patients with spasticity and the use of stretch as a treatment of spastic hypertonia. *Phys Med Rehabil Clin N Am*. 12(4):747–68.
- Kabat, H. and Knapp, M.E. (1944). The mechanism of muscle spasm in poliomyelitis. *J Pediatr*. 24:123–137.
- Kabat, H. (1980). *Low Back and Leg Pain for Herniated Cervical Disk: New Method of Diagnosis and Conservative Treatment*. Publisher: Warren H Green; First edition.
- Knott, M., Voss, D. E. (1968). *Proprioceptive Neuromuscular Facilitation: Patterns and Techniques*. Publisher: Medical Department Harper & Row; 2 edition.
- Levitt, S. (1966). Proprioceptive neuromuscular facilitation techniques in cerebral palsy. *Physiotherapy*. 52(2):46–51.
- Macedo, L. G., Saragiotto, B. T., Yamato, T. P., Costa, L. O., Menezes Costa, L. C., Ostelo, R. W., & Maher, C. G. (2016). *Motor control exercise for acute non-specific low back pain*. The Cochrane Library.
- Schieppati, M. (1987). The Hoffmann reflex: a means of assessing spinal reflex excitability and its descending control in man. *Progress in neurobiology*, 28(4), 345-376.
- Treleaven, J. (2008). Sensorimotor disturbances in neck disorders affecting postural stability, head and eye movement control. *Manual therapy*, 13(1), 2-11.
- Voss, D.E., K. Ionta, M.K., Myers, B.J. (1985). *Proprioceptive Neuromuscular Facilitation: Patterns and Techniques*, 3rd Edition. Publisher: LWW.