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February 2022

Newsletter IPNFA[®] research committee

Dear reader, we checked again the web but also the IPNFA[®] community for news and updates. This edition presents: a study **co-authored by Carsten, Marcel and Leandro** on irradiation, one of our key elements of facilitation. Furthermore we received contribution from our **Swiss colleague: Ulla**. She notified us about an interesting view on proprioception to limb movement and the effects of ageing. Ageing a main issue for our society and the next decades to come. Also **Vicente and Paulo** published on PNF, they co-authored a review on PNF in LBP. Furthermore information from **World Physiotherapy** and **several abstracts** with a link to the original publication. We hope that also this edition finds your appreciation and you enjoy reading about PNF related developments

I wish a joyful reading. Fred.

Marchese RR, Severo do Pinho A, Mazutti C, Rech KD, **Grzebellus M, Schäfer C, Giacometti da Silva L**, de Souza Pagnussat A

Proprioceptive neuromuscular facilitation induces muscle irradiation to the lower limbs - A cross-sectional study with healthy individuals

Journal of Bodywork and Movement Therapies, 2021; 27, 440 – 446

abstract

Introduction: This study aimed to evaluate the effectiveness of proprioceptive neuromuscular facilitation (PNF) in promoting muscle irradiation to the lower limbs and to relate these findings with muscle activation during the sit-to-stand task.

Methods: Twenty-four healthy women were recruited via convenience sampling and submitted to four PNF patterns: upper limb pattern with flexion-abduction-external rotation (UL), lower limb pattern with flexion-adduction-external rotation with knee flexion (lower limb pattern 1 [LL1]), lower limb pattern with flexion-abduction-internal rotation with knee flexion (lower limb pattern 2 [LL2]), and lifting to the right. Electromyography was recorded from the gluteus maximus, gluteus medius, vastus medialis, vastus lateralis, and soleus during the PNF patterns and during the sit-to-stand task.

Results: The most recruited muscles during the sit-to-stand task were the vastus lateralis, vastus medialis, and soleus ($p < 0.05$). Lifting to the right induced the greatest activation of the gluteus maximus ($p < 0.001$). Lifting to the right and LL2 were better than UL at recruiting the gluteus medius ($p < 0.05$). Lifting to the right and LL1 were better than UL at recruiting the vastus medialis and lateralis ($p < 0.05$; $p < 0.05$). and Lower limb pattern 1 and 2 were better than UL at recruiting the soleus muscle ($p < 0.05$).

Conclusion: PNF can be used to induce muscle irradiation to maintain or improve muscle activity to the muscles recruited during the sit-to-stand task. The best PNF pattern for inducing muscle irradiation to muscles recruited during the sit-to-stand task are lifting to the right, LL2, and LL1..

<https://doi.org/10.1016/j.jbmt.2020.12.026>

Landelle C. et al. **Contribution of muscle proprioception to limb movement perception and proprioceptive decline with ageing**
Current Opinion in Physiology 2021, 20:180–185

Perception of self-body movements relies on multiple senses among which muscle proprioception plays a crucial role. However, estimating its specific contribution is challenging given the difficulty to stimulate the deep muscle spindles independently from the skin and other tissues. Recent advances in psychophysical and neuroimaging studies that allow targeting muscle proprioception reveal (i) its specific contribution with respect to touch and vision, (ii) the interplay between bimanual proprioceptive signals and (iii) the sensorimotor cerebral network associated with movement illusion. Moreover, they highlight in older adults a larger decline in muscle proprioception than touch, which goes with structural alteration of cortical gray matter and corpus callosum, and with increased inter-network connectivity. These findings underline the importance to address disruption of sense of movement for both diagnosis and rehabilitation.

Introduction In 1826 Sir Charles Bell described the existence of the 6th sense or muscle sense and its contribution to the perception of self-body movement [1]. Since then, electrophysiological studies in humans have clearly identified that muscle spindles, widely scattered in the muscle belly, are extremely sensitive to muscle lengthening [2]. However, these proprioceptive mechanoreceptors are deeply embedded, which makes their access and specific stimulation challenging [3]. Classically, the role of muscle proprioception has been widely studied by assessing one's ability to detect or reproduce passive displacement of body segments that actually activates simultaneously both touch and muscle proprioception. However, touch also conveys kinaesthetic information. Indeed, just stretching [4] or brushing the skin [5,6] alone can create perception of illusory movements. Microneurographic studies further confirmed that cutaneous mechanoreceptors are sensitive to the velocity [7] and the direction [8] of passively imposed movements of a limb. In addition, a vast amount of studies have also demonstrated the kinaesthetic function of vision [6,9,10]. The perception of the self-body movement, called kinaesthesia, is thus fundamentally multisensory. Revealing the specific contribution of muscle proprioception to such a complex perception is critical and deciphering the corresponding proprioceptive brain network is challenging. This review presents recent insights into the specific contribution of muscle proprioception to kinaesthesia from studies that have disentangled proprioception and touch (vision being easily isolated), and from studies that investigated the interplay between bimanual proprioceptive feedback. The development of magnetic resonance imaging (MRI) compatible devices of stimulation has also allowed identification of the underlying brain network. Of relevance, recent behavioral and neural evidence has shown that touch and muscle proprioception may not contribute equally to kinaesthesia across the lifespan and may be unequally affected with ageing. An important finding that underlies the need to specifically assess proprioceptive deficits to adapt personalized sensory training approaches for rehabilitation perspectives.

<https://doi.org/10.1016/j.cophys.2021.01.016>

The website from **World Physiotherapy**, formerly known as the World Confederation of Physical Therapy (WCPT) provides nice news about the global position of physiotherapy.

[World Physiotherapy](#)

In the news section from the website, an nice announcement with involvement from one of our IPNFA members; see this piece of news information:

Poland was the destination for World Physiotherapy's first international business trip since the COVID-19 pandemic was declared in March 2020.

Organised by the Polish Chamber of Physiotherapists (KIF), the two-day trip was designed to mark the anniversary of the chamber's membership of World Physiotherapy and to discuss future collaborative activities.

Jonathon Kruger, World Physiotherapy's chief executive officer, met with representatives of the chamber and visited the Warsaw Institute of Psychiatry and Neurology. He also met with Natalia Morgulec-Adamowicz, of the faculty of rehabilitation at the Jozef Pilsudski Academy of Physical Education, **and visited classes led by Agnieszka Stepien.**

KIF has more than 71,000 members and is the largest national physiotherapy association in Poland.

During the discussion meeting, KIF was represented by Maciej Krawczyk, Zbigniew Wronski, Tomasz Niewiadomski, Ernest Wisniewski, Jacek Koszela, Dalia Woznica, Weronika Krzepakowska, and Wojciech Komosa.

Representatives of the Polish Society of Physiotherapy, which had previously represented Polish physiotherapists within World Physiotherapy (then World Confederation for Physical Therapy) were also invited to take part in the discussion meeting. This included Jan Angielniak, Magdalena Hagner-Derengowska, Aleksandra Szabert,

Jonathon said: "This trip was a fantastic opportunity to connect with one of our largest, and most recent, member organisations. The work that the leadership of KIF has undertaken to drive the development of physiotherapy in Poland has been very impressive."

The World Physiotherapy website informs about the state of the physiotherapy in general all over the globe, an interesting view is the census (counting of ...) in using the link at the bottom of the press release, one can select issues from the survey send to PT associations, that are member of the World Physiotherapy. Further details per country can be obtained.



Press release

For immediate release 11 January 2022

Annual membership census reveals global state of the physiotherapy profession. Responses to the latest World Physiotherapy annual membership census reveal the current state of physiotherapy around the world and gender balance within the global profession.

World Physiotherapy publishes data from its member organisations every year on a range of issues, including professional regulation, practice, education, and the number of employed physiotherapists. This data provides a comprehensive and valuable global profile of the profession.

The annual membership census also included questions about gender and leadership and the governance of World Physiotherapy's member organisations.

The annual membership census date was 30 June 2021.

The census was sent to World Physiotherapy's 125 member organisations, of which 117 responded. The high response rate, 94% (2020: 91%), demonstrates strong engagement between World Physiotherapy and its member organisations and data reliability. The data gives a global snapshot of the physiotherapy profession across the world, showing variations in the density of physiotherapists in different countries/territories and between World Physiotherapy regions.

Highlights of the 2021 census include:

- 61% of respondents said membership of their organisation had increased
- 31% of respondents (2020: 27%) said there was full direct access in their country/territory and people could refer themselves to a physiotherapist without a referral, to public health systems and to private practice
- in 80% of countries/territories, physiotherapists can provide telehealth services but many of them do not have the appropriate recognition and payment for this service
- globally, 62% of physiotherapists are women and 42% of World Physiotherapy member organisations have female presidents or chairs
- globally, 687,623 physiotherapists (35% of 1,901,585 physiotherapists around the world) are members of their national physiotherapy association, an increase of 29,190 physiotherapists compared with 2020.

World Physiotherapy chief executive officer Jonathon Kruger said: "The responses to the surveys from our member organisations are critical to the understanding the current state of physiotherapy around the world and how it is evolving over time. This year we have asked our member organisations about gender balance to understand more about diversity and inclusion within the global profession."

The profile maps, which are developed from responses to the annual membership census, allow people to see how the global profession has evolved since 2013. The maps are an interactive resource that can be printed or downloaded and can be accessed here: [Profile of the global profession | World Physiotherapy](#)



Brzuszkiewicz-Kuźmicka G, Kuźmicki S, Domaniecki J.
 Brain Injury, (2012) 26:12,

Relationships between kinesiotherapy methods used in rehabilitation and the course of lost function recovery following surgical treatment of cranio-cerebral trauma

Introduction and aim: This paper aims to outline the relationships between kinesiotherapy methods used in rehabilitation and the recovery of the patient's ability to perform activities of daily living (ADLs), improvement of functional condition, regression of pareses and improvement of conscious state following surgical treatment of traumatic subdural haematomas.

Materials and methods: The study was conducted on 84 patients treated surgically for traumatic subdural haematomas, divided into two groups. The key differentiating factor was the kinesiotherapy method used in rehabilitation. Patients were assessed using the International Scale of Muscle Weakness (ISMW), Barthel Index and modified Rankin Scale, while their conscious state was assessed using the Glasgow Coma Scale.

Results: A significant improvement of the assessed features was observed in all patients. However, patients treated with proprioceptive neuromuscular facilitation (PNF) and elements of the Bobath concept regained lost function significantly faster than patients treated with traditional kinesiotherapy. No significant differences were observed in the course of improvement of conscious state between the two groups.

Conclusions: Treatment using functional elements may significantly accelerate the return of the ability to perform ADLs, improvement in functional condition and regression of pareses in comparison with traditional kinesiotherapy. Keywords: Cranio-cerebral trauma, kinesiotherapy

<https://doi.org/10.3109/02699052.2012.694562>

Arcanjo FL, Martins JVP, Moté P, Leporace G, de Oliveira DA, Santana de Sousa C, Saquetto MB, Gomes-Neto M.

Proprioceptive neuromuscular facilitation training reduces pain and disability in individuals with chronic low back pain: A systematic review and meta-analysis Complementary Therapies in Clinical Practice 46, 2022

A B S T R A C T

Background: and purpose: Although proprioceptive neuromuscular facilitation (PNF) exercises are used in rehabilitation practice, their effects in patients with low back pain (LBP) remain unclear. This study aimed to investigate the efficacy of PNF training for pain and disability in patients with LBP.

Methods: In this systematic review, we searched five databases from the earliest date available to October 2020. Three comparisons were performed: PNF versus control, PNF versus core strengthening, and PNF versus conventional physical therapy.

Results: Sixteen studies met the eligibility criteria (722 patients). PNF training improved pain (standardized mean difference [SMD]: - 2.6; 95% confidence interval [CI]: - 4.2 to - 0.9, n = 174) and disability (SMD: - 3.29; 95% CI: - 5.3 to - 1.3, n = 144) compared to the control. PNF training also yielded a greater benefit for pain reduction (mean difference [MD]: - 1.8, 95% CI: - 2.2 to - 0.3, n = 177) and disability improvement (MD: - 6.6, 95% CI: - 9.3 to - 3.8, n = 113) than did core strengthening.

Conclusion: PNF training seems to be a useful strategy for decreasing pain and improving disability in patients with LBP. However, the quality of evidence for the outcomes of both pain and disability was low to moderate.

<https://doi.org/10.1016/j.ctcp.2021.101505>

The **P**eople **N**eed **F**un corner: 😊

We don't stop playing because we grow old;
We grow old because we stop playing

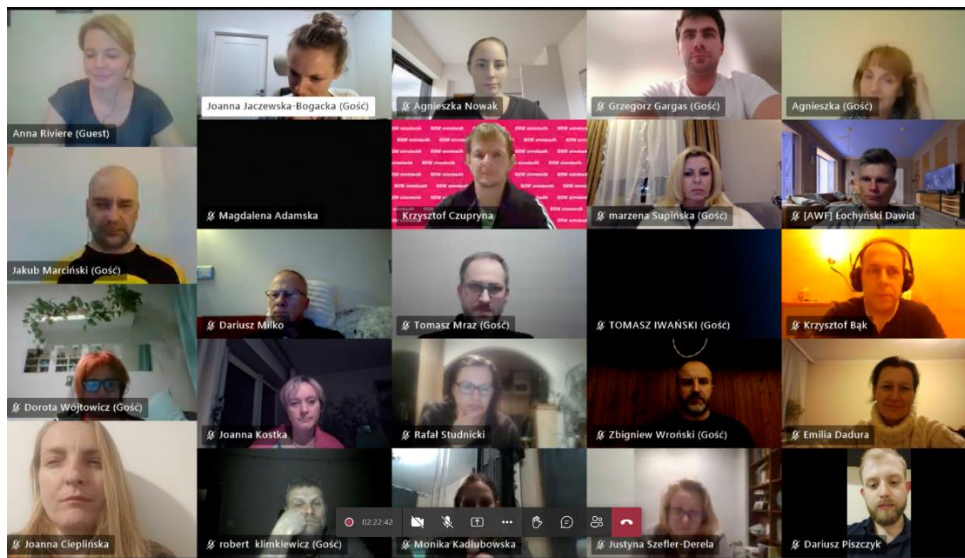


Whatever you do, always give 100%. Unless you're donating blood.

Quote from—Bill Murray

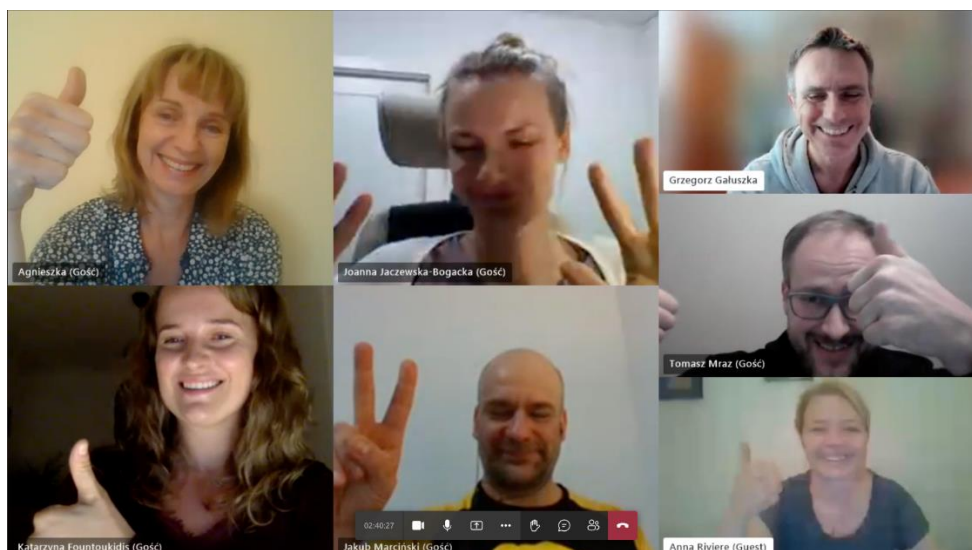
Webinars for academic teachers in Poland

In January 2022, the IPNFA Poland launched a project for the academic teachers who teach the PNF concept in universities. Information about the planned project had been sent earlier to the authorities of over fifty universities educating physiotherapists. We decided to invite our guests to participate in five two-hour online meetings covering the most important issues of the PNF concept. We also consider organizing practical sessions in several universities in Poland.



Over eighty teachers from 25 universities participated in the first meetings. Some of these lecturers have completed IPNFA certified courses in the past, while others had only theoretical knowledge. The lecturers confirm their willingness to participate in the next and appreciate the activities of our group.

Dear Friends, we encourage you to start similar activities in your country. It is an amazing experience to teach and discuss with lecturers. We gain new educational experiences by educating scientists. Some of them treat patients, while others conduct only teaching and research. These are new and valuable challenges for us! We hope that the initiative of the Polish group will result in future research projects and greater interest in the PNF concept.



Chaturvedi P, Singh AK, Tiwari V, et al.

Proprioceptive neuromuscular facilitation (PNF) vs. task specific training in acute stroke: the effects on neuroplasticity

MOJ Anat & Physiol. 2018;5(2):154–158

Abstract

Objectives: There are several approaches for rehabilitation of stroke patients. Proprioceptive Neuromuscular Facilitation (PNF) and Task Specific Training are the two approaches, known to promote motor learning and motor control. In this study we aim to compare both approaches on the basis of Brain Derived Neurotrophic Factor (BDNF) levels in the serum before and after intervention and at 6 months.

Methods: 90 subjects were recruited in this study. Subjects were divided into two groups. Group 1 was given PNF exercises and group 2 was given task specific training. Both group received intervention 30 minutes twice daily, five days a week for four weeks.

Results: PNF group showed more improvement than task specific group. There was significant improvement in serum BDNF levels ($p=.004$), FMA scores ($p=.003$) at 4 weeks and at 6 months (S. BDNF $p=.001$, FMA $p<.05$). Group 1 showed 53.02 ± 34.14 points and group 2 showed 38.82 ± 40.24 points, which is significant. There was 5.89 ± 4.07 ng/ml raise in S.BDNF in group 1 and 3.45 ± 4.19 ng/ml in group 2 from admission to 6 months. Results are showing more improvement in PNF group.

Conclusion: PNF exercises may effective in promoting neuroplasticity and functional activities. They are more effective if implemented as early as possible. On the basis of finding of our study PNF can be recommended as standardized approach of rehabilitation in acute stroke if the patient is able to follow the commands.

<https://doi.org/10.15406/mojap.2018.05.00181>

The People Need Fun corner: 😊

An IPNFA® educated physiotherapist has the brain of a scientist, the heart of a humanist and the hands of an artist.

