A new way to change dance motor patterns: the Allyane process

Jean Baptiste Colombié, PT, AT, Malandain Ballet Biarritz

■ ABSTRACT

The Allyane process is a **neuro-muscular reprogramming method** based on neuro-sciences scientific background [1]. Its princip is to strongly activate the aferrent way of the reticulared formation, responsible of the voluntary motor learning [2,3,4].

Developed 13 years ago by AT for tennis players, this method is used by health professionals since 3 years.

3 phases composes the process: screening, erasing and reprogramming. It uses **mental skill imagery, afferent proprioceptive informations** (sensitives, kinesthetics, intentions, feelings...) **and low frequencies sounds** (LFS).

At the Malandain Ballet Biarritz we use it in case of overuse Injuries (OI) and functional pathologies. Used after a global functional movement analysis, it enables to treat motor inhibitions (MI) and to speed up the return on stage (ROS).

The novelty of this process is its weakness and there is a lack of scientific studies on it. This presentation is also a way to interest searchers and students on an innovating subject.

- -

■ PURPOSE

OI are mostly dues to the repetitive movements and the training load [5]. With the overstrain we observe the alteration of the dancing movement: muscular strength and reactivity decrease[6] and the dancer begin to dance "on his bones and joints". **The problem is that this alteration modify the reflex motor pattern (RMP) too** [7,8]. At long the dancer reflex is to move saving energy, inhibiting his muscular system: even if the dancer is rested or prepared to the training load, overstrain takes part of, leads his dance...

At the clinical examination, we can observe joint instability, changing of biomechanical axes, chronic muscular spasms, and the overuse of differents anatomics systems: osteocartilaginous, tendinous, ligament fatigue[6]... which became OI.

To treat those pains durably **we have to change the pathogenic RPM**. This is the goal of neuromuscular reprogramming methods (NMRm). A lot of NMRm has been developed those 20 last years. They are based on a multi afference motor learning (visual, proprioceptive, mental visualisation, kinectic, objectives...) and described with different protocols [9,10,11,12].

Their first common point is their long integration time (between 4 to 15 months) which is an important efficiency limit. For a dancer a 20 min long protocol per day and a constant voluntary control of his dance during 6 months is quite difficult... And the second one is to use mental motor imagering whose results are known in dance or sports [13,14].

■ ALLYANE PRINCIPS

An Allyane treatment is 2h long. Normally, a single session is enough.

The first phase is the **functional screening**. It permits to isolate the starting point of the pathogenic RMP and to translate it in a dancer's feeling, a proprioceptive information, a muscular inhibition (analytic or functional), a wrong mental intention... This analytic correction is also the first step of the correct RMP which is gradually expanded to the global motion. At the screening end we have mentalised two perceptions: the pathogenic RMP and the corrected one.

The difficulty is to change a voluntary movement into a reflex one. Neurophysiology can explains it : learning a new RMP is quick (about 500 repetitions) changing a RMP take more than 5000 repetitions (without activate the previous one) [15,16]. Moreover, if two motor patterns are in conflict (for the same skill), the previous and the reflex one is always dominant.

The Allyane process contents an **erasing phase of the pathogenic RMP**, so it permits to build a new one without making a conflict between the two.

Then, by mental imagery and helped by LFS, we can activate the corrected RMP, starting with the analytic correction to the global movement and feeling.

At the end of this **reprogramming phase**, the dancer can physically check his reflex correction. Does he feels the difference? Does this difference is reflex or voluntary? We can adjust the results making an other reprogramming phase.

The last phase serves to fix the new RMP: during 15 min, we ask to the dancer to visualise every life motions with his new RMP feeling. It serves to activate it in a large motion range.

After 2 hours of the Allyane process, the dancer has to physically activate his new RMP. The ROS is savier because we know that his dance won't hurt him. An important point is to ask for the dancer not to think of his new RMP: it's a reflex, so the voluntary mode doesn't have to be activated.

In case of chronic OI, we observe a 3 days period of adaptation pains caused by the changing of biomechanical axes. If this period is longer, we adapt it.

■ LOW FREQUENCIES SOUNDS

The low frequencies sounds effects on human brain are known and still applied in many specialities [17]. Some memorization studies assisted with LFS describes the increase of the alertness level of the subject and sensory processing of the input information [18].

There are two differents kinds of LFS into the Allyane process. Pulsed sounds modify his state of consciousness (alpha mode), stimulating the perception of the subject [19]. Associated sound activate the the reticulared formation, responsible of the voluntary motor learning [3].

■ WHEN CAN WE USE THE ALLYANE PROCESS?

pathologic motion   joint instability   motor inhibition   wounds sequels

■ WHEN SHOULD NOT WE USE IT?

osteo articular structural disfunction   acute tissue inflammation   traumatism

Example of a chronic ankle instability treatment

Screening	Pathogenic RMP imagering	Corrected RMP imagering	Erase	Reprogramming	Test	Ancrage	Test 2
Side hop test SEBTm Quantitative muscular analytic Testing (QMAT): fibular, tibial ant, post, gluteus medius	Plantar crushing valgus knee gluteus medius	Fibular, tibial ant and post, gluteus contraction feeling, stability	Foot, ankle, knee, hip, pathogenic RMP	Corrected RMP analitic contraction of Gluteus med, fibulars, tibial ant and post, knee stability, jump pulse and reception	QMAT Corrected RMP	Walk, full dance, (barre, milieu...)	Large motion rang

CONCLUSION

The Allyane process is a innovative neuromuscular reprogramming method with a rigorous protocol using mental imagery, proprioceptive afferent informations and low frequency sounds. Its originality is
- an objective to change a voluntary motor pattern into a RMP.
- an erase phase of the pathogenic RMP
- the aid of LFS to increase the alertness and learning level of the dancer.

We are actually working on a chronic ankle instability study, it could be a first step to evaluate scientifically the results of the Allyane process.
There is a debate on low frequency transcranial electromagnetic simulations for helping learning a motor skill [20]. Maybe the question is more on the process of reprogramming than on the tool to do it.
But we absolutely need scientist invest on our neuro reprogramming work, first to better understand it and then to improve it.

(1) Friggeri A, Le Blay G. Reprogrammation neuro-cognitive dans les pathologies mécaniques de l'appareil locomoteur selon le procédé Allyane. Cahiers de la SOFMMOO, Number 12, Octobre 2018
(2) Apps Richard, Lee Stephen. Central control of cerebellar climbing fibre input during motor learning, The Journal of Physiology, Volume 541, Number 1, 1 May 2002, pp. 301-317(17)
(3) Weicker H, Kinsherf R, Diserens K, Deigner Hans-Peter, Struder Heiko. Physiology and pathophysiology of basalganglia: Impact on motor system function. European Journal of Sport Science, Volume 1, Number 2, Number 2/ June 2001, pp. 1-46(46)
(4) Porrill John, Dean Paul. Cerebellar motor learning: when is cortical plasticity not enough? PLoS Computational Biology, Volume 3, Number 10, 2007, pp. 1935-1950(16)
(5) Boeding Jeske R. E., Visser Edwin, Meuffels Duncan E., Jan de Vos Rober. Is Training Load Associated with Symptoms of Overuse Injury in Dancers? A Prospective Observational Study. Journal of Dance Medicine & Science, Volume 23, Number 1, March 2019, pp. 11-16(6)
(6) Murgia C. Overuse, Tissue Fatigue, and Injuries. Journal of Dance Medicine & Science, Volume 17, Number 3, September 2013, pp. 92-100(9)
(7) Feldman Anatol, Levin Mindy. Spatial control of reflexes, posture and movement in normal conditions and after neurological lesions. Journal of Human Kinetics, Volume 52, Number 1, 2016, pp.
(8) Zoran Milošević, Nebojša Maksimović, Nada Milošević, Borislav Obradović. Theories of connections - Practical implications in acquiring motor skills. Sport Mont Journal, Volume 7, Numbers 21-22, 2010, pp. 322-329(8)
(9) Kermanec Gilles. Stratégies d'apprentissage et autorégulation. Revue de question dans le domaine des habiletés sportives. Movement Sport Sciences, 2004 - academia.edu
(10) Hignet Rémy. Concepts et principes de la reprogrammation sensorimotrice (RSM). Kinésithérapie,la revue.Volume 12, Issues 128–129, August–September 2012, Pages 23-28
(11) Smarandache Carmen R., Daur Nelly, Hedrich Ulrike B. S., Stein Wolfgang. Regulation of motor pattern frequency by

reversals in proprioceptive feedback. European Journal of Neuroscience, Volume 28, Number 3, August 2008, pp. 460-474(15)
(12) Lucca Lucia Francesca. Virtual Reality and Motor Rehabilitation of the Upper Limb After Stroke: A Generation of Progress? Journal of Rehabilitation Medicine, Volume 41, Number 12, October 2009, pp. 1003-1006(4)
(13) Coker Elizabeth, Mc Isaac L. Tara, Nilsen Dawn. Motor Imagery Modality in Expert Dancers: An Investigation of Hip and Pelvis Kinematics in Demi-Plié and Sauté. Journal of Dance Medicine & Science, Volume 19, Number 2, June 2015, pp. 63-69(7)
(14) Oishi K, Maeshima T. Autonomic nervous system activities during motor imagery in elite athletes. J Clin Neurophysiol. 2004 May Jun; 21(3):170-9.
(15) Maxwell J.P., Masters R.S.W., Kerr E.; Weedon E. The implicit benefit of learning without errors The Quarterly Journal of Experimental Psychology, Volume 54, Number 4, 1 November 2001, pp. 1049-1068(20)
(16) Sunaga Tsutomu. How the sound frequency of background music influences consumers' perceptions and decision making. Psychology and Marketing, Volume 35, Number 4, 1 April 2018, pp. 253-267(15)
(17) Daud Syarifah Noor Syakiylla Sayed, Sudirnan Rubita. Brain Signal Analysis to Investigate Sound Effect on Memorization. Advanced Science Letters, Volume 23, Number 11, November 2017, pp. 11119-11123(5)
(18) Skaric Lazar, Tomasevic Milorad, Rakovic Dejan, Jovanov Emil, Radivojevic Vlada, Sukovic Predrag, Car Marko, Radenovic Dejan. Electrocortical (EEG) correlates of music and states of consciousness. Neuropsychological Trends, Volume 2, Number 1, 2007, pp. 75-83(9)
(19) Dioniso Ana, Catarina Duarte Isabel, Patricio Miguel, Castelo-Branco Miguel. The Use of Repetitive Transcranial Magnetic Stimulation for Stroke Rehabilitation: A Systematic Review. Journal of Stroke and Cerebrovascular Diseases - 2018 Article
(20) Beaulieu LD, Flamand VH, Masse- Alarie H.Reliability and minimal detectable change of transcranial magnetic stimulation outcomes in healthy adults: a systematic review - Brain stimulation, 2017 - Elsevier