Neuromuscular Stretching

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Objectives

- Indications of PNF
- Fundamentals
  - Autogenic Inhibition
  - Reciprocal Inhibition
- EBP
- Techniques
- Principles
- Practice

Indications of PNF

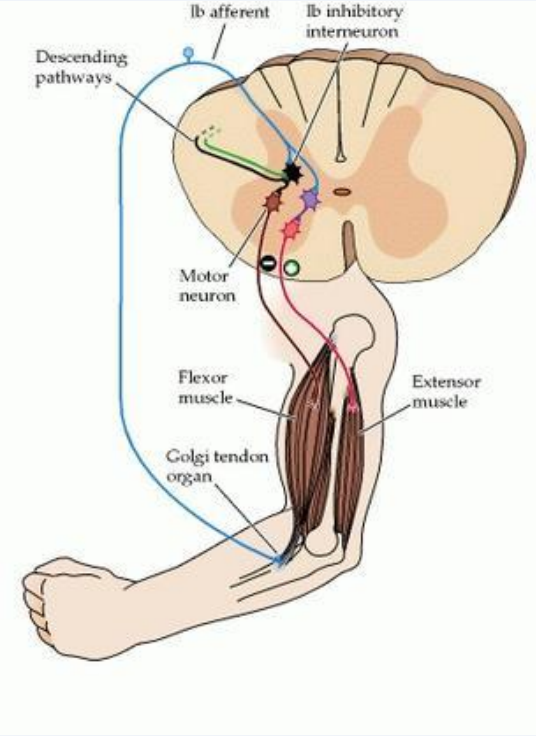
- Increase strength
- Increase flexibility
- Increase range of motion
- Improve neuromuscular control

Fundamentals

- Autogenic Inhibition
  - Within a muscle
  - Activation of muscle spindles as protective mechanism
  - Inhibitory response from GTOs

Fundamentals

- Reciprocal Inhibition
  - Between muscles: Agonist/Antagonist
  - Agonist = Excitatory
  - Antagonist = Inhibitory
  - Allows for joint motion



EBP

- Wicke and associates found self-PNF produced greater ROMs increases versus static stretching[1]
- Increases ROM more effectively when compared to static stretching[2-5]
- A single bout of PNF produces greater increases in ROM when compared to static stretching[6]

EBP

- Miyahara and associates found a decrease in isometric maximal strength[2]
- Reis and associates did not find a decrease in maximal voluntary contraction with short duration PNF[7]

EBP

- Pereira found PNF did not increase BP in elderly patients[8]
- PNF and vertical jump
  - Church et al.[9] and Marek et al.[10] found a decrease
  - Young & Elliot[11] and Christensen & Nordstrom[12] did not find a decrease

EBP

- Caplan et al. found PNF to be effective in changing running mechanics[13]
- May not be as effective as dynamic stretching in increasing acute muscular power[14]

Implementation

Pros

- More effective in improving ROM
- Short bouts may not impact maximal voluntary contraction
- Improve running mechanics
- Does not cause an increase in BP

Cons

- May lead to decrease in maximal isometric voluntary contraction
- May lead to decrease in vertical jump (conflicting)
- Not as effective as dynamic stretching

Techniques

- Strengthening vs. Stretching*
  - Contract-Relax
  - Hold-Relax
  - Slow Reversal-Hold-Relax

Principles

- Hand placement
  - Proper stabilization
- Instructions
  - Hold/Push = isometric contraction
  - Relax = stretch
- Resistance
  - Appropriate for individual and muscle group
- Know Agonist/Antagonist Relationship

Demo

- Wrist flexors
  - Do as a group
- Hamstring Stretch
- Quadriceps Stretch
- Gastrocnemius Stretch
- Pectoralis Stretch

Breakout

- Practice!

References

- 1: Wicke J, Gainey K, Figueroa M. A comparison of self-administered proprioceptive neuromuscular facilitation to static stretching on range of motion and flexibility. *J Str Cond Res.* 2014;28(1);168-172.
- 2: Miyahara Y, Naito H, Ogura Y, Katamoto S, Aoki J. Effects of proprioceptive neuromuscular facilitation stretching and static stretching on maximal voluntary contraction. *J Str Cond Res.* 2013;27(1):195-201.
- 3: Chan SP, Hong Y, Robinson PD. Flexibility and passive resistance of the hamstrings of young adults using two different static stretching protocols. *Scand J Med Sci Sports.* 2001;11:81-86.
- 4: Feland J, Myrer J, Merrill R. Acute changes in hamstring flexibility: PNF versus static stretch in senior athletes. *Phys Ther Sport*. 2001;2:186-193.

References

- 5: Whatman C, Knappsteina A, Hume P. Acute changes in passive stiffness and range of motion post-stretching. *Phys Ther Sport*. 2006;7:195-200.
- 6: O'Hora J, Cartwright A, Wage CD, Hough A, Shum GLK. Efficacy of static stretching and proprioceptive neuromuscular facilitation on hamstrings length after a single session. *J Str Cond Res*. 2011;25(6):1586-1591.
- 7: Reis EF, Pereira GB, Sousa NM, Tibana RA, Silva MF, Araujo M, Gomes I, Prestes J. Acute effects of proprioceptive neuromuscular facilitation and static stretching on maximal voluntary contraction and muscle electromyographical activity in indoor soccer players. *Cl Phy Fun Imag*. 2013;33(6):418-422.

References

- 8: Pereira MP. Proprioceptive neuromuscular facilitation does not increase blood pressure of healthy elderly women. *Physio Th Pr.* 2012;28(5):412-415.
- 9: Church BJ, Wiggins MS, Moode MF, Crist R. Effects of warm-up and flexibility treatments on vertical jump performance. *J Strength Cond Res*. 2001;15:332-336.
- 10: Marek SM, Cramer JT, Fincher AL, Massey LL, et al. Acute effects of static and proprioceptive neuromuscular facilitation stretching on muscle strength and power output. *J Athl Train*. 2005;40:94-103.
- 11: Young W, Elliot S. Acute effects of static stretching, proprioceptive neuromuscular facilitation stretching, and maximal voluntary contractions on explosive force production and jumping performance. *Res Q Exerc Sport.* 2001;72:273-282.

References

- 12: Christensen B, Nordstrom B. The effects of proprioceptive neuromuscular facilitation and dynamic stretching techniques on vertical jump performance. *J Str Cond Res*. 2008;22(6):1826-1831.
- 13: Caplan N, Rogers R, Parr MK, Hayes PR. The effects of proprioceptive neuromuscular facilitation and static stretch training on running mechanics. *J Str Cond Res.* 2009;23(4):1175-1180.
- 14: Manoel ME, Harris-Love MO, Danoff JV, Miller TA. Acute effects of static, dynamic, and proprioceptive neuromuscular facilitation stretching on muscle power in women. *J Str Cond Res.* 2008;22(5):1528-1534.

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Thank You!

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