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


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Thank You!

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