

# ERGONOMICS:

Why is Dentistry Such a Pain in the Neck and Back

Joel Whiteman, DDS

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# WHO AM I?

- ▶ General Dentist in Sacramento for 20 years
- ▶ Assistant Professor at CNU College of Dental Medicine
  - ▶ Course Director:
    - ▶ Operative 1-3
    - ▶ Fixed
    - ▶ Oral Diagnosis and Treatment Planning



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# DISCLAIMER

▶ I have no stake in any company or product that is discussed in this presentation

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# COURSE OBJECTIVES

- ▶ Understand the Causes of Dental Pain
- ▶ How Ergonomic Principles can help
- ▶ What can we do to improve our lives as dentists

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# HISTORY

- ▶ Dentistry was originally a standing profession
- ▶ Dentist had pain
  - ▶ Lower Back
  - ▶ Flat Feet
  - ▶ Postural Defects
  - ▶ Neurocirculatory Disease (Varicose Veins)



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# HISTORY

- ▶ Dentist switched to a seated position
- ▶ Pain still an issues
- ▶ Neurocirculatory Disease improved



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# HISTORY

- ▶ 1960's switched to 4-Handed Dentistry
- ▶ Was thought to help and improve body issues
- ▶ Actually made issues worse
  - ▶ Due to tendency to sit longer than before



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# PROVIDER PAIN

Authors	Country	Study Year	Percentage Reporting Pain
Shugars et al	United States	1987	60
Rundcrantz et al	Sweden	1990	72
Augustson and Marken	Norway	1996	81
Finsen et al	Denmark	1997	65
Chowanadisai	Thailand	2000	78

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# WHY DO WE HAVE PAIN?

- ▶ Doing dentistry takes 50% of our bodies muscles
- ▶ Static Muscle Forces
- ▶ Prolonged Static Positions (PSP)
- ▶ Musculoskeletal Disorder



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## PROLONGED STATIC POSITIONS

- ▶ Staying in the same position for a long period of time
- ▶ 4-handed Dentistry
- ▶ Extended periods
- ▶ Computers and EMR




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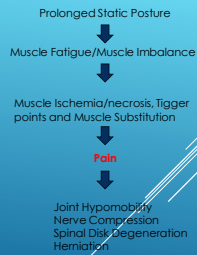
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## PSP: CONSEQUENCES

- ▶ Muscular Imbalances
- ▶ Ischemia
- ▶ Trigger Points
- ▶ Joint Hypomobility
- ▶ Spinal Disc Degeneration




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## MUSCLE IMBALANCES

- ▶ What is this?
- ▶ Why does this happen?
- ▶ Muscles worked get shorter and stronger
- ▶ Unused muscles get longer and weaker
- ▶ Stressed shortened muscles can become ischemic and painful
- ▶ Work in front and below eye level causes a head forward and rounded shoulder position
- ▶ Asymmetrical Forces can reduce range of motion
  - ▶ Neck
  - ▶ Spine

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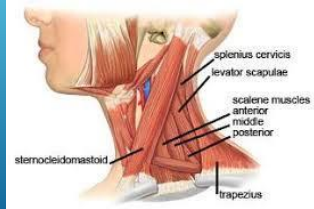
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# MUSCLE IMBALANCES: HEAD FORWARD POSITION

- ▶ Anterior Mover Muscles
  - ▶ Scalene
  - ▶ SCM
  - ▶ Pectoralis




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# MUSCLE IMBALANCES: ROUNDED POSTURE

- ▶ Weaken and elongate the stabilizer muscles of the shoulder and back
  - ▶ Middle Trapezius
  - ▶ Lower Trapezius
  - ▶ Serratus Anterior
- ▶ Causes shoulder blades to lift off of the spine
- ▶ More force on Upper Neck
  - ▶ Upper Trapezius
  - ▶ Levator Scapulae
  - ▶ Spinal Vertebral Disc




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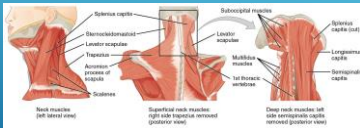
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# MUSCLE IMBALANCES: ROUNDED POSTURE




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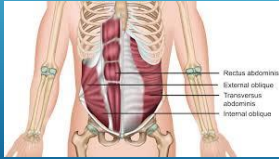
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## MUSCLE IMBALANCES: ABDOMINAL

- ▶ Lower Back extension of the Extensor Muscles
- ▶ Deep stabilizing muscles of the abdominal are weakened
  - ▶ Transversus Abdominus
- ▶ Hodges et al
- ▶ Hides et al
- ▶ Richardson et al



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## MUSCLE IMBALANCES: ABDOMINAL



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## MUSCLE ISCHEMIA

- ▶ Prolonged usage:
  - ▶ Stretches the Tendons
  - ▶ Compress Vascular Supply
  - ▶ Deplete Nutrients and oxygen
  - ▶ Lactic Acid builds up
  - ▶ Damage to muscle tissues



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## MUSCLE ISCHEMIA

- ▶ Repair
- ▶ Necrosis
- ▶ Muscle Compensation
- ▶ Muscle Substitution
- ▶ Abnormal Compensation
  - ▶ Joint Hypomobility
  - ▶ Nerve Compression
  - ▶ Spinal Disc Disorders



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## TRIGGER POINTS

- ▶ Areas of ischemic damage
- ▶ Form knots that will not stretch out
- ▶ Can cause referred pain to other areas in the body



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## JOINT HYPOMOBILITY

- ▶ What is this?
- ▶ Cause
- ▶ Synovial Fluid
- ▶ PSP reduces Synovial Fluid
- ▶ Forward Leaning



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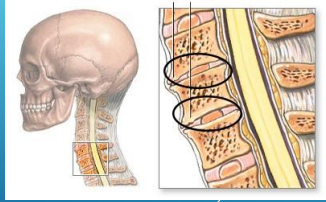
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## SPINE

- ▶ Unsupported sitting
- ▶ Forward Seated position
- ▶ Bulging Disc
- ▶ Spinal movement



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## MSD: MUSCULOSKELTAL DISORDERS

- ▶ Definition: A disorder of the muscle, tendon, peripheral nerves or vascular system not directly resulting from an acute or instantaneous event.

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## COMMON MSD IN DENTISTRY

- ▶ Chronic Low Back Pain
- ▶ Tension Neck Syndrome
- ▶ Trapezius Myalgia
- ▶ Rotator Cuff Impingement



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## HOW DO WE COMBAT THESE ISSUES

- ▶ Good Ergonomics
- ▶ Avoid Static Postures
- ▶ Stretching
- ▶ Exercise

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## ERGONOMICS

- ▶ Hip Angle
- ▶ Foot Position
- ▶ Elbow Position
- ▶ Stool Settings
- ▶ Neck Angle
- ▶ Magnification
- ▶ Patient Position



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## PRIOR RECOMMENDATIONS

- 10° - 20° NECK ANGLE
- 0° - 5° BACK ANGLE
- 90° ELBOW ANGLE
- 90° HIP ANGLE



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### NEW RECOMMENDATIONS

- 10° - 20° NECK ANGLE
- 0° - 5° BACK ANGLE
- ±90° ELBOW ANGLE
- 105° - 125° HIP ANGLE



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### HIP ANGLE

HIP ANGLE

105° - 125°



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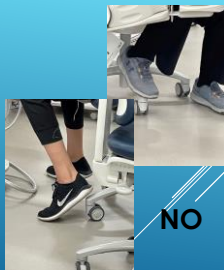
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### FOOT POSITION



Yes



NO

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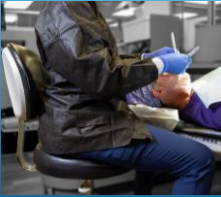
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## ELBOW POSITION



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## STOOLS



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## STOOL SETTINGS



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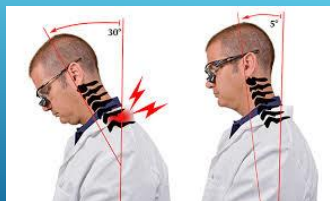
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## NECK ANGLE

10° - 20°



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## LOUPES/MAGNIFICATION



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## ERGO LOUPES



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## ERGO LOUPES



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## PATIENT POSITIONING



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## YOUR POSITIONING



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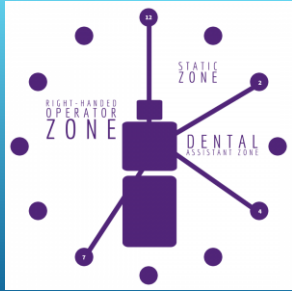
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## YOUR POSITION



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## AVOID STATIC POSTURES

- ▶ Vary work position often
- ▶ Sit and Stand
- ▶ Reposition Feet
- ▶ Position the patient properly
- ▶ Avoid Twisting



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## VARY POSITION



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## SIT AND STAND



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## REPOSITION YOUR FEET



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## AVOID TWISTING



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AVOID TWISTING: REAR DELIVERY



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AVOID TWISTING: SIDE DELIVERY



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AVOID TWISTING: OVER THE PATIENT



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## MICROBREAKS



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## STRETCHING



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## STRETCHING: BENEFITS

- ▶ Increases Blood Flow to Muscles
- ▶ Increases Synovial Fluid to joints
- ▶ Decrease the formation of Trigger Points
- ▶ Maintains Range of Motion

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## STRETCHING: BENEFITS

- ▶ Increases nutrient supply to vertebral disks
- ▶ Creates a relaxation response in the CNS
- ▶ Warms-up the muscles for work
- ▶ Identifies tight structures that may be predisposed to injury

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## HOW TO STRETCH

- ▶ Assume the proper position
- ▶ Breathe Deeply
- ▶ Exhale as you slowly increase the intensity of the stretch
  - ▶ Create mild tension
- ▶ Hold for 2-4 breathes cycles
- ▶ Slowly release to neutral
- ▶ Repeat

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## STRETCHING

- ▶ Avoid stretching into a painful range
- ▶ Stop if pain increases
- ▶ Stretch both way
  - ▶ Helps ID unilateral tightness
- ▶ Focus on the tight direction
- ▶ Avoid over stretching




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## STRETCHING: AREAS

- ▶ Chest muscles
- ▶ Lower Back
- ▶ Piriform muscles
- ▶ Hip Flexors
- ▶ Asymmetric



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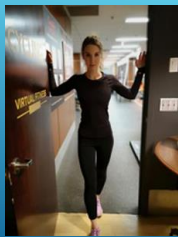
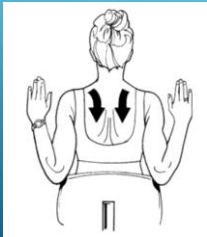
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## STRETCHING: CHEST MUSCLES



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## STRETCHING: LOWER BACK



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### STRETCHING: PIRIFORM MUSCLES



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### STRETCHING: HIP FLEXORS



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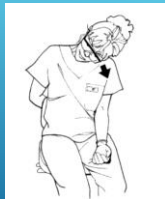
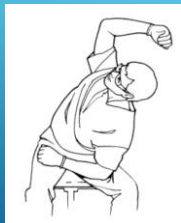
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### STRETCHING: ASYMMETRIC



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# STRETCH BREAK

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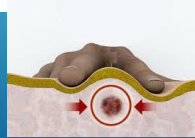
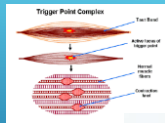
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## TRIGGER POINTS

- ▶ Areas not relieved by stretching
- ▶ Feels like a knot
- ▶ Can be painful



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## TRIGGER POINTS

- ▶ See a Professional
  - ▶ Neuromuscular Therapist
  - ▶ Massage Therapist
  - ▶ MD trained in Spray and Stretch
  - ▶ Self-administered



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## TRIGGER POINTS: SELF-ADMINISTERED

- ▶ Self-massage tools
- ▶ Small balls
  - ▶ Ball between the back and wall



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## STRENGTHENING: WHY?



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## GUIDELINES FOR EXERCISE

- ▶ Consult your MD
- ▶ Don't do strengthening in painful areas
- ▶ Begin Gradually
- ▶ Stop
  - ▶ Numbness
  - ▶ Tingling
  - ▶ Dizziness
  - ▶ Shortness of breath
- ▶ Strengthen 3-4 times a week
- ▶ Stretch Daily
- ▶ In pain free ranges



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## STRENGTHENING

- ▶ Shoulders
- ▶ Back
- ▶ Core



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## STRENGTHENING: SHOULDERS



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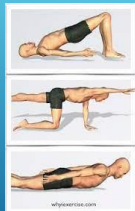
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## STRENGTHENING: BACK



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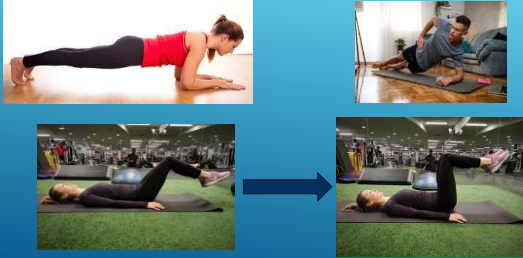
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## STRENGTHENING: CORE



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## AEROBIC EXERCISE

- ▶ 3-4 times a week
- ▶ 20+ min
- ▶ Do multiple types
- ▶ Benefits



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## OTHER AREAS OF PAIN

- ▶ Repetitive use injuries
  - ▶ Wrist
  - ▶ Thumb



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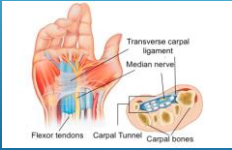
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## WRIST PAIN: CARPAL TUNNEL SYNDROME



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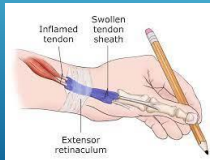
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## THUMB PAIN

- ▶ Arthritis
- ▶ De Quervain's



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## WHAT CAN WE DO?

- ▶ Proper technique
- ▶ Strengthening

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# HANDPIECE



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# HANDPIECE



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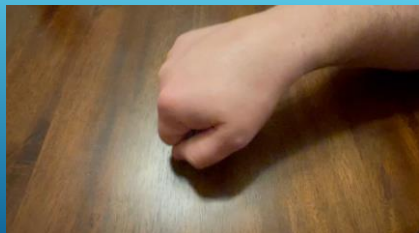
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# WRIST EXERCISES: ROTATIONS



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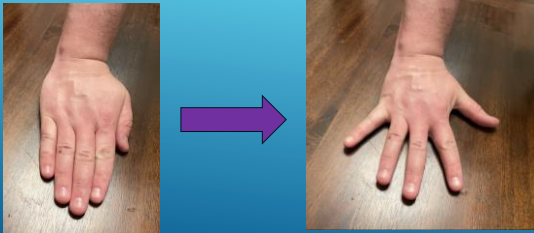
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### WRIST EXERCISES: FINGER STRETCH



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### WRIST EXERCISES: THUMB STRETCH



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### WRIST EXERCISES: PRAYER STRETCH



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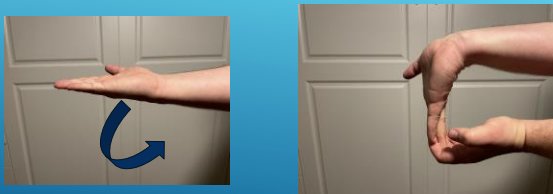
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### WRIST EXERCISES: FLEXOR STRETCH



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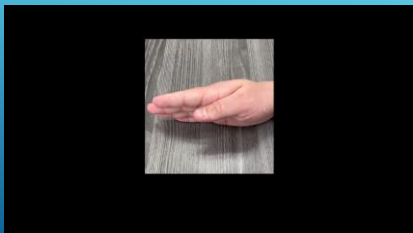
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### THUMB EXERCISES



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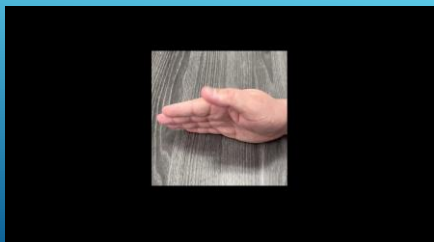
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### THUMB EXERCISES



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## THUMB EXERCISES



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## ADDITIONAL RESOURCES

- ▶ Dr. Bethany Velachy
  - ▶ [Posturedontics.com](http://Posturedontics.com)
- ▶ Certified Physical Therapist
- ▶ Occupational Therapists

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## QUESTIONS?



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THANK  
YOU!



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