



LIMITLESS

Accelerated Return to Play: Neuro-Centric Strategies for Joint Replacement Clients

PRESENTED BY

Dr. Grove Higgins & Pat Marques

Introduction

- **Dr. Grove Higgins**

- Chiropractor & Soft Tissue Practitioner
- Speaker and Educator
- Functional Anatomy Instructor
- NSCA CSCS
- Research:
 - Biomechanics Gait and Foot Development
 - Anatomy of Lower Leg Modeling
 - Exercise & Hormonal Response
- Worked in medicine since 1993

- **Pat Marques**

- LTC (R) U.S. Army
- BS Exercise Science
- Z-Health Master Trainer & Instructor
- NSCA CPT
- Speaker and Educator
- Neuro-Centric Exercise Therapist
- Research
 - Exercise & Hormonal Response, Sleep



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Agenda

- **Joint Replacement Basics & Myths**
 - Numbers & Causes
 - Typical Post-Surgical PT
 - Common Myths
- **Template for Post-PT Joint Replacement Exercise Therapy**
 - Assessments
 - Sensory Input
 - Motor Control
 - Isometrics
- **Pre- & Post Joint Replacement Business Tips**
- **Resources**



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Statistics

- **Projected annual rates of joint replacement by 2025 in U.S.:**
 - Knee = 1,272,000¹
 - Hip = 652,000¹
 - Shoulder = 175-350,000²

- **Average age for joint replacements:**
 - Knee = 66*
 - Hip = 65*
 - Shoulder = 72*

¹Jasvinder A. Singh, Shaohua Yu, Lang Chen and John D. Cleveland (2019). *Rates of Total Joint Replacement in the United States: Future Projections to 2020–2040 Using the National Inpatient Sample*. The Journal of Rheumatology April 2019, jrheum.170990; DOI: <https://doi.org/10.3899/jrheum.170990>

²Eric R Wagner, Kevin X Farley, Ixavier Higgins, Jacob M Wilson, Charles A Daly, Michael B Gottschal (2020). *The incidence of shoulder arthroplasty: rise and future projections compared with hip and knee arthroplasty*. Journal of Shoulder and Elbow Surgery, 2020 Dec;29(12):2601-2609. doi: 10.1016/j.jse.2020.03.049. Epub 2020 Jun 9.

* Averages vary widely depending on resource



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Causes

- **Osteoarthritis**
 - Poor Movement Patterns – Gait
 - Weight – 83% of THR are obese
- **Inflammatory disorders**
 - Rheumatoid Arthritis, Gout, etc.
- **Injury**
- **Emerging Cause**
 - Type II Diabetes and Insulin Resistance/Metabolic Syndrome

“half of all adults with diabetes—47%—also have arthritis. People with arthritis have a 61% higher risk of developing diabetes than those without this joint disease.”

Watson, S. (n.d.). The Link Between Arthritis and Diabetes. Learn about the link between arthritis & diabetes here Today. Retrieved June 28, 2022, from <https://www.arthritis.org/health-wellness/about-arthritis/related-conditions/other-diseases/the-link-between-arthritis-and-diabetes>



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Causes

Power of Repetitive = **Motion**

Knee Example:

1 lb body weight = 4lbs weight through knee joint during gait

4lbs x 10,000steps = 40,000lbs

20lbs overweight x 10,000steps = 100tons/day
potential cumulative trauma!

41.9% of Americans are Obese



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Post-Surgical PT & Issues

- **Typical Post-Surgical PT:**

Protected Motion Phase
(0-3 wks)

Protected Motion & Muscle Activation Phase
(3-8 wks)

Moderate Strengthening Phase
(4-12 wks)

Advanced Movement / High Velocity Phase
(3-6 mos)

- **Common Post-Joint Replacement Issues:**

- Pain (up to 2 years)
- Asymmetrical movement
- Strength loss



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General Myths

- **General Joint Replacement Myths:**
 - Joint replacements don't last – I'll need another operation eventually
 - It is a long recovery following joint replacement
 - Artificial joints are only for people with arthritis
 - After you complete Physical Therapy, you're as good as you'll get and no more can be done



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Knee Joint Replacement Myths

- **Knee Joint Replacement Myths:**
 - After knee replacement you cannot fully bend the knee
 - You should not do twisting or lateral movements after knee replacement
 - You cannot drive after knee replacement



Hip Joint Replacement Myths

- **Hip Joint Replacement Myths:**
 - You won't walk for weeks following hip replacement surgery
 - Those with severe hip arthritis cannot get a hip replacement
 - You can't flex you hip farther than 90° or adduct across the midline (crossing the legs) or the joint will dislocate



Shoulder Joint Replacement Myths

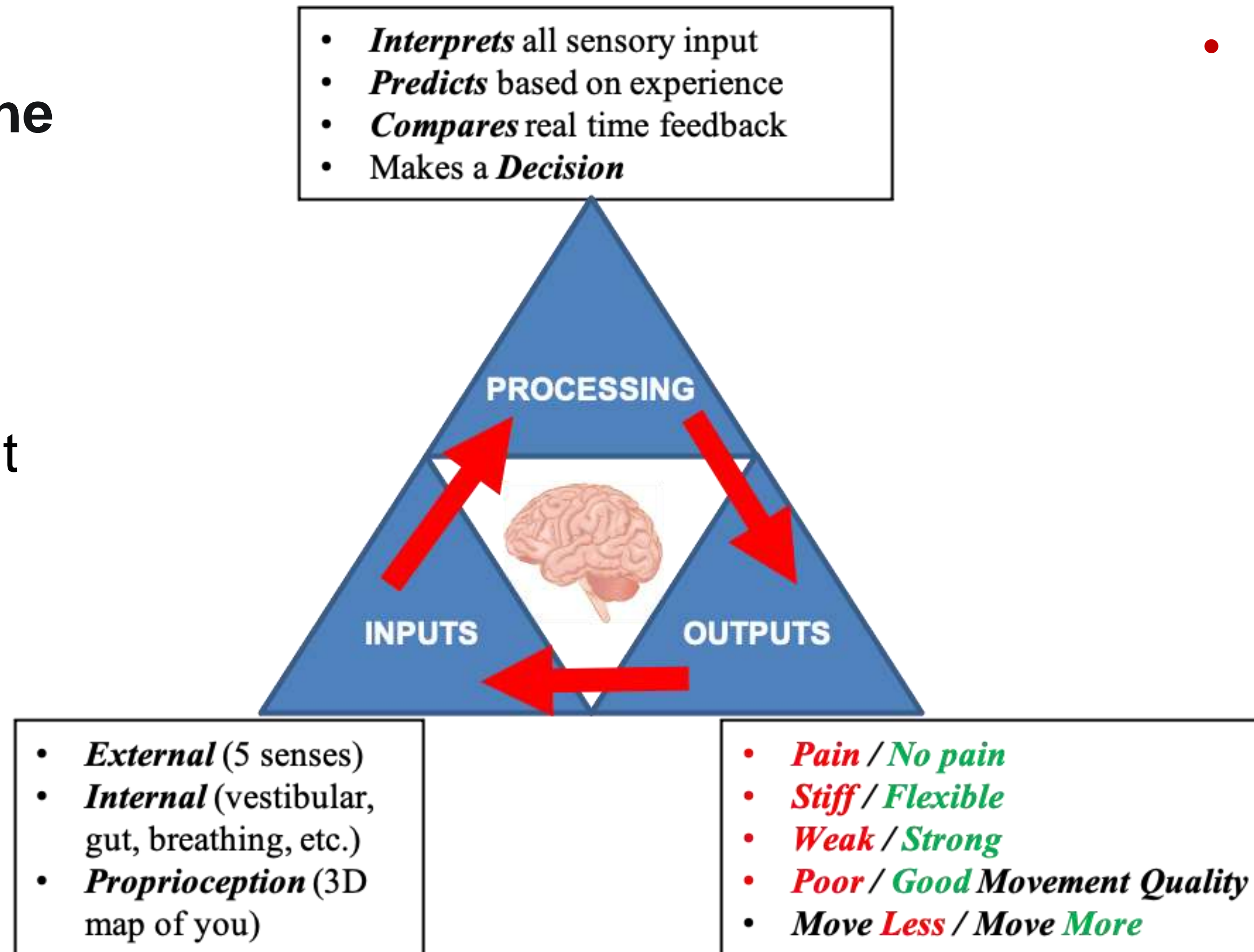
- **Shoulder Joint Replacement Myths:**
 - After a shoulder replacement, you can't lift or reach overhead
 - With a shoulder replacement you should not lift over 20 lbs. with that arm
 - After a shoulder replacement, you can't play sports with repetitive overhead movements such as tennis



Neuro-Centric Strategies for Joint Replacement Fitness

- The *input* to the brain determines the *output*

- To get a better output, you must:
 - Change the input
 - Improve the processing



- Biomechanics *obey* and *respond* to the nervous system, not vice versa

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Template for Post-PT Joint Replacement Exercise Therapy

- **Assess/Reassess**
- **Sensory Input**
- **Motor Control**
- **Isometrics**
- **Neuro-Centric Dynamic Exercise**



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Assess / Reassess

- **Baseline & In-Session**
- **Range of motion**
 - Primary motions (flexion, extension, etc.)
 - Functional / Activities of daily life
 - Sport requirements
- **Strength**
 - Manual muscle testing
 - Dynamometer
 - “Strength” vs. Firing



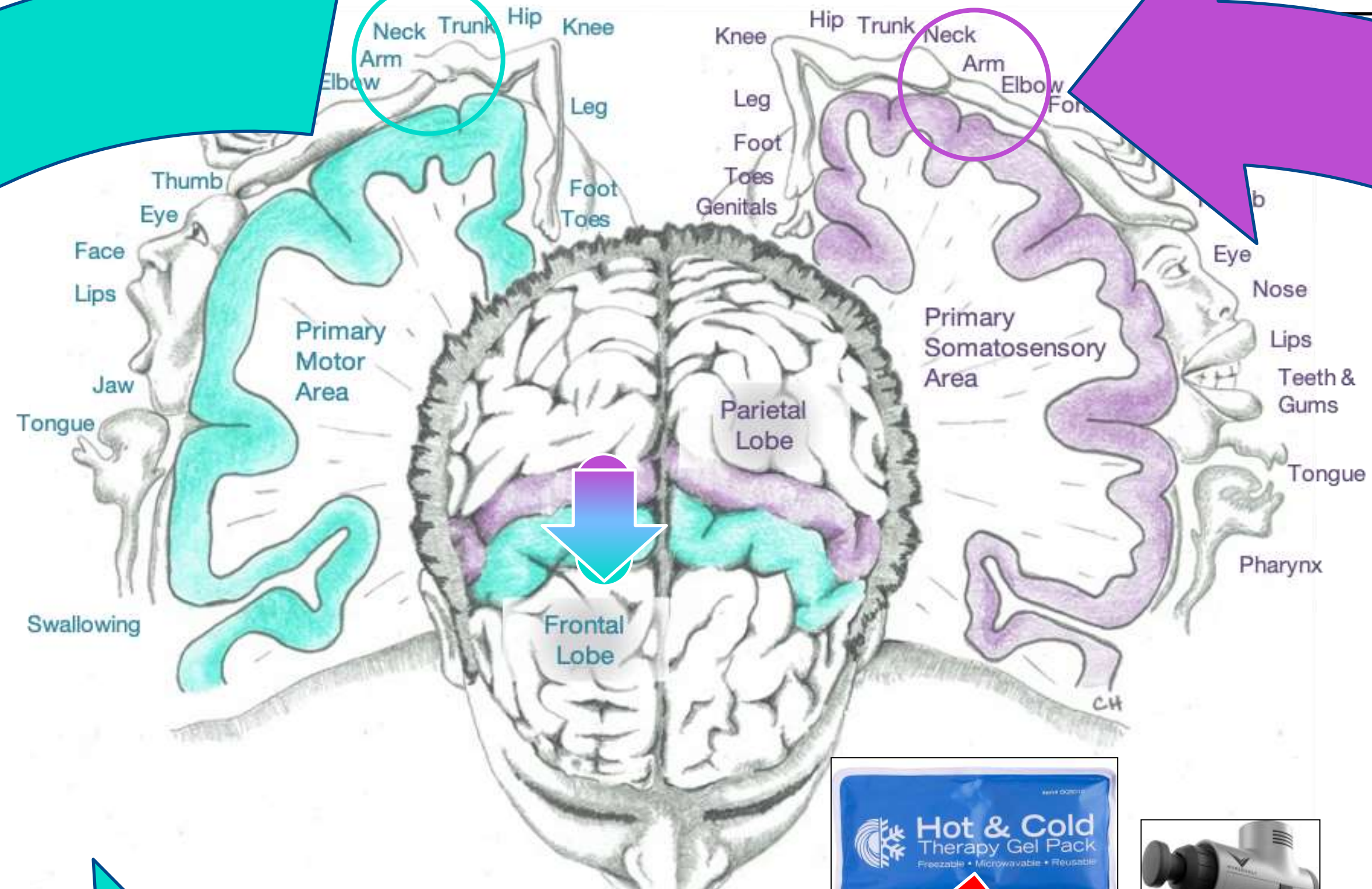
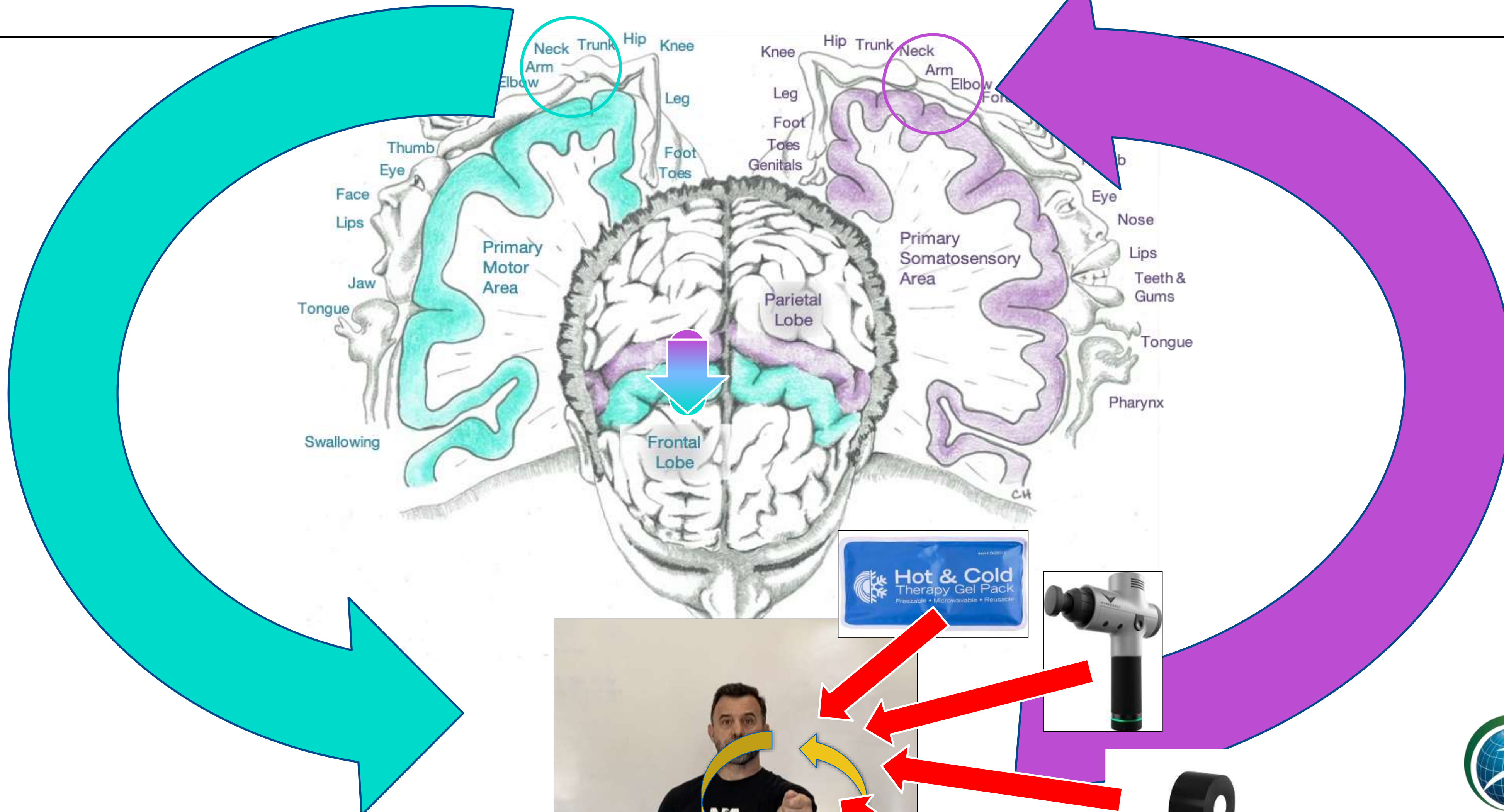
Sensory Input

- **Primary Goal – Improve proprioception**
- **The brain’s 3D Map for movement**
- **Why:**
 - Brain “sees” the area better
 - Informs the motor cortex for better movement
 - Improves spatial orientation
 - Pain reduction
- **How:**
 - Skin stimulation – hands / brush
 - Vibration – vibration tools
 - Temperature – hot/cold pack
 - Pressure – wraps / floss
 - Skin stretch – kinesiology tape



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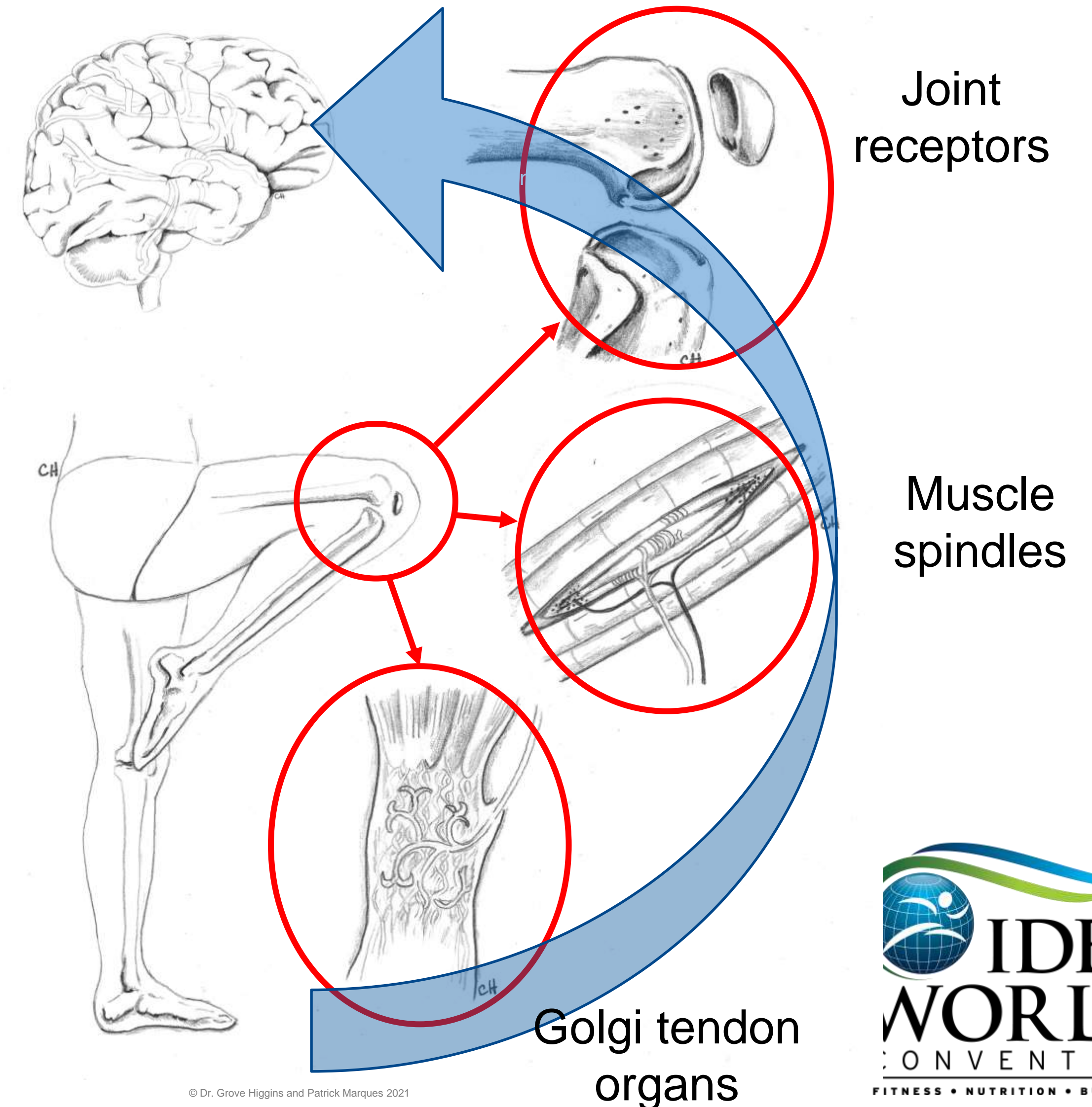
Sensory Input



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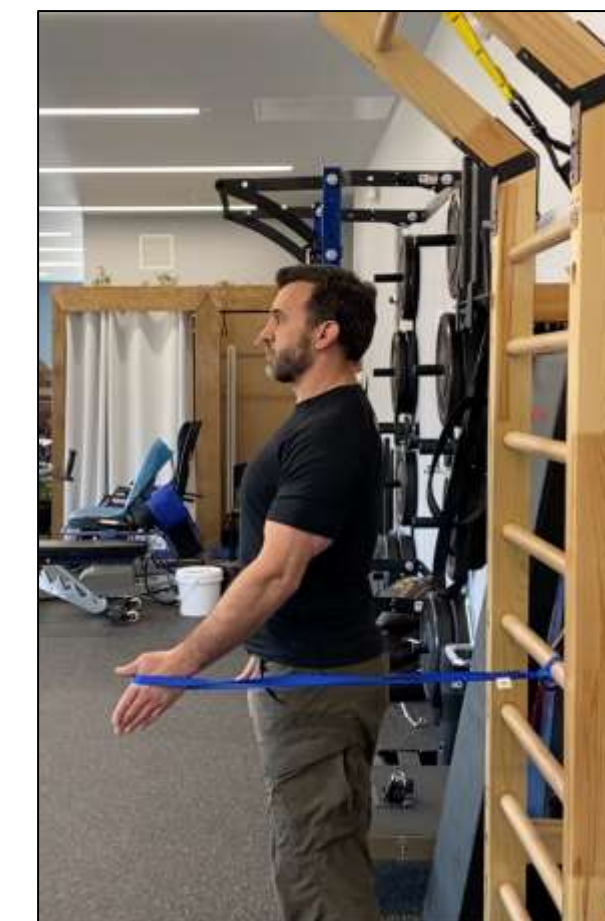
Motor Control Training

- **Taking joint through their full, pain-free ROM**
 - Primary Goal – Improve proprioception
- **The brain's 3D Map for movement**
- **Why:**
 - Mechanoreceptor damage
 - Likely poor proprioception before replacement
 - Proprioception affects strength, flexibility, & coordination



Isometric Strength Training

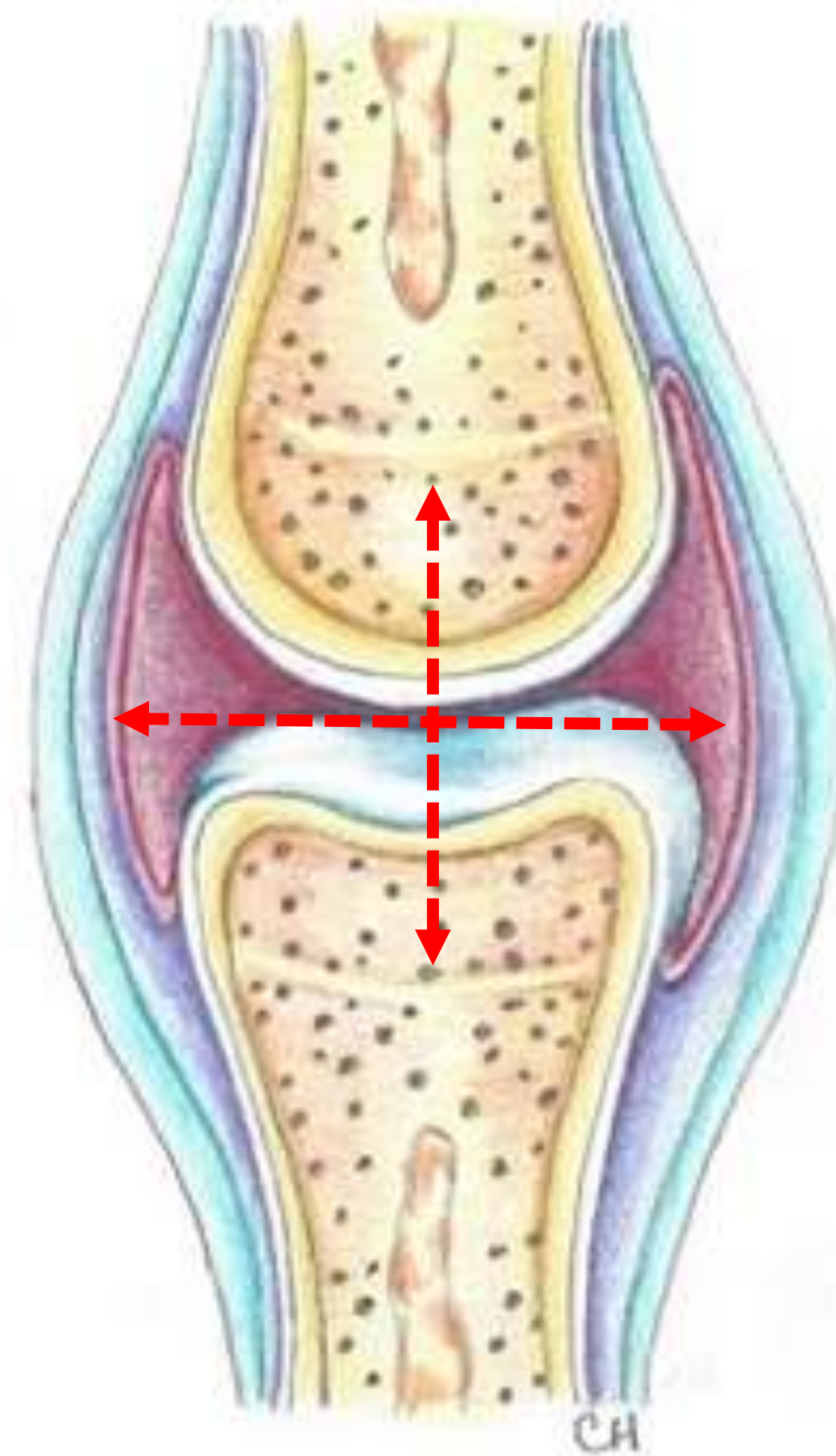
- **Muscular contraction without shortening or lengthening**
- **Primary Goal – Improve strength/control**
- **Why:**
 - Low neurological threat
 - Max force production / joint “packing”
 - Trains force production
 - Activates brain areas that “plan” movement
 - Pain reduction



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Isometric Strength Training

- **Synovial Fluid**
 - High viscosity
 - Non-Newtonian fluid
- **Viscosity increases as force goes through the joint:**
 - Shear-tensioning force
 - Increased joint stabilization



Neuro-Centric Dynamic Exercise

- Varying movement planes & stimulus
- Primary Goal – Improve strength/control
- Why:
 - Builds the “library of priors”
 - Conditions the tissues *AND* the nervous system
 - Associates vision with movement
 - Unilateral vs. bilateral



Knee Replacement Template - Assessments

- **Range of Motion**



Lying Flexion



Lying Extension



Lying Tibial Rotation



- **Strength/Muscle Testing:**

- Client initiates, you meet the force, then try to push them out (~3 sec)
- Both sides
- Don't touch the muscle
- No pain



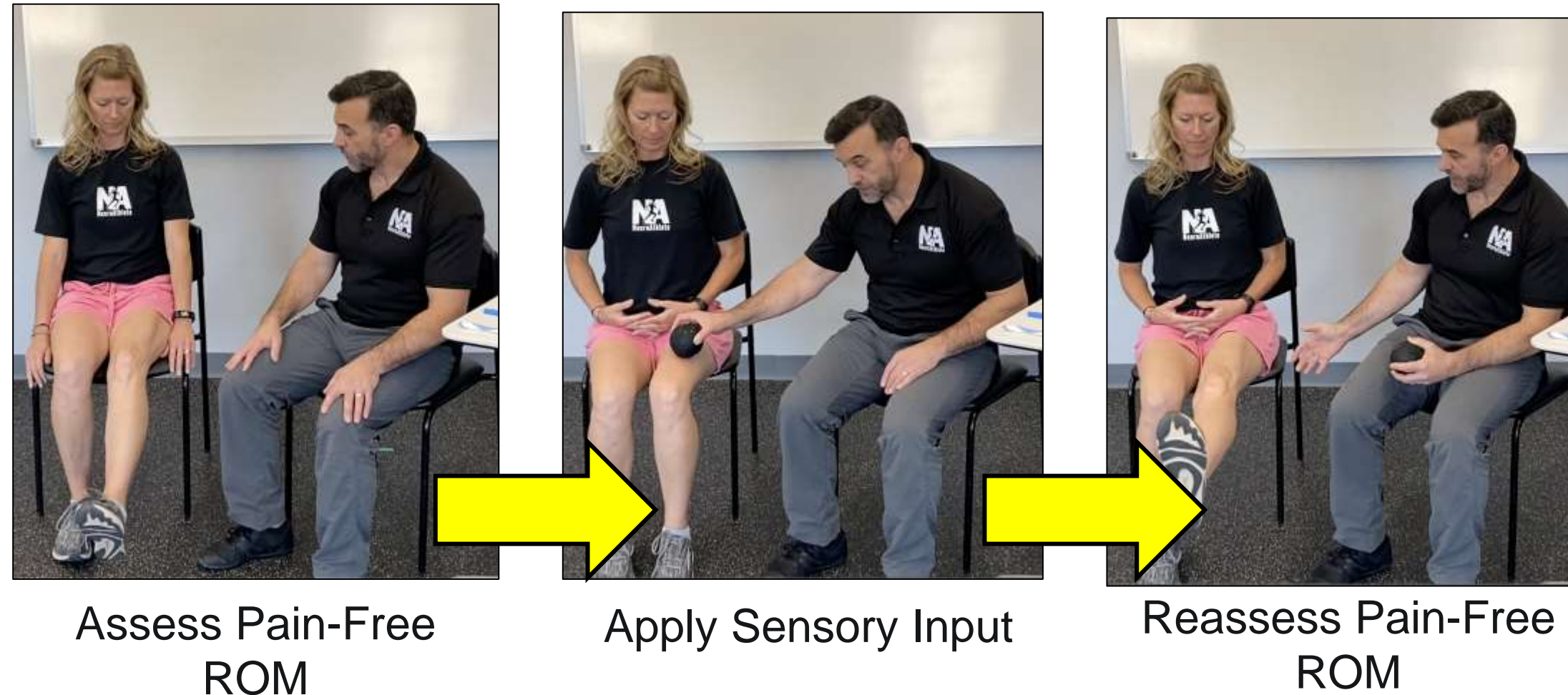
Quadriceps



Hamstrings

Knee Replacement Template – Sensory Input

- **Basic Process – Assess/Reassess Protocol:**



Types of Sensory Input:

- Skin stimulation – hands / brush
- Vibration – vibration tools
- Temperature – hot/cold pack
- Pressure – wraps / floss
- Skin stretch – kinesiology tape

- **Could also assess lunge, squat, etc.**

- **Apply the sensory stimulus to:**

- Muscles that cross the joint
- Areas of pain

How to use:

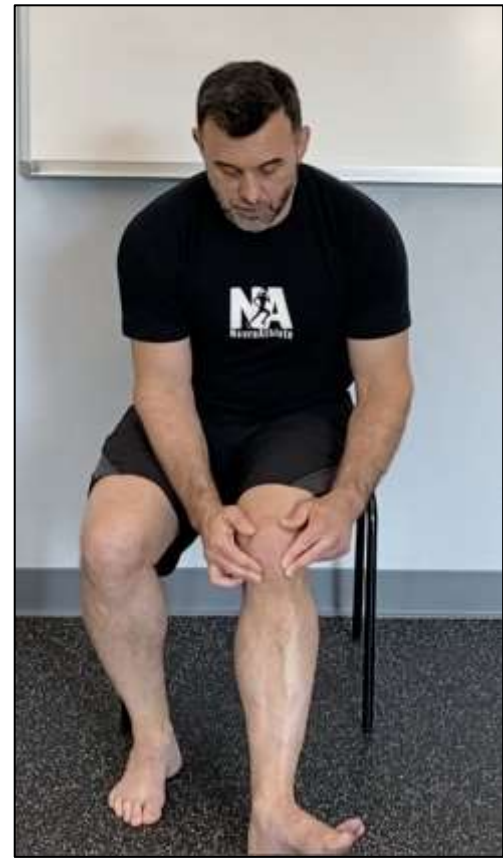
- Before/during exercise
- Between sets
- At home



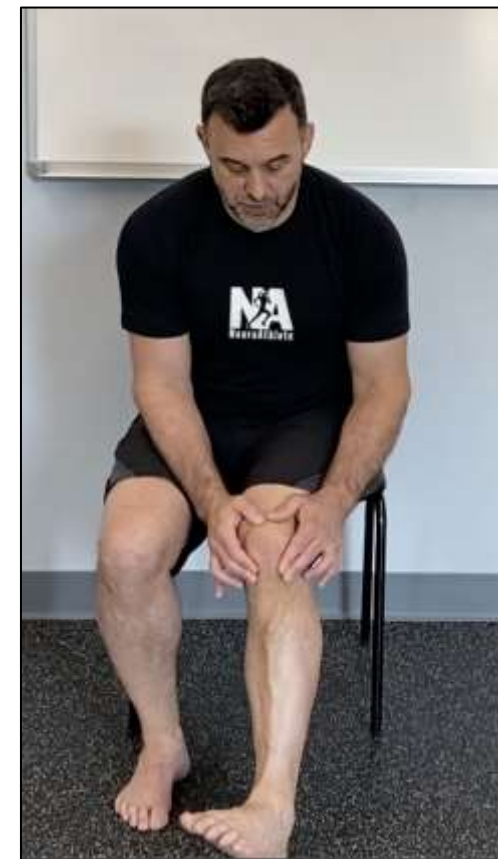
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Knee Replacement Template – Motor Control

- **Motor Control Drills:**



Seated Tibial
Rotation



Standing Tibial
Rotation



Goals of Motor Control:

- Pain-free *end* Range of Motion
- Good control and coordination of the movement
- Can perform the movements with minimal excess tension
- Perform at different speeds

- **Rules:**

- No pain
- Breath
- 3-5 reps each direction
- 3-5 times a day

How to use:

- Warm up & cooldown
- Between sets
- At home



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Knee Replacement Template – Isometric Strength Training

- **Knee Isometrics:**



Standing Knee Flexion (Mid-Range)



Standing Knee Extension (Mid-Range)

- **Parameters:**

- Effort level (1-100%)
- Time
- Joint position/angles (1-3)
- Open or closed chain

Goals of Isometrics:

- Comfortable force production
- Joint “packing”/stabilization
- Force production with low neurological threat
- Long holds at building effort % to 4-6 sec holds at 100%

Joint Positions:

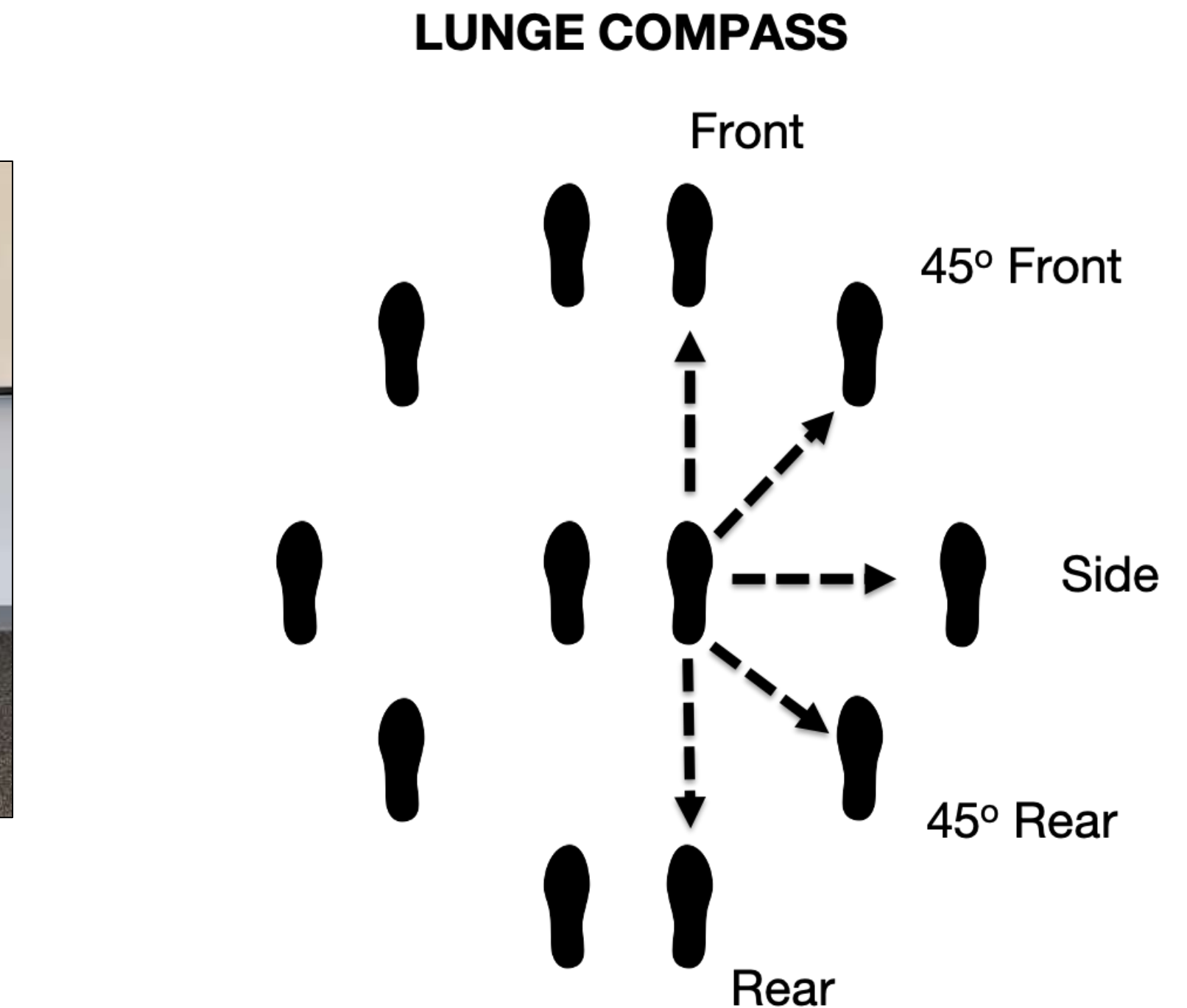
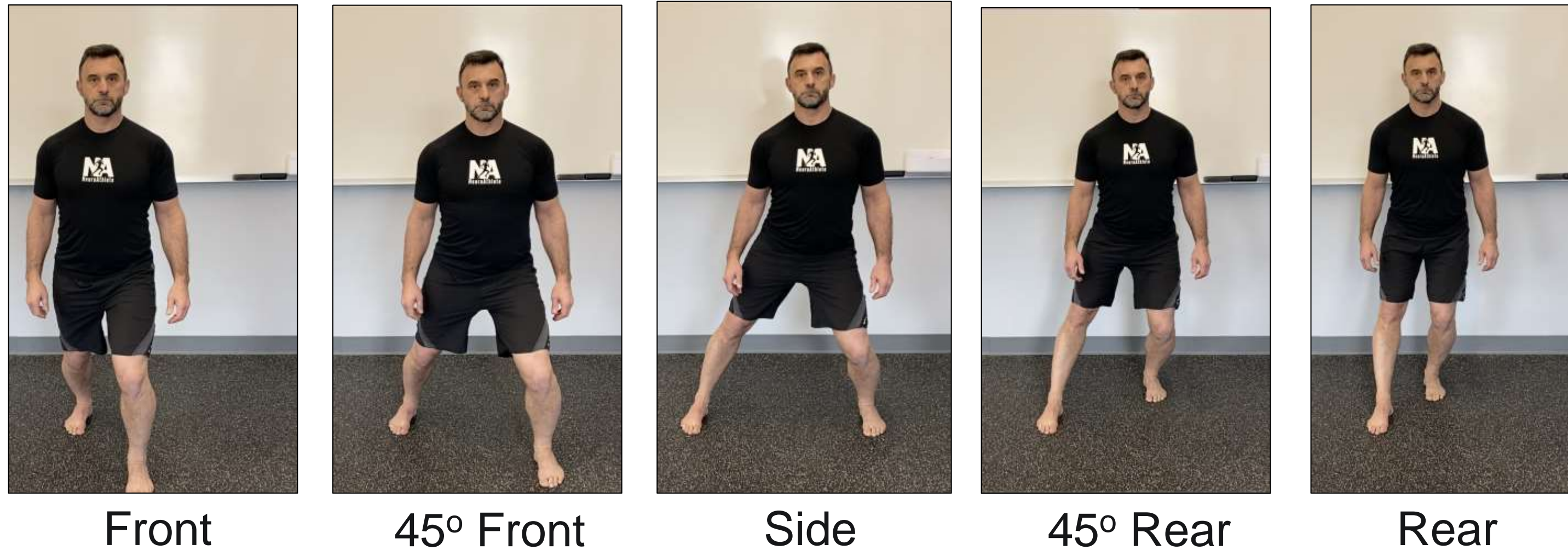
- Near fully stretched
- Mid-range
- Near fully contracted



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Knee Replacement Template – Neuro-Centric Dynamic Training

- **Lunge Compass:**



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- **Parameters:**

- Non-lunging foot flat
- Lunging side knee centered on foot
- Hips square to front
- Torso is upright

Foot Position Variations:

- Neutral
- Externally rotated
- Internally rotated



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Hip Replacement Template - Assessments

- **Range of Motion**



Flexion



Extension



External Rotation



Internal Rotation

- **Strength/Muscle Testing:**

- Client initiates, you meet the force, then try to push them out (~3 sec)
- Both sides
- Don't touch the muscle
- No pain



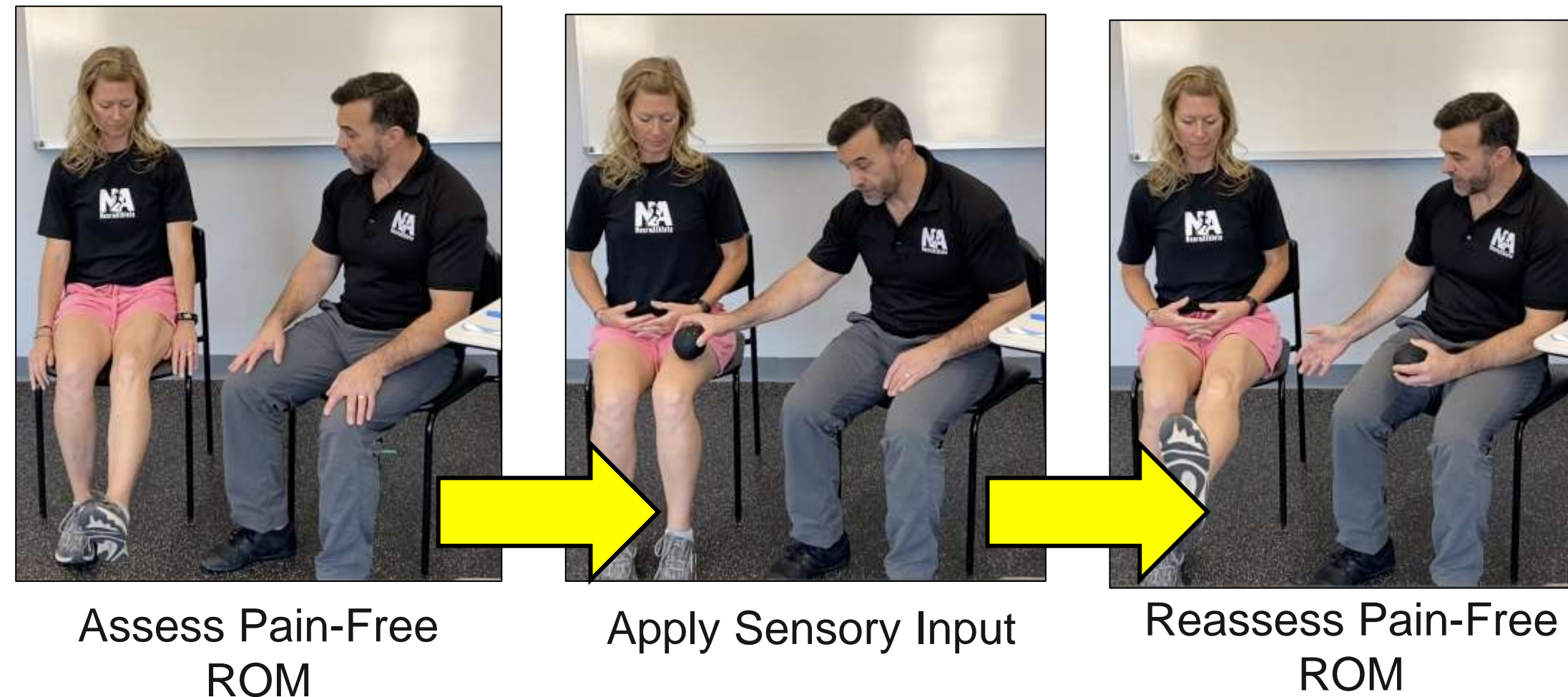
Rectus Femoris



Glute Max

Hip Replacement Template – Sensory Input

- **Basic Process – Assess/Reassess Protocol:**



Types of Sensory Input:

- Skin stimulation – hands / brush
- Vibration – vibration tools
- Temperature – hot/cold pack
- Pressure – wraps / floss
- Skin stretch – kinesiology tape

- **Could also assess lunge, squat, etc.**

- **Apply the sensory stimulus to:**

- Muscles that cross the joint
- Areas of pain

How to use:

- Before/during exercise
- Between sets
- At home



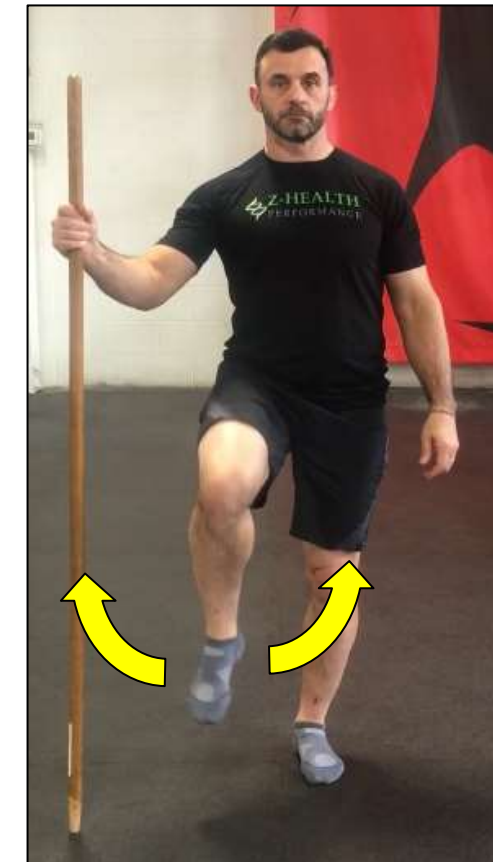
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Hip Replacement Template – Motor Control

- **Motor Control Drills:**



Hip Half Circles



Hip Pendulums

Goals of Motor Control:

- Pain-free *end* Range of Motion
- Good control and coordination of the movement
- Can perform the movements with minimal excess tension
- Perform at different speeds

- **Rules:**

- No pain
- Breath
- 3-5 reps each direction
- 3-5 times a day

How to use:

- Warm up & cooldown
- Between sets
- At home



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Hip Replacement Template – Isometric Strength Training

- **Hip Isometrics:**



Hip Adduction Isometrics
(Closed Chain)



Hip Abduction Isometrics
(Closed Chain)

- **Parameters:**

- Effort level (1-100%)
- Time
- Joint position/angles (1-3)
- Open or closed chain

Goals of Isometrics:

- Comfortable force production
- Joint “packing”/stabilization
- Force production with low neurological threat
- Long holds at building effort % to 4-6 sec holds at 100%

Joint Positions:

- Near fully stretched
- Mid-range
- Near fully contracted



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Hip Replacement Template – Neuro-Centric Dynamic Training

- **Visually-Guided Lunge Compass:**

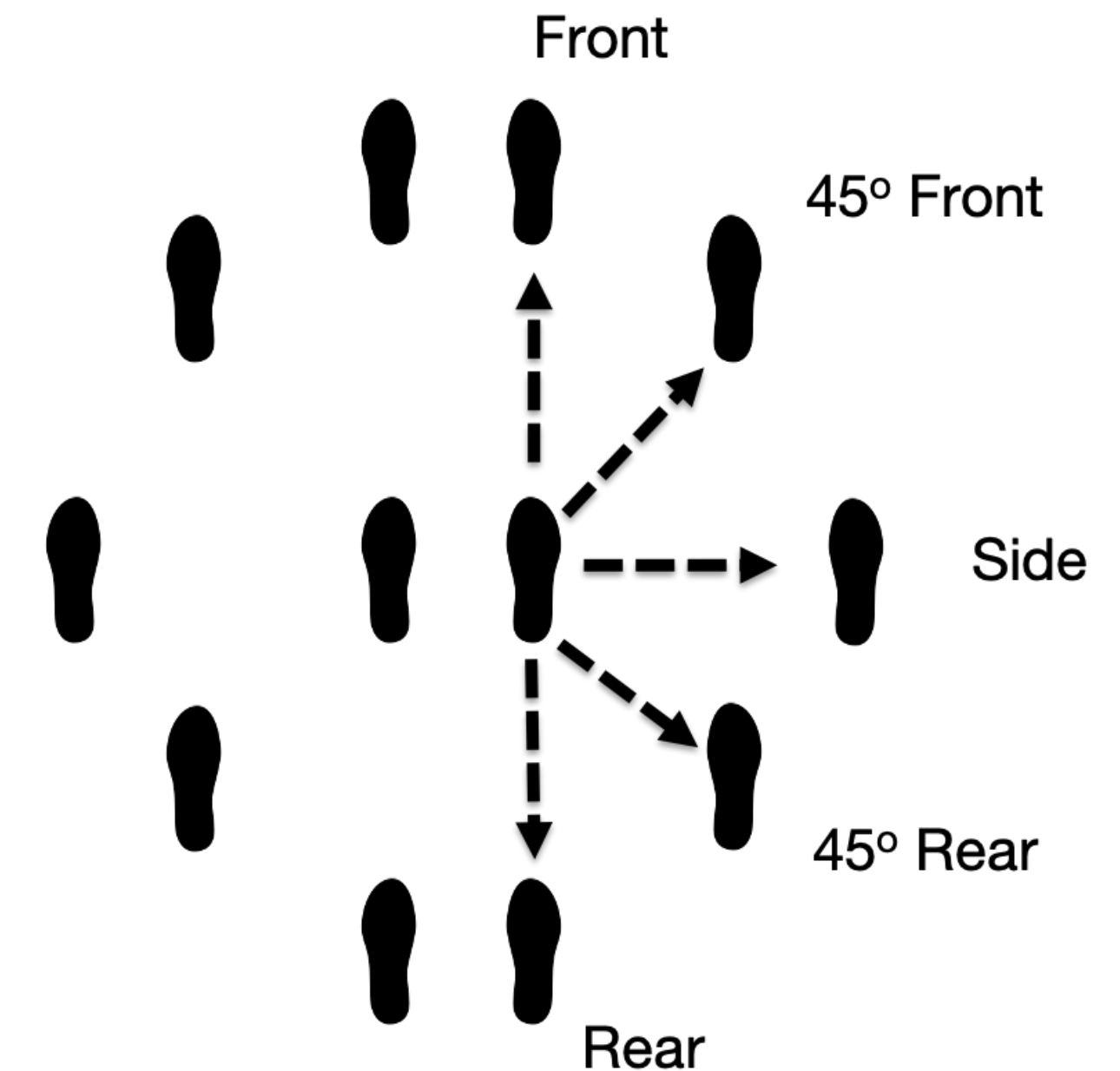


45° Front



Side

LUNGE COMPASS



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- **Parameters:**

- Non-lunging foot flat
- Lunging side knee centered on foot
- Hips square to front
- Torso is upright

Foot Position Variations:

- Neutral
- Externally rotated
- Internally rotated



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Shoulder Replacement Template - Assessments

- **Range of Motion**



Abduction (Int. Rot.)



Flexion



Internal Rotation

- **Strength/Muscle Testing:**

- Client initiates, you meet the force, then try to push them out (~3 sec)
- Both sides
- Don't touch the muscle
- No pain



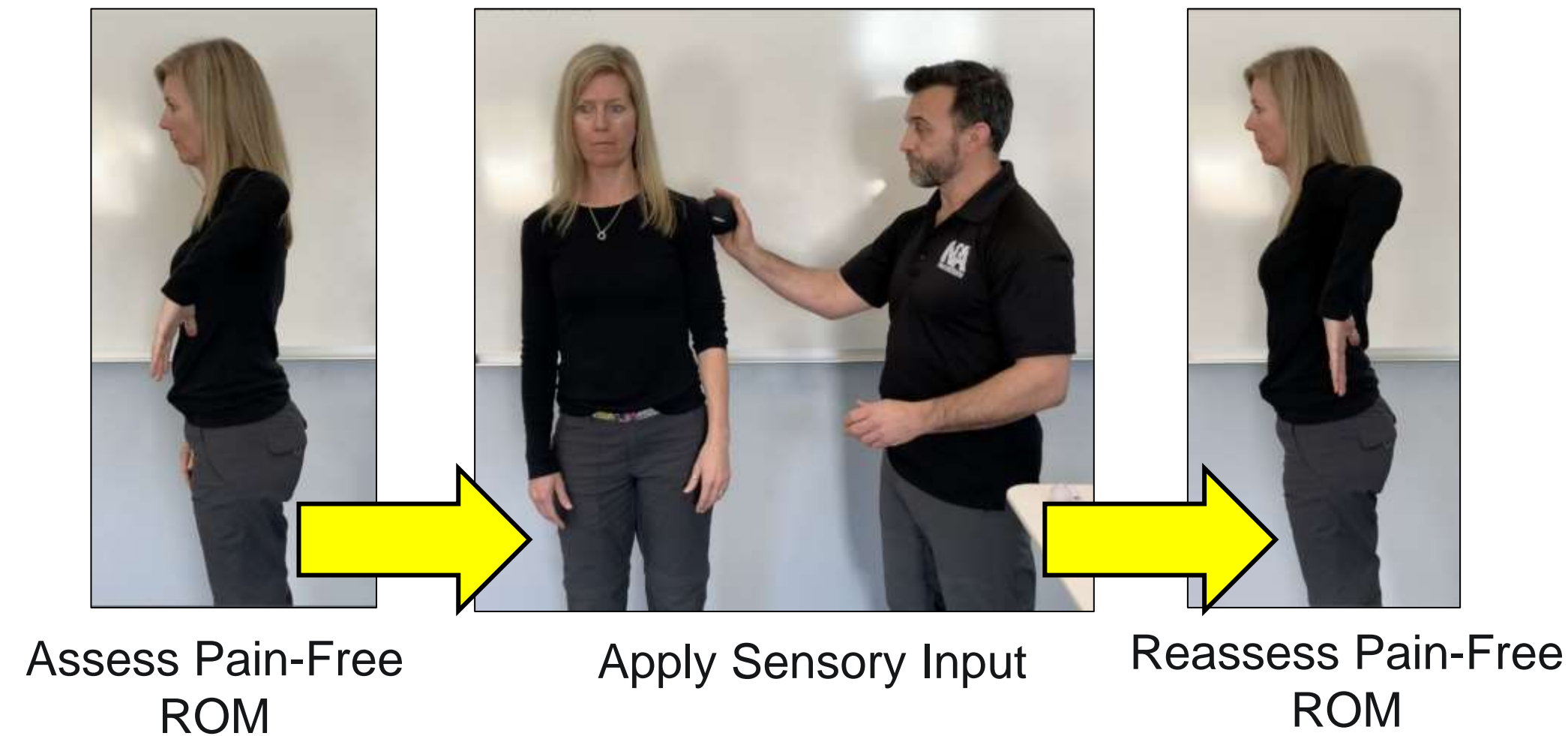
Subscapularis



Pec Major

Shoulder Replacement Template – Sensory Input

- **Basic Process – Assess/Reassess Protocol:**



Types of Sensory Input:

- Skin stimulation – hands / brush
- Vibration – vibration tools
- Temperature – hot/cold pack
- Pressure – wraps / floss
- Skin stretch – kinesiology tape

- **Could also assess push, pull, etc.**

- **Apply the sensory stimulus to:**

- Muscles that cross the joint
- Areas of pain

How to use:

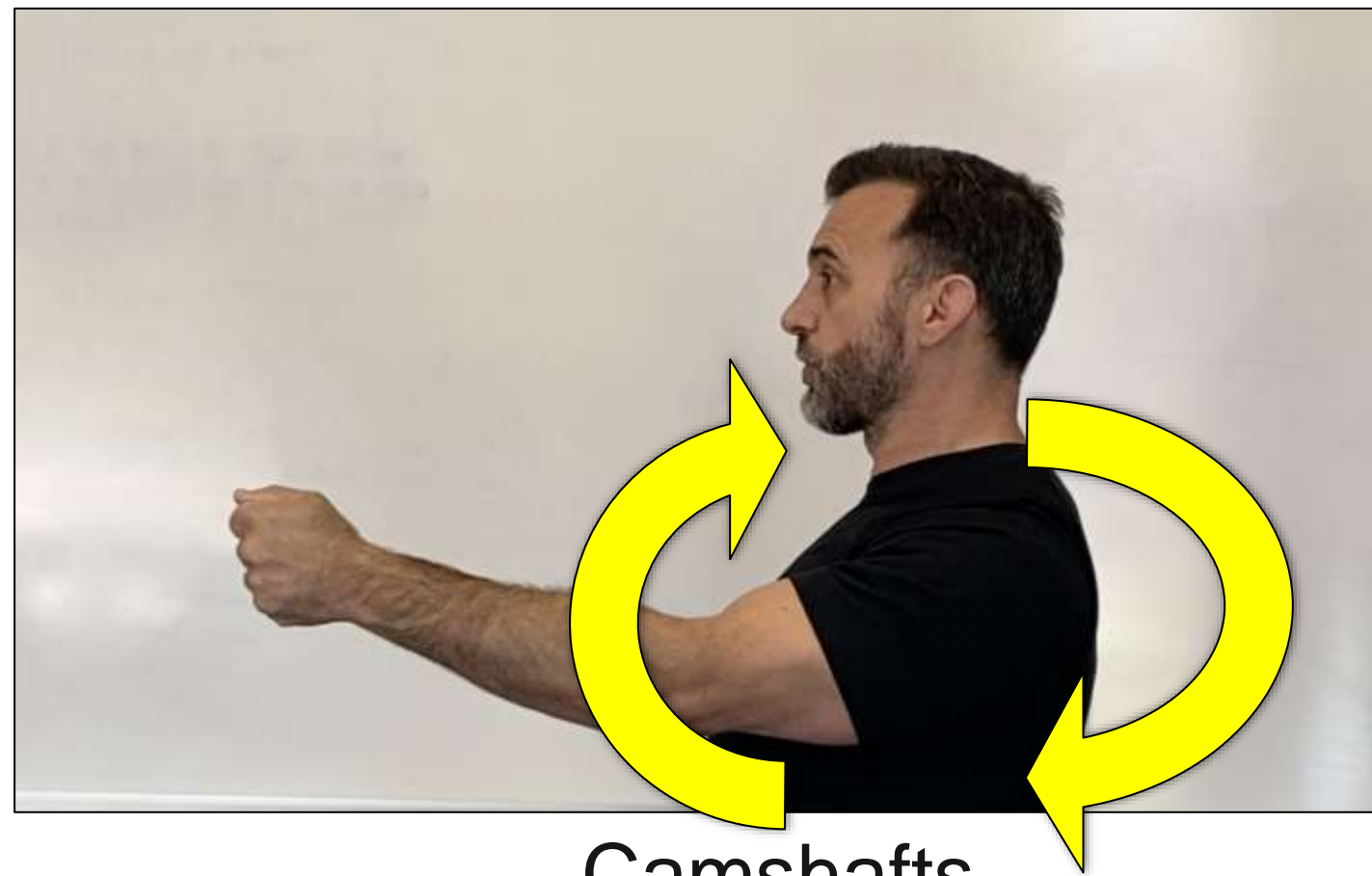
- Before/during exercise
- Between sets
- At home



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Shoulder Replacement Template – Motor Control

- **Motor Control Drills:**



Camshafts



Shoulder Fig.-8's

Goals of Motor Control:

- Pain-free *end* Range of Motion
- Good control and coordination of the movement
- Can perform the movements with minimal excess tension
- Perform at different speeds

- **Rules:**

- No pain
- Breath
- 3-5 reps each direction
- 3-5 times a day

How to use:

- Warm up & cooldown
- Between sets
- At home



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Shoulder Replacement Template – Isometric Strength Training

- **Shoulder Isometrics:**



Shoulder Horizontal Abduction (Mid-Range)



Shoulder Horizontal Abduction (Mid-Range)



Shoulder Internal Rotation (Mid-Range)

Goals of Isometrics:

- Comfortable force production
- Joint “packing”/stabilization
- Force production with low neurological threat
- Long holds at building effort % to 4-6 sec holds at 100%

- **Parameters:**

- Effort level (1-100%)
- Time
- Joint position/angles (1-3)
- Open or closed chain

Joint Positions:

- Near fully stretched
- Mid-range
- Near fully contracted



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Shoulder Replacement Template – Neuro-Centric Dynamic Training

- **Shoulder Compass Pull-Aparts:**



Vertical Right



45° Up/Right
to Down/Left



Horizontal

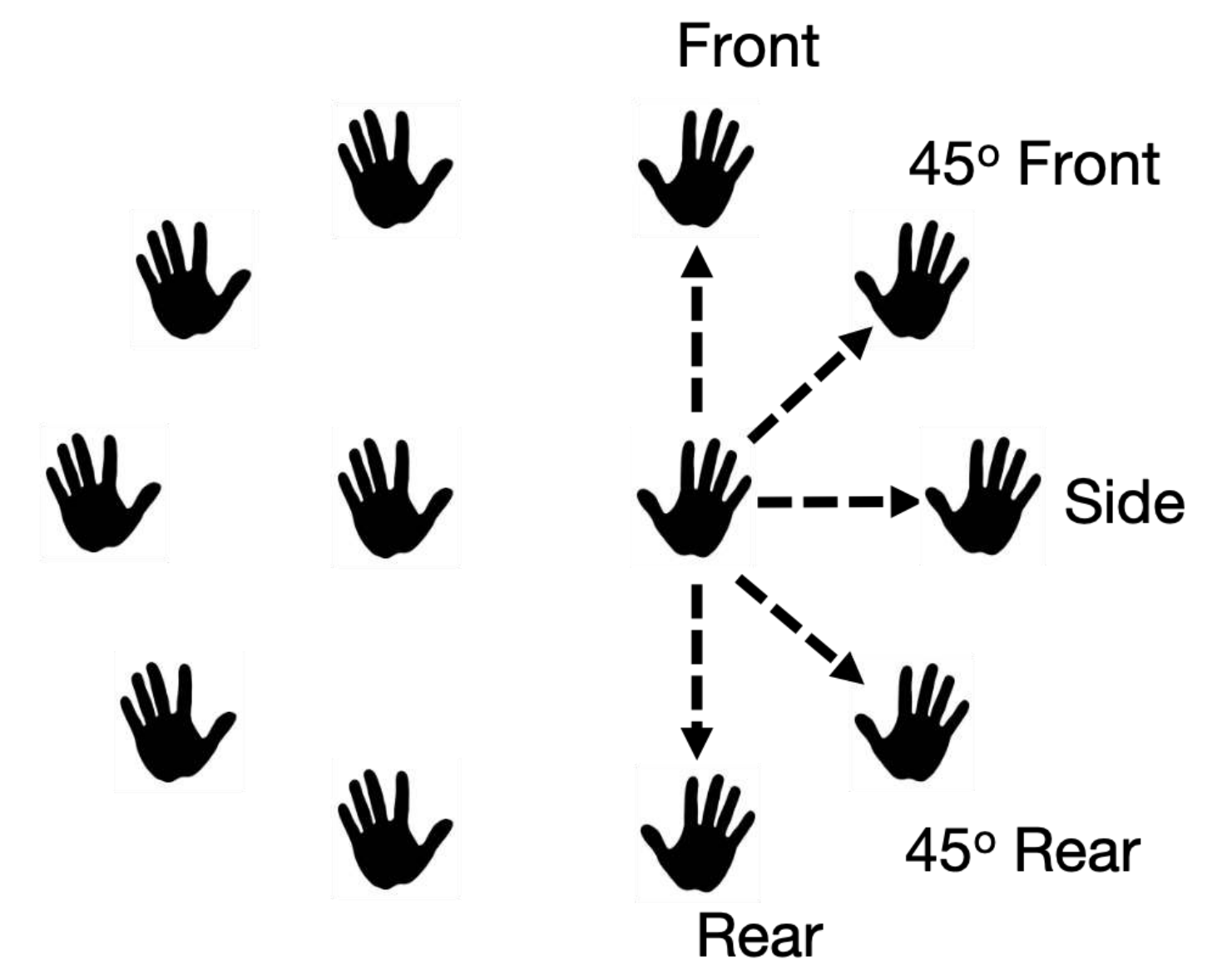


45° Up/Left to
Down/Right



Vertical Left

SHOULDER COMPASS



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- **Parameters:**

- Shoulders packed
- Spine straight
- Hips square to front
- Torso is upright

Hand Position Variations:

- Neutral
- Externally rotated
- Internally rotated



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Pre- & Post Joint Replacement Business Tips

- **Niche Market**
 - TJR clients need more motor development and fitness beyond prescribed therapy
 - Many trainers are not comfortable or have skills for the TJR
 - Many MDs, DOs, & PTs would prescribe continued exercise if they knew there were qualified trainers!



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Pre- & Post Joint Replacement Business Tips – Provider Side

- **Problems**

- General lack of trust in the safety and effectiveness of the fitness industry
- Reimbursement for rehabilitation – rates, policy limits
- Healthcare provider burnout – limited volume for quality care in the system

- **Solutions**

- Quickly communicate skillset
 - Skills, safety, effectiveness
- Simple value proposition
 - Perform the services within their clinic, revenue stream with Dr./Therapist prescribed and observed programming
- Collaborate on patient specific programs
- Creative ways to reduce stress & workload
 - Simple reports and updates on client progress



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Pre- & Post Joint Replacement Business Tips – Client Side

- **Problems**

- General lack of trust in the safety and effectiveness of the fitness industry for their problem
- Lack of knowledge of availability of services
- Insurance limits for rehabilitation
 - Limited Medicare providers, policy limits

- **Solutions**

- Quickly communicate skillset and availability
 - Testimonials and Referrals
- Simple value proposition
 - Cost of further fitness vs continued disability or future joint replacements
 - MedFit Cares – Medically prescribed fitness (HSA to help pay! Tax Write-off)
- Cooperate with Provider
 - Provide value add to the Dr./Patient relationship



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Resources

- **How to find us:**
 - Website: www.clinic.neuroathlete.com
 - Facebook: NeuroAthlete Clinic
 - Instagram: @neuroathleteclinic
 - YouTube: NeuroAthlete Clinic
 - Email: info@neuroathleteclinic.com

- **Neuro-Centric Education:**
 - Z-Health Performance Solutions - www.zhealtheducation.com

- **Joint Replacement Fitness Specialist certification**
 - MedFit – www.medfitclassroom.org (Specialist Courses)



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About MedFit

MedFit Network was founded in 2013 by fitness industry veteran Lisa Dougherty. MFN is a membership organization for medical fitness professionals, and a free directory for the public to find qualified fitness professionals in their area who can safely work with their medical conditions.



As MedFit Network grew, Lisa noticed a lack of available medical fitness education for professionals. In 2017, she founded the MedFit Education Foundation, a nonprofit dedicated to elevating the quality and amount of medical fitness education. Through the Foundation, Lisa's led the way to creating education via MedFit Classroom, MedFit Tour and MedFit TV. In 2022, Lisa co-founded MedFit Care with Dr. David Kruse to provide exercise prescriptions for consumers to use with fitness professionals.

MedFit Family of Organizations



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Current and Upcoming Specialist Courses

Blue = course currently available

- **Adaptive Fitness Specialist**
- **Alzheimer's Disease Fitness Specialist**
- **Arthritis Fitness Specialist**
- Autism Spectrum Disorder (ASD) Fitness Specialist
- **Cancer Exercise Specialist**
- Cardiac Rehab Fitness Specialist
- **Type 2 Diabetes Fitness Specialist**
- **Drug and Alcohol Recovery Fitness Specialist**
- Fibromyalgia Fitness Specialist
- **Foundations of Medical Fitness: A Comprehensive Course for Fitness Specialists**
- **Geriatric Fitness & Lifestyle Specialist**
- **Joint Replacement Fitness Specialist**
- **Longevity Lifestyle & Fitness Specialist**
- Medically-based Aquatics Specialist
- Meditation Specialist
- **Menopause Fitness & Health Specialist**
- **Multiple Sclerosis Fitness Specialist**
- **Obesity Fitness Specialist**
- Orthopedic
- **Osteoporosis Fitness Specialist**
- **Parkinson's Disease Fitness Specialist**
- Prenatal & Postpartum Fitness Specialist
- Respiratory Disease Fitness Specialist
- Sleep Coach Specialist
- **Sports Medicine Fitness Specialist**
- **Stroke Recovery Fitness Specialist**
- Weight Loss & Management Specialist
- Youth Fitness & Nutrition Specialist



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March 16-18, 2023

Medical Fitness Tour: Southern California
Los Angeles Athletic Club

Pre-registration will open in July. Join our mailing list to be notified:
medicalfitnessstour.org/mft2023

**Attendance will provide 12-20 CECs. Pending approval.*



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