NECESSARY BEHAVIORAL AND BIOMECHANICAL ADAPTATIONS IN PAIN MANAGEMENT

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PRECISION

INTERVENTIONAL PAIN CENTER

I HAVE NO FINANCIAL DISCLOSURE OR CONFLICTS OF INTEREST WITH THE MATERIAL PRESENTED IN THIS SLIDE SHOW

NECESSARY BEHAVIORAL AND BIOMECHANICAL ADAPTATIONS IN PAIN MANAGEMENT

OBJECTIVES

- UNDERSTANDING PATHOLOGY
- APPLICATION
- MAINTENANCE

WHAT IS PAIN

pain
1.highly unpleasant physical sensation caused by illness or injury:
"she's in great pain"
"chest pains“
“low back pain”

PAIN

- **1:** A LOCALIZED OR GENERALIZED UNPLEASANT BODILY SENSATION OR COMPLEX OF SENSATIONS THAT CAUSES MILD TO SEVERE PHYSICAL DISCOMFORT AND EMOTIONAL DISTRESS AND TYPICALLY RESULTS FROM BODILY DISORDER (SUCH AS INJURY OR DISEASE)
- **2:** A BASIC BODILY SENSATION THAT IS INDUCED BY A NOXIOUS STIMULUS, IS RECEIVED BY NAKED NERVE ENDINGS, IS ASSOCIATED WITH ACTUAL OR POTENTIAL TISSUE DAMAGE, IS CHARACTERIZED BY PHYSICAL DISCOMFORT (SUCH AS PRICKING, THROBBING, OR ACHING), AND TYPICALLY LEADS TO EVASIVE ACTION

DEFINITION

be·hav·ior·al
[bɪˈheɪvjər(ə)l]
1.involving, relating to, or emphasizing behavior the way one acts or conducts onself:
"closely related species have similar behavioral patterns"
"a behavioral approach to children's language“

bio·mech·an·ic·al
[ˌbʌɪə(ʊ)mɪˈkanɪkl]
1.relating to the mechanical laws concerning the movement or structure of living organisms:
"a biomechanical advantage"
"we do a lot of biomechanical analysis of my running”

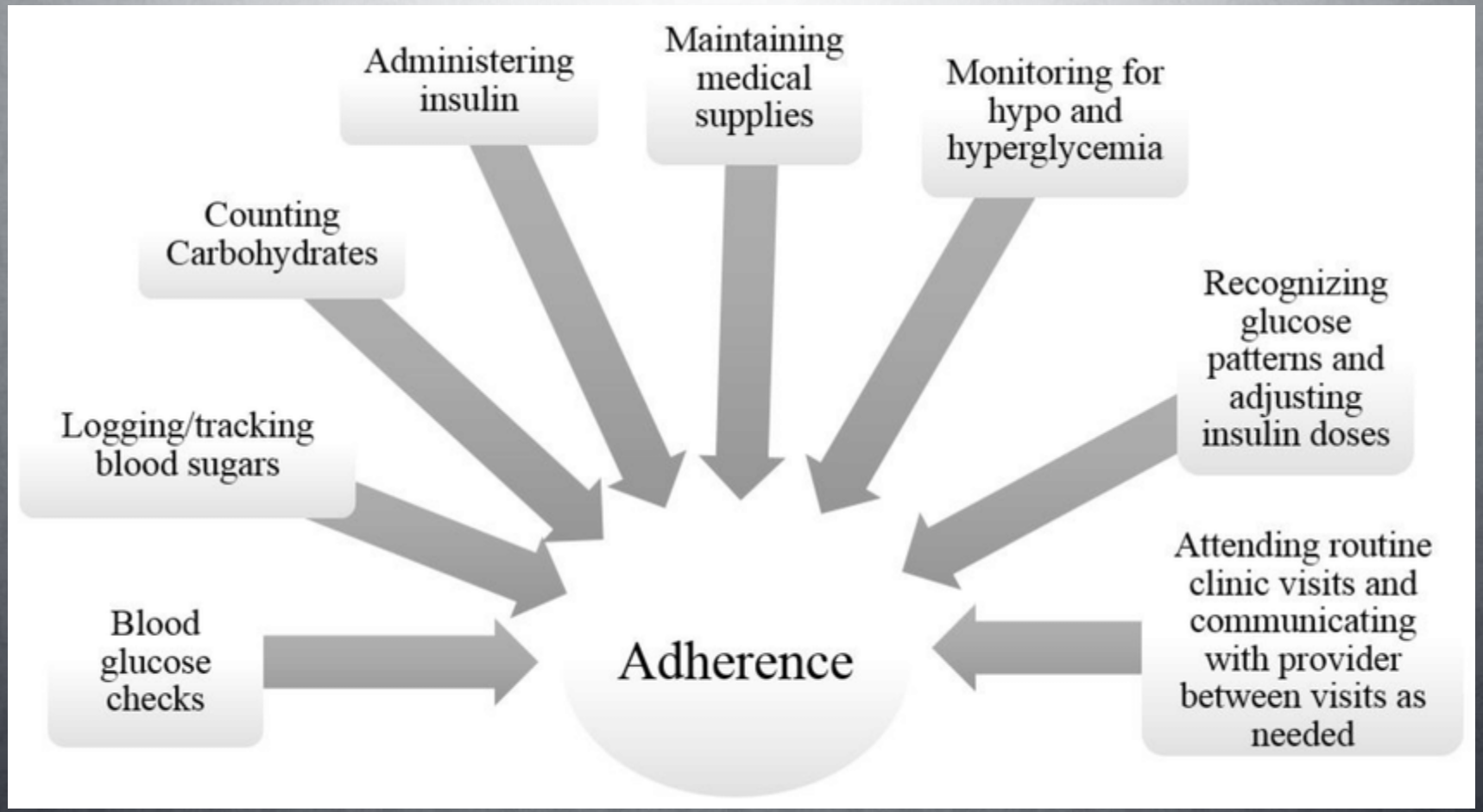
CONUNDRUM

- PROBLEM
  - SENT 2 PATIENTS TO SAME SPECIALIST
    - PT 1 COMES BACK AND STATES: BEST THING I EVER DID, I FEEL GREAT, CAN'T BELIEVE I DIDN'T DO THIS SOONER
    - PT2: MIGHT HAVE FELT BETTER FOR SHORT TERM BUT NOW BACK TO BASELINE

DRAWING PARALLELS…

- DIABETIC PT'S
- HYPERTENSIVE PT'S
- POST SURGICAL PT'S
- ETC.

TYPE 2 DIABETICS



OUTCOME

- DM2 PT 1:
  - DOES NOT UNDERSTAND PATHOLOGY, PROGNOSIS, TREATMENT AND RESISTS REGIMEN RESULTING IN POOR COMPLIANCE → POOR OUTCOME
- DM2 PT2:
  - UNDERSTANDS PATHOLOGY, PROGNOSIS, TREATMENT AND ADHERES TO REGIMEN RESULTING IN PERSISTENT COMPLIANCE → OPTIMAL OUTCOME

Stepwise Approach to Management of DM2

Step 1

Lifestyle Modification

Step 2

Oral Hypoglycemics

Step 3

Insulin Therapy

CASE 1

- 54YO M COMPUTER PROGRAMMER W/ PMH OF HTN AND HYPOTHYROIDISM PRESENTS W/ WORSENING BACK PAIN PARTICULARLY AT WORK W/ OCCASIONAL BURNING DISCOMFORT DOWN B/L LE. PT HAS TRIED OTC MEDICATIONS, ICE/HEAT, ACUPUNCTURE W/ MILD SHORT TERM RELIEF.

OBJECTIVES

- UNDERSTANDING PATHOLOGY
- APPLICATION
- MAINTENANCE

- **UNDERSTANDING PATHOLOGY**
  - FOR THE PROVIDER
    - IS THIS 2/2 A MECHANICAL MOV'T OF THE DISC/IS THIS PERSISTENT IRRITATION/COMPRESSION OF SPINAL NERVES/IS THIS A STRESS INDUCED INSULT TO THE DISC ITSELF
  - FOR THE PATIENT
    - DOES THE PATIENT UNDERSTAND THE CULPRIT OF HIS PAIN/PROGNOSIS AND ULTIMATE OUTCOME
- **APPLICATION**
  - ONCE TREATMENT ENSUES – WILL PT BE CURED LIKE THE COMMON COLD OR WILL PT HAVE PERSISTENT OR ON/OFF SYMPTOMS
  - ARE THERE THINGS TO LOOK OUT FOR AND TREATMENT MODALITIES THAT PATIENT SHOULD BE ADHERING TO
- **MAINTENANCE**
  - DOES THE PATIENT REQUIRE PERSISTENT STRATEGIES IN DEALING WITH PAIN
  - IF PAIN RECURS WHAT THEN

- SITTING **INCREASES** LUMBAR DISC PRESSURE BY 20–45% COMPARED TO STANDING, WITH SLOUCHED OR FORWARD-LEANING POSTURES CREATING THE HIGHEST STRESS ON THE LOWER BACK
- WHEN YOU SIT, THE NATURAL INWARD CURVE OF THE LUMBAR SPINE (LORDOSIS) TENDS TO FLATTEN, SHIFTING MORE PRESSURE ONTO THE DISCS IN THE LOWER BACK
- IN UPRIGHT SITTING, DISC PRESSURE IS APPROXIMATELY 30–45% HIGHER THAN STANDING, MEANING THE DISCS EXPERIENCE 1.24 TO 1.45 TIMES MORE LOAD THAN WHEN STANDING
- SLUMPED OR FORWARD-LEANING SITTING FURTHER INCREASES THIS PRESSURE, AS THE NUCLEUS PULPOSUS (THE GEL-LIKE CENTER OF THE DISC) IS PUSHED TOWARD THE BACK WALL, WHICH IS WHERE HERNIATIONS COMMONLY OCCUR
- SITTING ON THE FLOOR WITH A ROUNDED SPINE PRODUCES THE HIGHEST DISC PRESSURE OF ALL TESTED POSITIONS

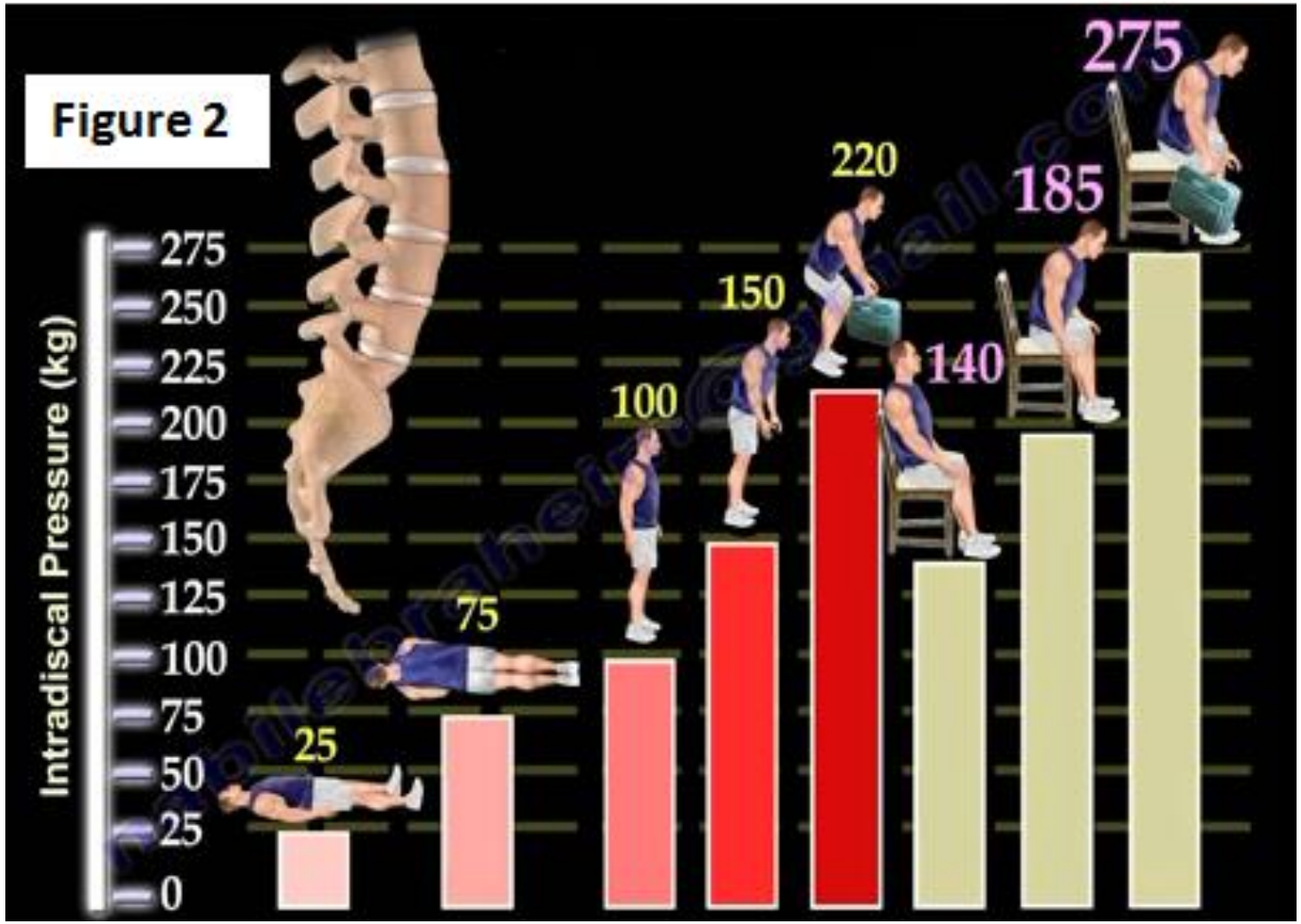
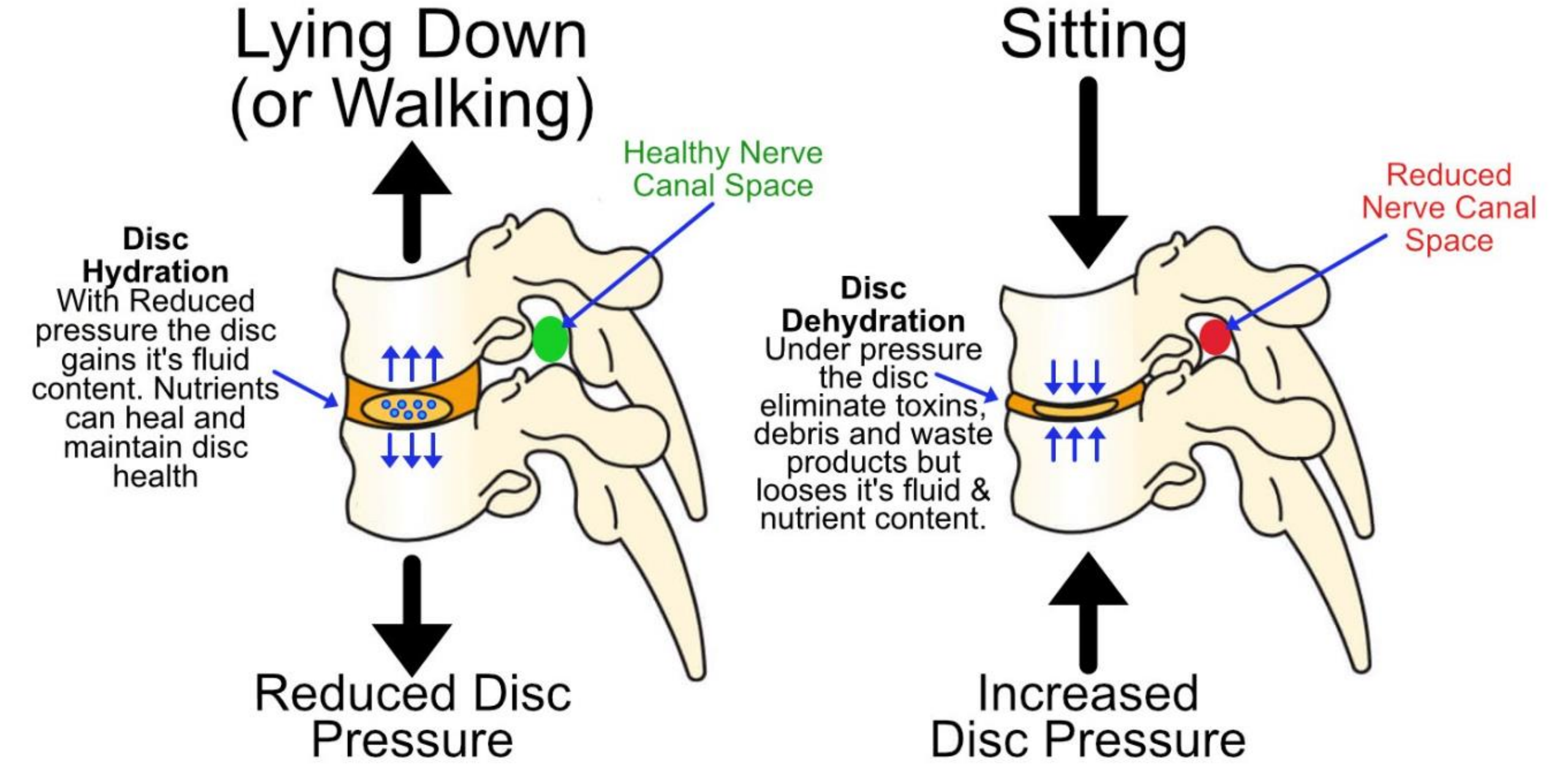
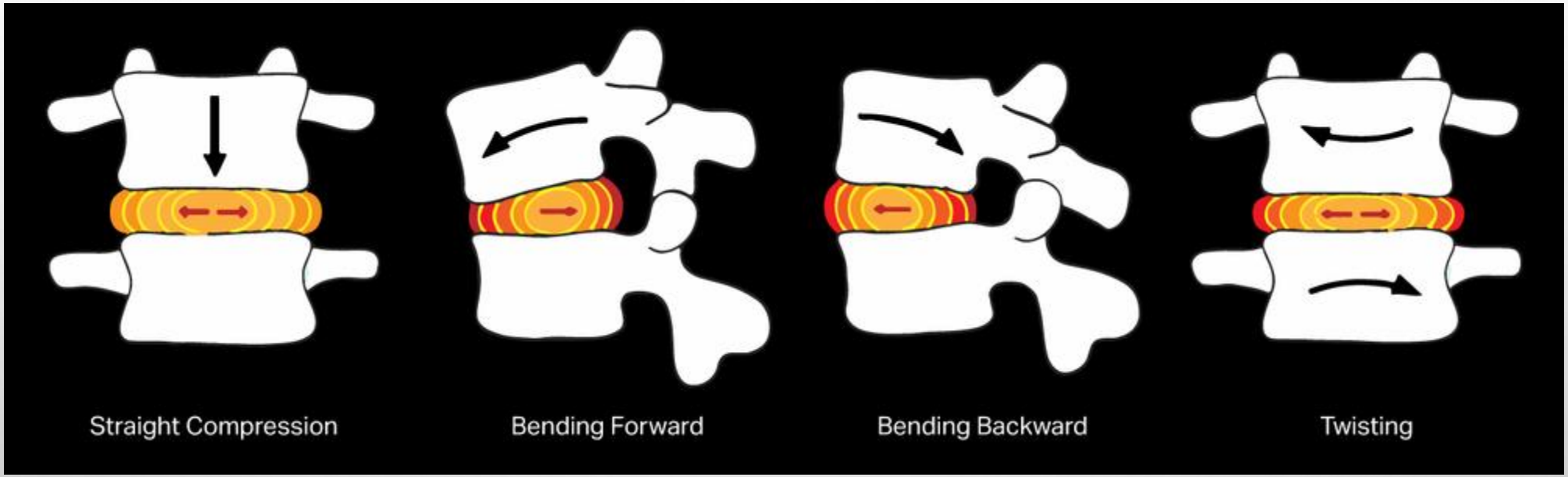


Figure 2
Intradiscal Pressure (kg)
275
250
225
200
175
150
125
100
75
50
25
0
25
75
100
150
220
140
185
275


Lying Down
(or Walking)
Healthy Nerve
Canal Space
Disc
Hydration
With Reduced
pressure the disc
gains it's fluid
content. Nutrients
can heal and
maintain disc
health
Reduced Disc
Pressure
Sitting
Reduced
Nerve Canal
Space
Disc
Dehydration
Under pressure
the disc
eliminate toxins,
debris and waste
products but
looses it's fluid &
nutrient content.
Increased
Disc Pressure


Straight Compression
Bending Forward
Bending Backward
Twisting

RISKS OF PROLONGED SITTING

- EXTENDED PERIODS OF UNINTERRUPTED SITTING CAN LEAD TO:
    - DISC BULGES, PROTRUSIONS, OR HERNIATIONS DUE TO SUSTAINED POSTERIOR PRESSURE
    - WEAKENING OF THE ANNULUS FIBROSUS (OUTER DISC LAYER) FROM REPEATED STRESS
    - INCREASED RISK OF RE-HERNIATION IN PREVIOUSLY INJURED DISCS

CASE 1 CONT'D

- IMAGING FINDINGS DEPICT A BULGING DISC WITH MILD NFN
- PT FAILS CONSERVATIVE THERAPY AND ULTIMATELY UNDERGOES INTERVENTIONAL THERAPY BY WAY OF ESI
- PT WITHIN A FEW DAYS TIME FEELS BACK TO HIS USUAL SELF

1ST SCENARIO

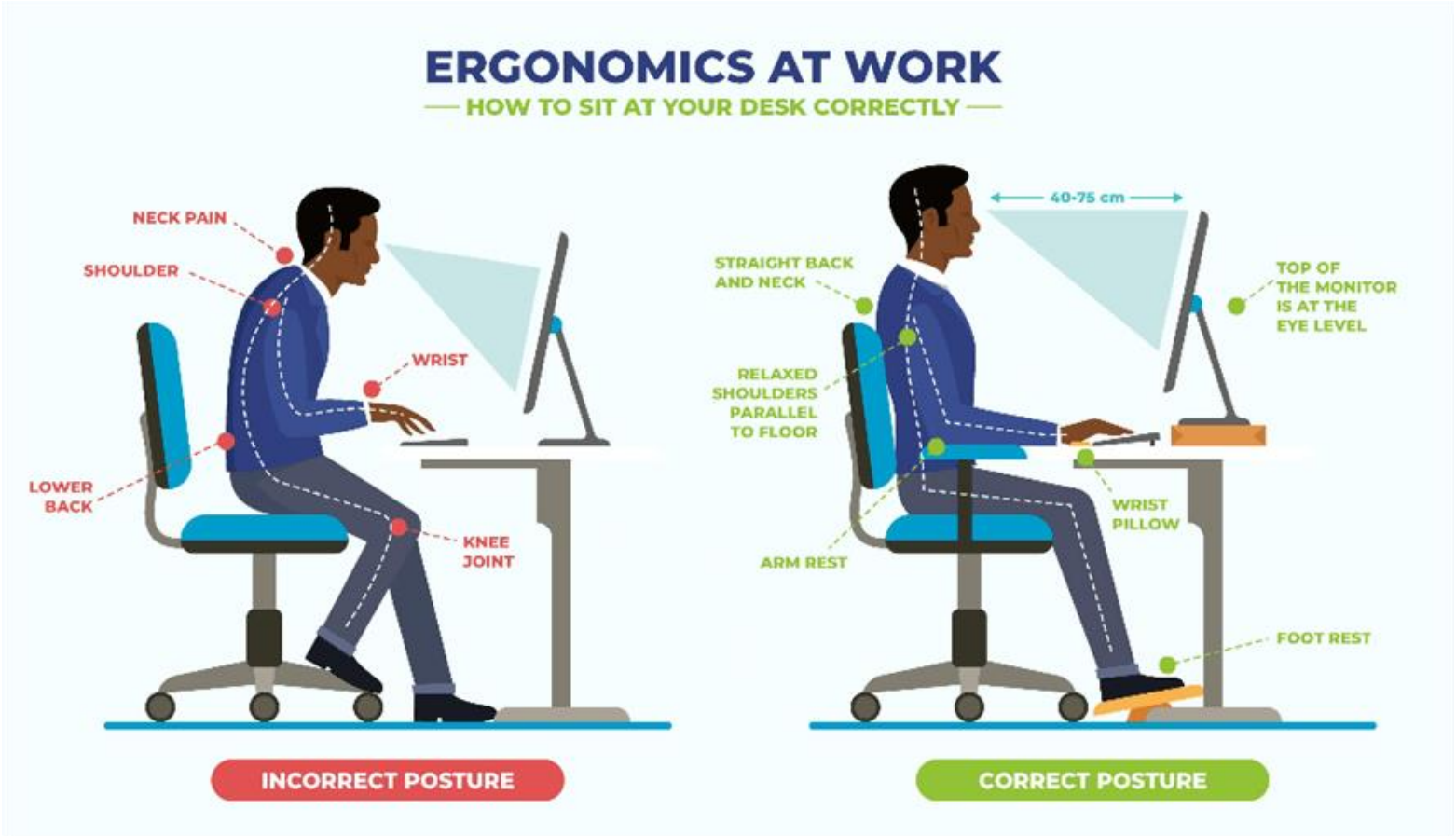
- PT RETURNS TO WORK AND WITHIN A FEW WEEKS BEGINS TO C/O SIMILAR ISSUES
- PRESENTS BACK TO PCP AND ENDORSES THAT DID WELL FOR A SHORT PERIOD OF TIME BUT ULTIMATELY INJECTION FAILED
- NEXT STEPS UNDERTAKEN → TITRATION OF MEDICATION, 2ND OPINION, SURGICAL REFERRAL VS PT GIVING UP AND STATING HE HAS TO LIVE WITH HIS PAIN

2ND SCENARIO

- PT RETURNS TO WORK AND WITHIN 6 MOS HAS RECURRENCE OF SYMPTOMS
- PT UNDERSTANDS PATHOLOGY AND NOW IS PREPARED
- HAS WORKED WITH CARE TEAM IN IDENTIFYING TRIGGERS
- HAS INSIGHT INTO PROGNOSIS AND TREATMENT
- ADHERES TO REGIMEN
  - ADAPTS/LIFESTYLE CHANGES → HEALTHIEST BMI POSSIBLE, INCLUDING ABSTAINING FROM PRO-INFLAMMATORY TRIGGERS
  - ADHERES TO BIOMECHANICAL PRINCIPLES
  - IF NECESSARY RETURNS FOR MORE TREATMENT TO DECREASE INFLAMMATION AND CONTROL PAIN WHILE MAINTAINING ADHERENCE TO REGIMEN

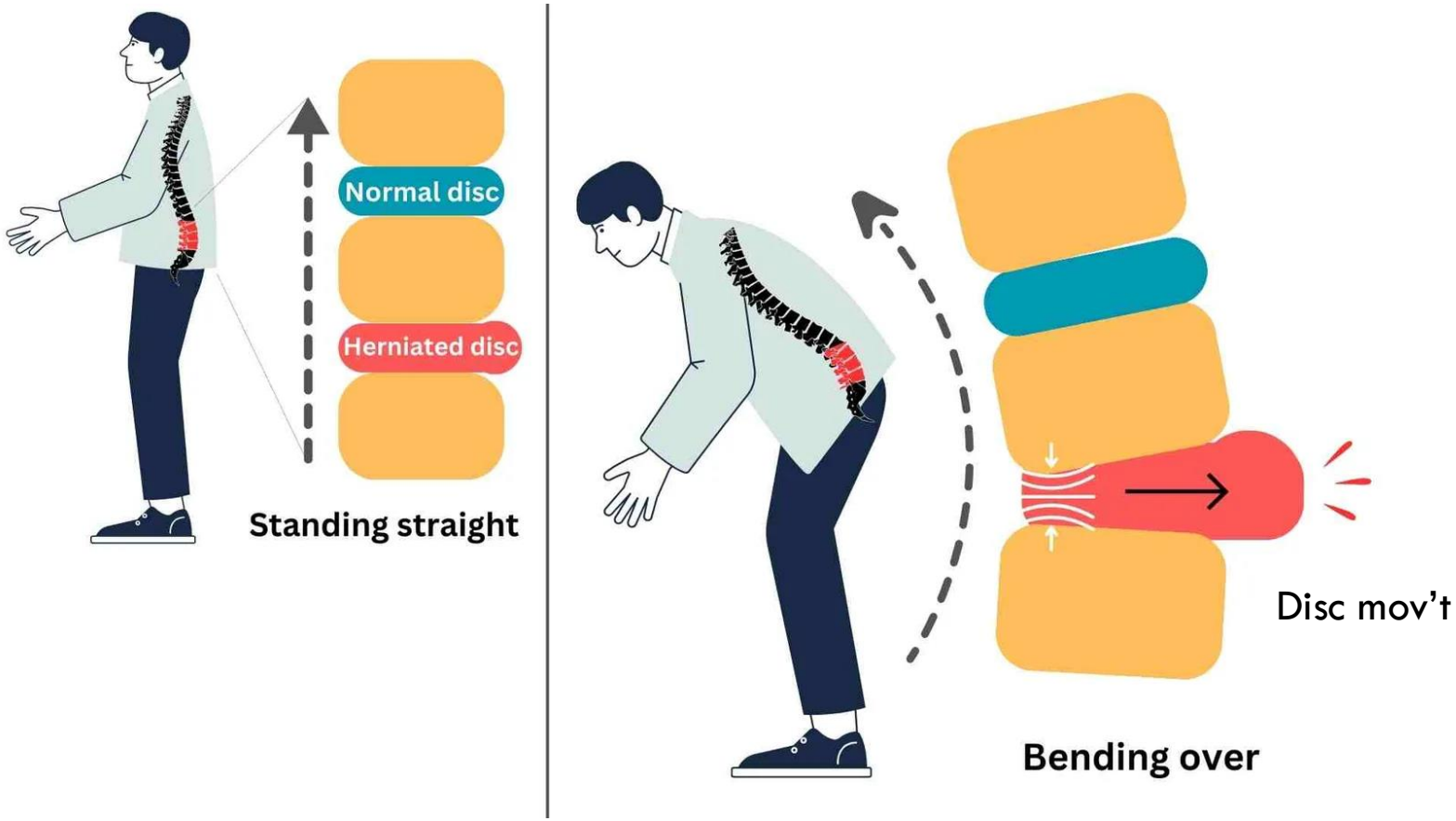
STRATEGIES TO REDUCE LUMBAR DISC PRESSURE

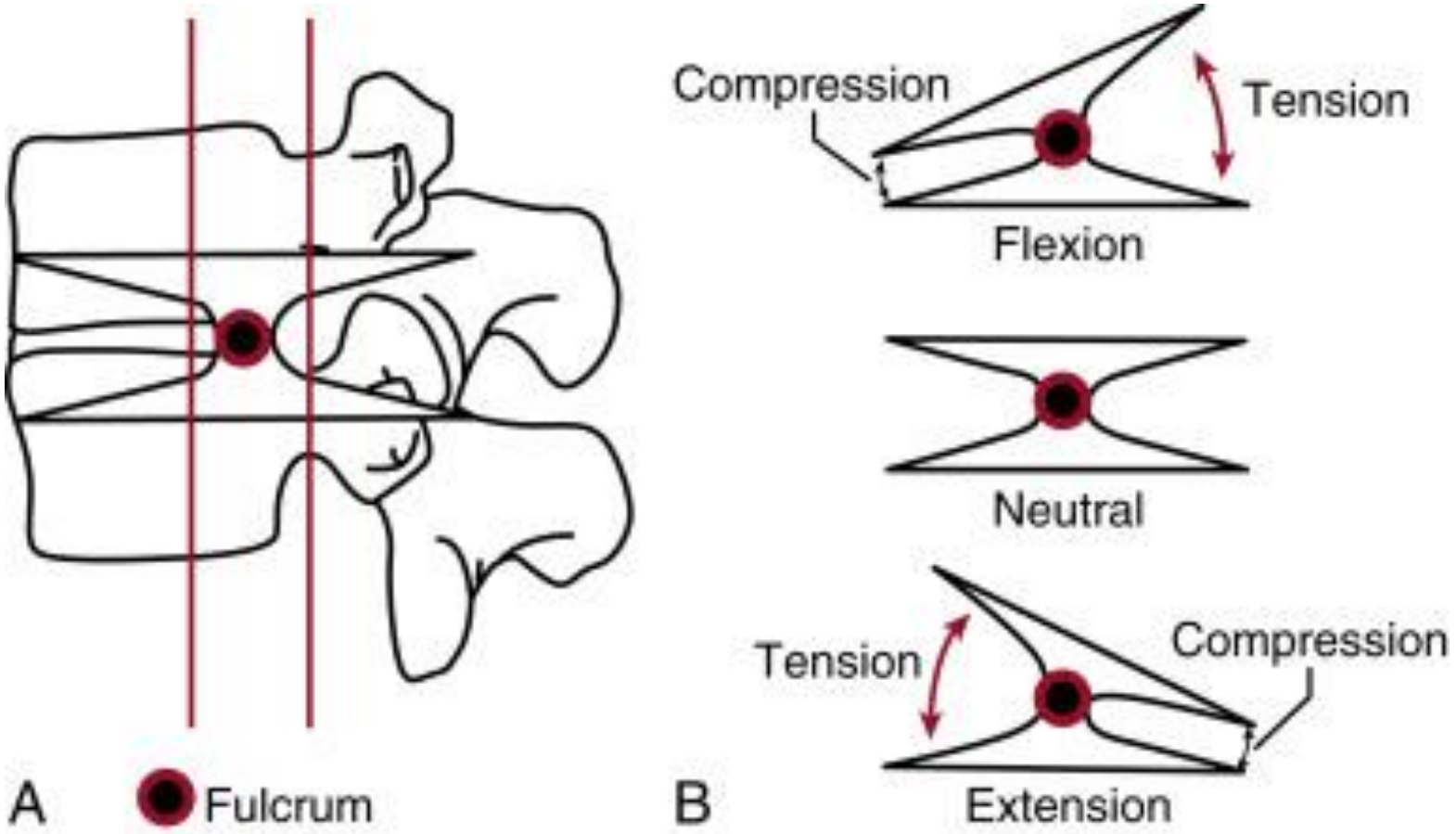
- TAKE FREQUENT BREAKS: STAND, STRETCH, OR WALK EVERY 30–60 MINUTES TO RELIEVE DISC LOAD
- USE ERGONOMIC CHAIRS: ADJUSTABLE HEIGHT, LUMBAR SUPPORT, AND BACKREST ANGLE HELP MAINTAIN PROPER ALIGNMENT
- MAINTAIN PROPER POSTURE: KEEP SHOULDERS RELAXED, FEET FLAT, HIPS SLIGHTLY HIGHER THAN KNEES, AND BACK SUPPORTED
- ALTERNATE POSITIONS: RECLINE SLIGHTLY OR USE A KNEELING CHAIR TO REDUCE PRESSURE ON THE LUMBAR DISCS
- ENGAGE CORE MUSCLES: STRENGTHENING THE CORE HELPS SUPPORT THE SPINE AND REDUCES DISC STRESS DURING SITTING
- BY **COMBINING** PROPER POSTURE, ERGONOMIC SEATING, AND REGULAR MOVEMENT, YOU CAN SIGNIFICANTLY REDUCE THE EXTRA PRESSURE SITTING PLACES ON YOUR LUMBAR DISCS AND PROTECT YOUR LOWER BACK OVER TIME

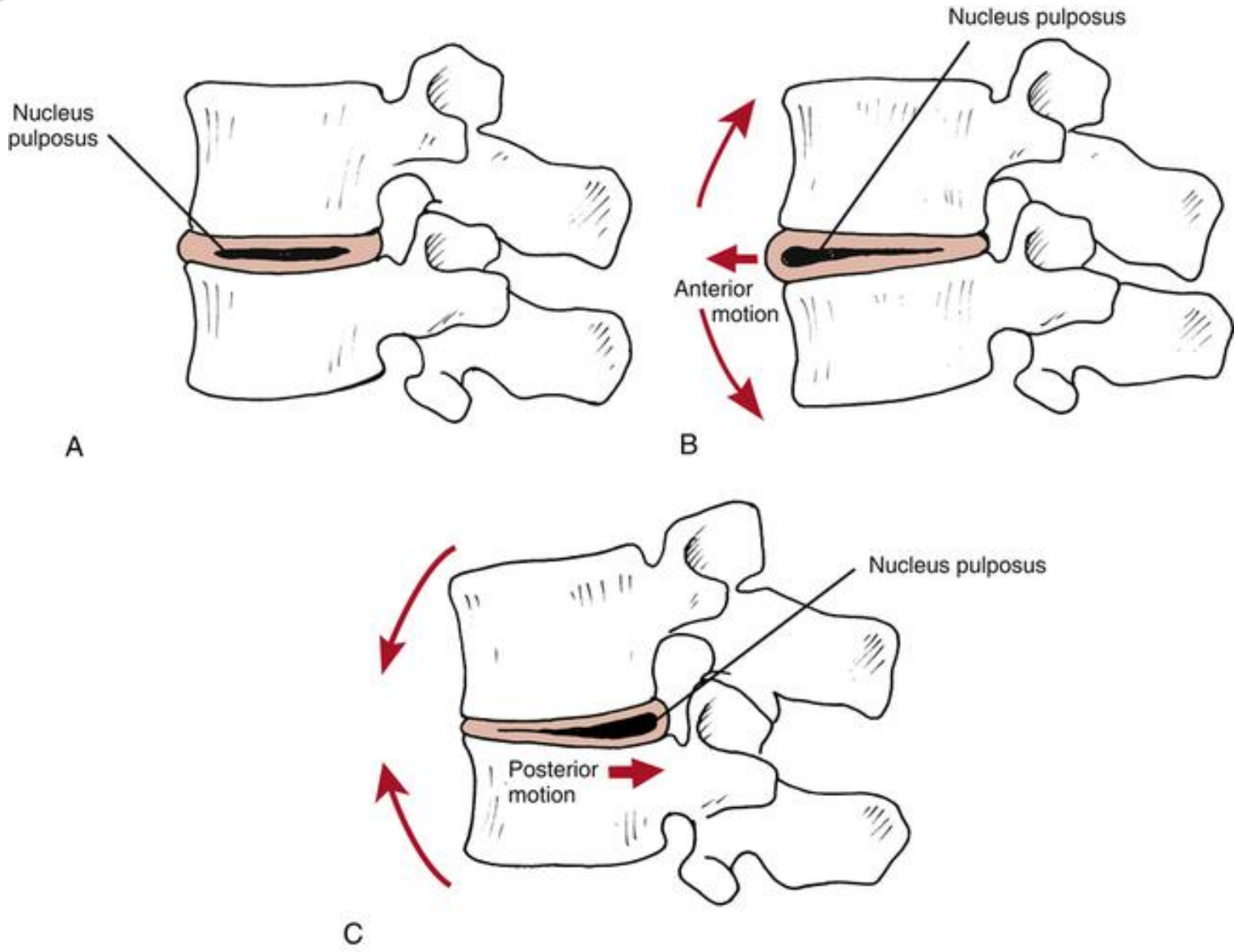

ERGONOMICS AT WORK
HOW TO SIT AT YOUR DESK CORRECTLY
NECK PAIN
SHOULDER
WRIST
LOWER BACK
KNEE JOINT
INCORRECT POSTURE
40-75 cm
STRAIGHT BACK AND NECK
TOP OF THE MONITOR IS AT THE EYE LEVEL
RELAXED SHOULDERS PARALLEL TO FLOOR
WRIST PILLOW
ARM REST
FOOT REST
CORRECT POSTURE

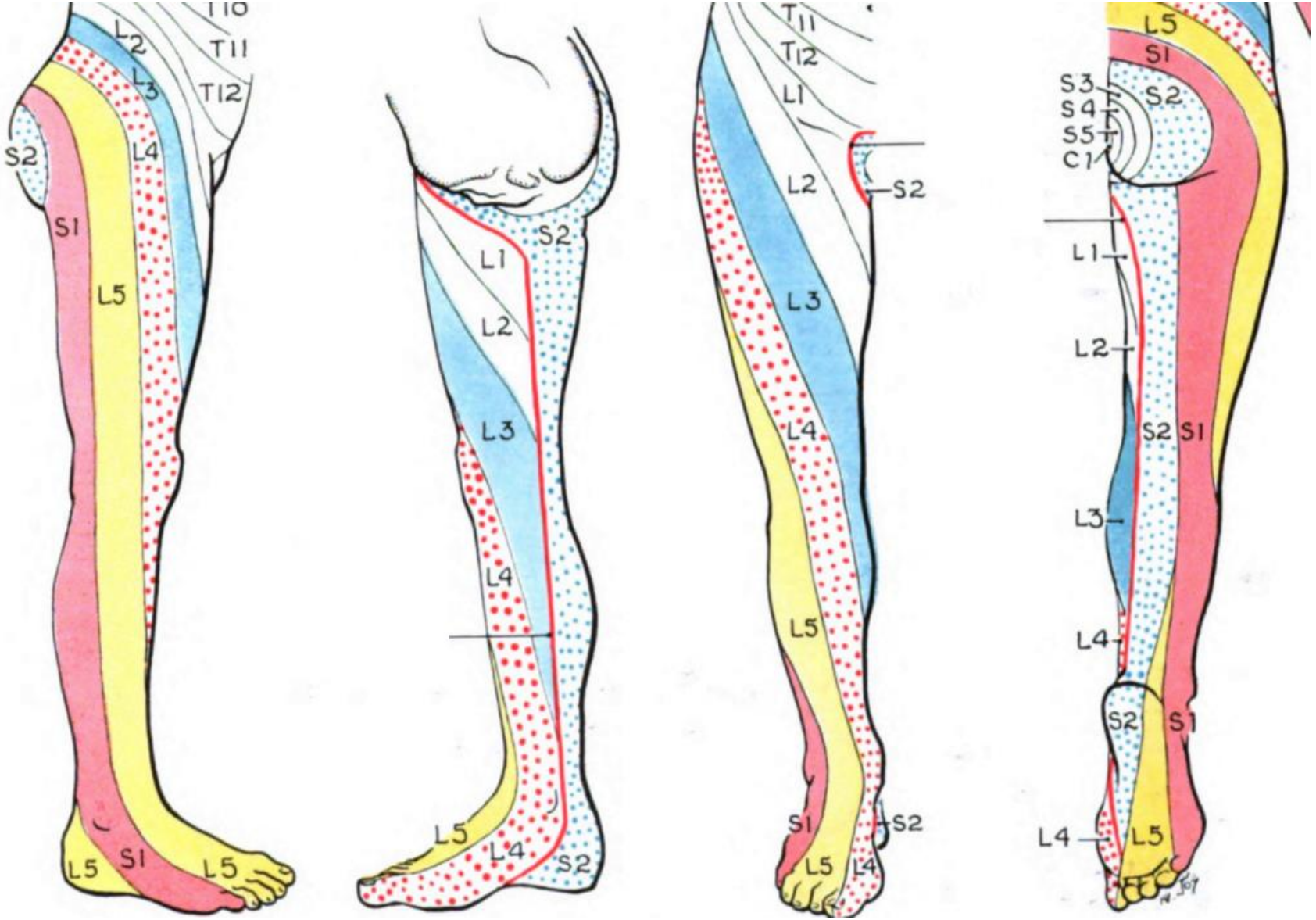
CASE 2

- 34 YO M W/ UNREMARKABLE PMH PRESENTS W/ 4 MOS DURATION OF LBP W/ L LE RADICULAR SYMPTOMS THAT BEGAN AFTER HELPING HIS FRIEND MOVE. PT DESCRIBES A BURNING/ELECTRICAL LIKE PAIN W/ ENDORSEMENT OF FOOT NUMBNESS ON TOP OF FOOT TO BIG TOE. PT DENIES PREVIOUS SYMPTOMATOLOGY, DENIES SADDLE ANESTHESIA AND/OR BOWEL/BLADDER INCONTINENCE.


Normal disc
Herniated disc
Standing straight
Disc mov't
Bending over


A
Fulcrum
B
Compression
Tension
Flexion
Neutral
Tension
Compression
Extension


Nucleus
pulposus
A
Nucleus pulposus
Anterior
motion
B
Nucleus pulposus
Posterior
motion
C


T10
L2
T11
L3
T12
S2
L4
S1
L5
L5
S1
L5
L1
L2
L3
L4
L5
S2
S2
T11
T12
L1
L2
S2
L3
L4
L5
S1
S2
L5
S1
S3
S4
S5
C1
S2
L1
L2
S2
S1
L3
L4
S2
S1
L4
L5

WORK UP

- HX:
  - SUDDEN AXIAL LOADING LIKELY IN NON OPTIMAL PLANE →LEG PAIN IN DERMATOMAL DISTRIBUTION, PARASTHESIA

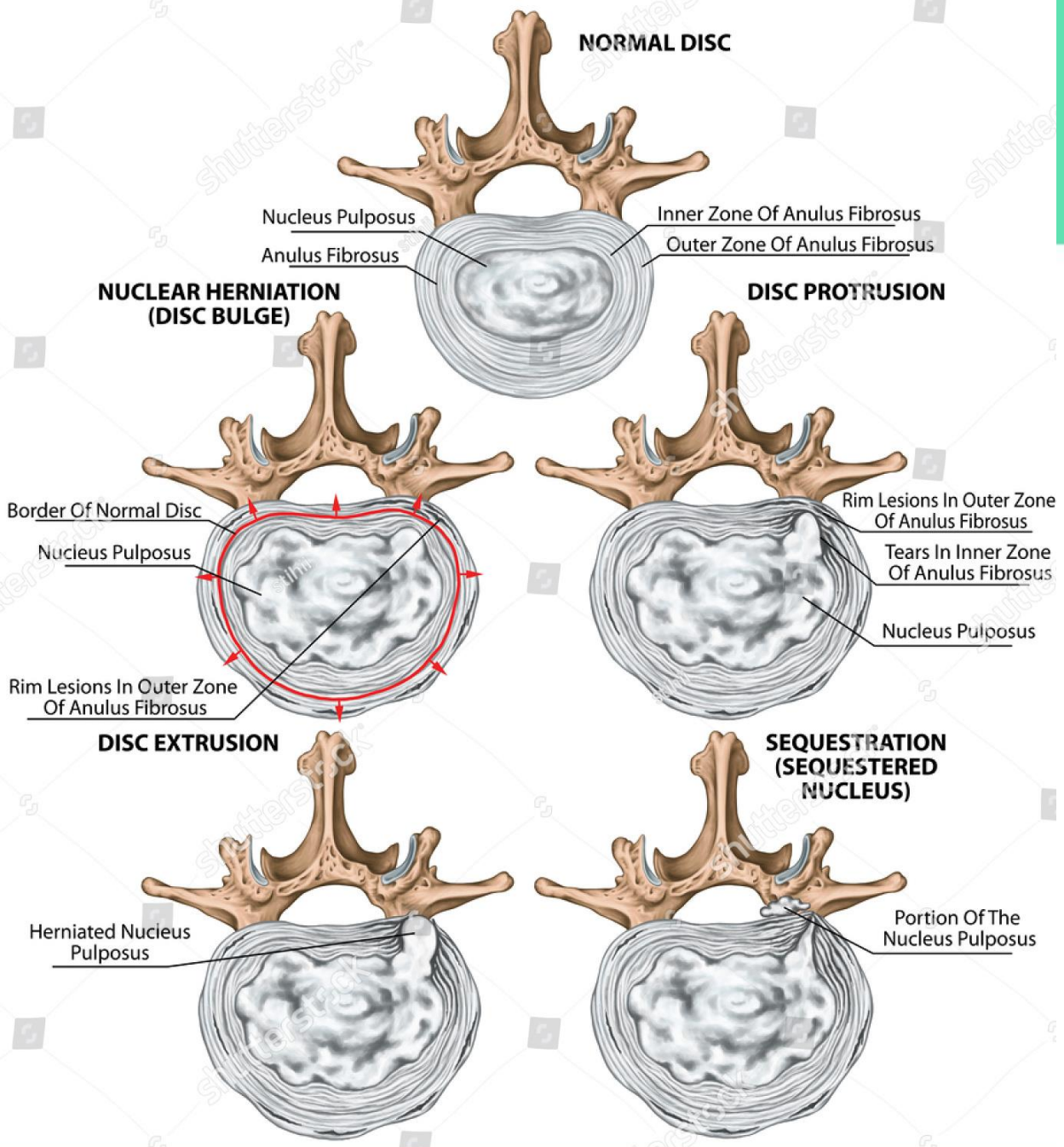
- OBJECTIVE
  - PRESENTATION (PT MAY NOT BE ABLE TO FIND COMFORTABLE POSITION TO SIT, ALTERNATES BTW STANDING/SITTING, DIFFICULTY PLACING LE IN EXPECTED POSITION → SLAPPING OF THE LIMB..) FAVORING AFFECTED LIMB

- PE
  - PAIN W/ LUMBAR FLEXION
  - +VE ROOT TENSION TEST (UPPER LE → FEMORAL STRETCH TEST VS. LOWER LE → SLR)
  - PARASTHESIA
  - DTR ABNORMALITY (USUALLY LOWER MOTOR NEURON INVOLVEMENT – DEPRESSED)

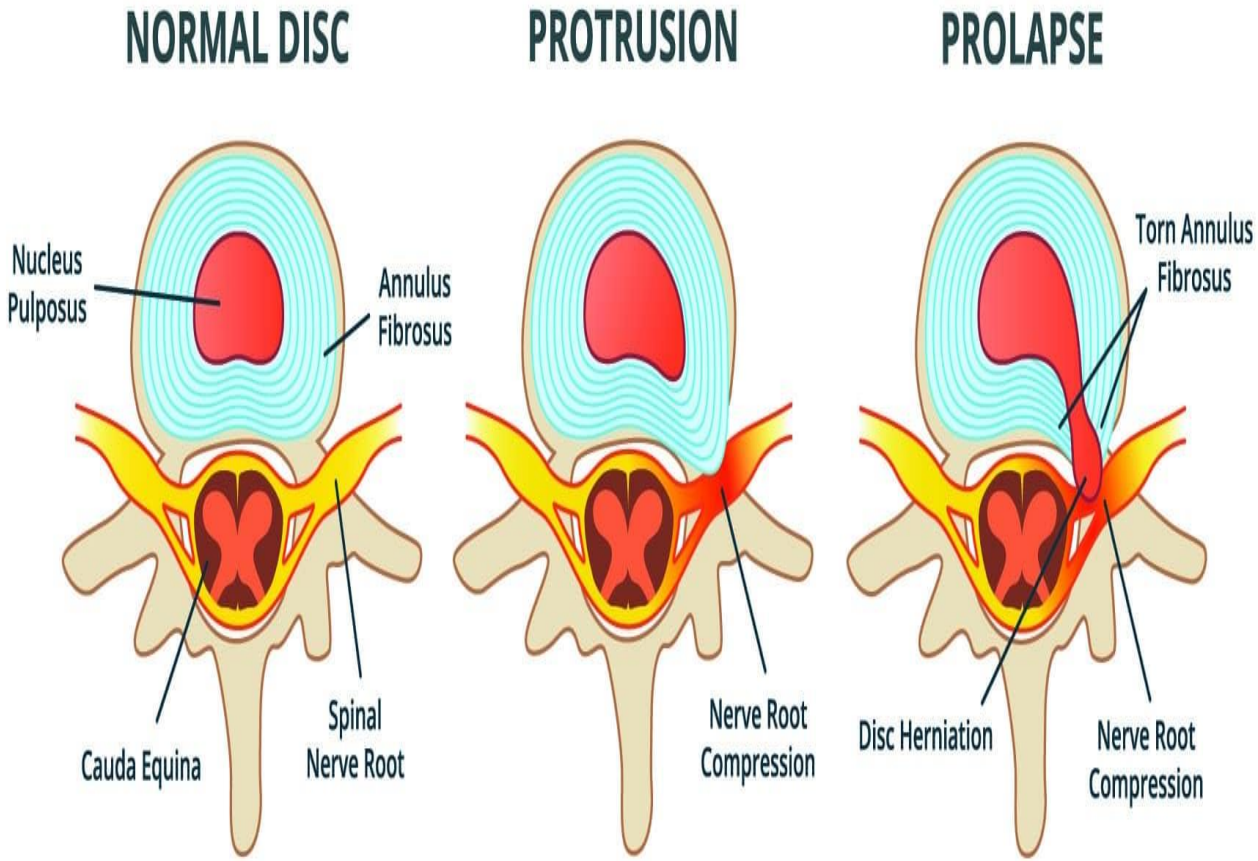
WORK UP/TREATMENT

- INITIATE TREATMENT: ANALGESICS, MEMBRANE STABILIZERS, PT, CHIRO ETC.

- OBJECTIVE 'PROOF' → IMAGING (BASIC/**ADVANCED**) → CT/MRI
  - IMAGING FINDINGS : PROTRUDED DISC TO LEFT @ L4/5 LEVEL



Stages of Disc Herniation



OBJECTIVES

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- MAINTENANCE

- **UNDERSTANDING PATHOLOGY**
  - FOR THE PROVIDER
    - IS THIS 2/2 A MECHANICAL MOV'T OF THE DISC/IS THIS PERSISTENT IRRITATION/COMPRESSION OF SPINAL NERVES/IS THIS A STRESS INDUCED INSULT TO THE DISC ITSELF
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- **MAINTENANCE**
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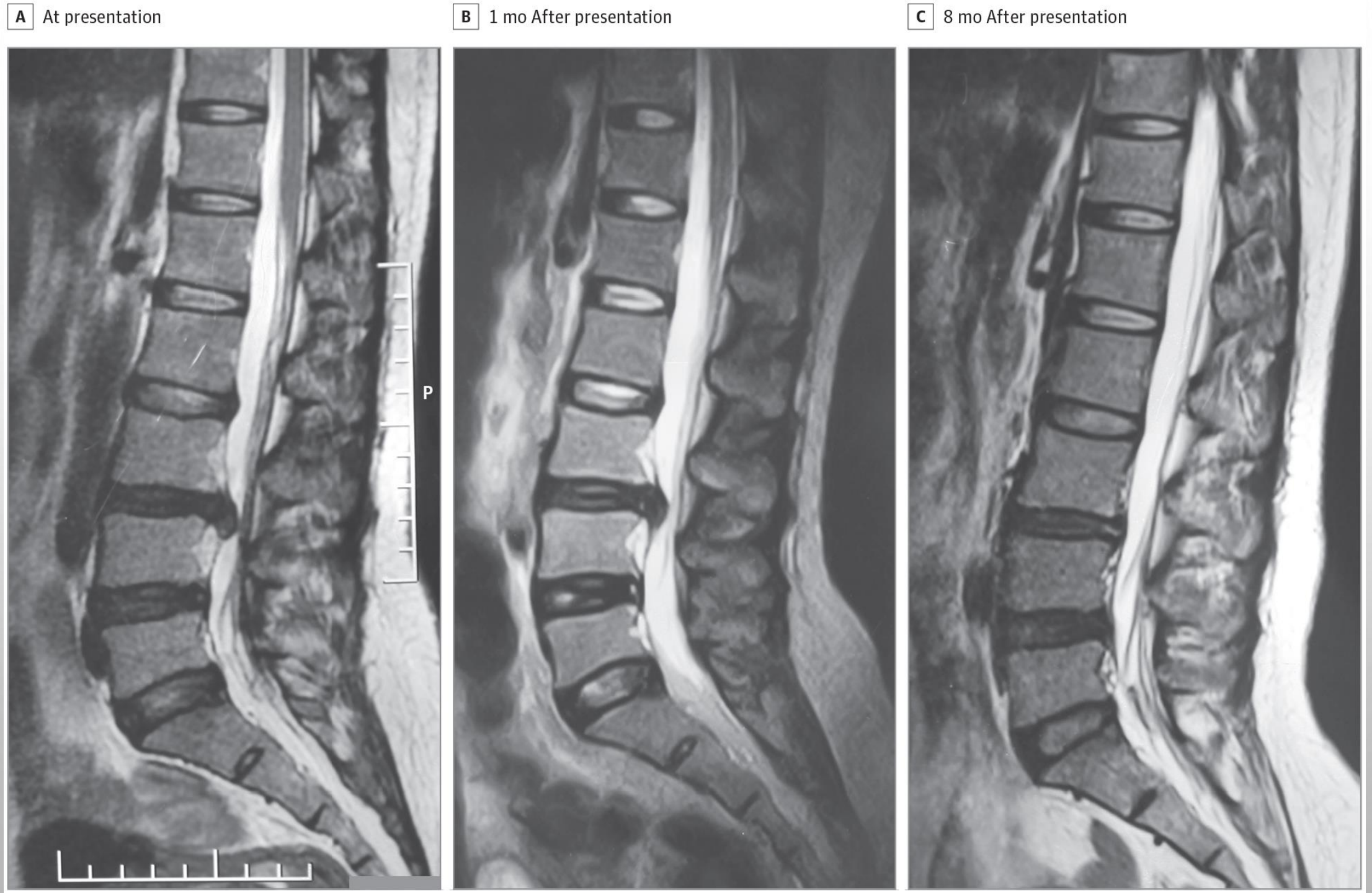
  - IF PAIN RECURS WHAT THEN

TREATMENT

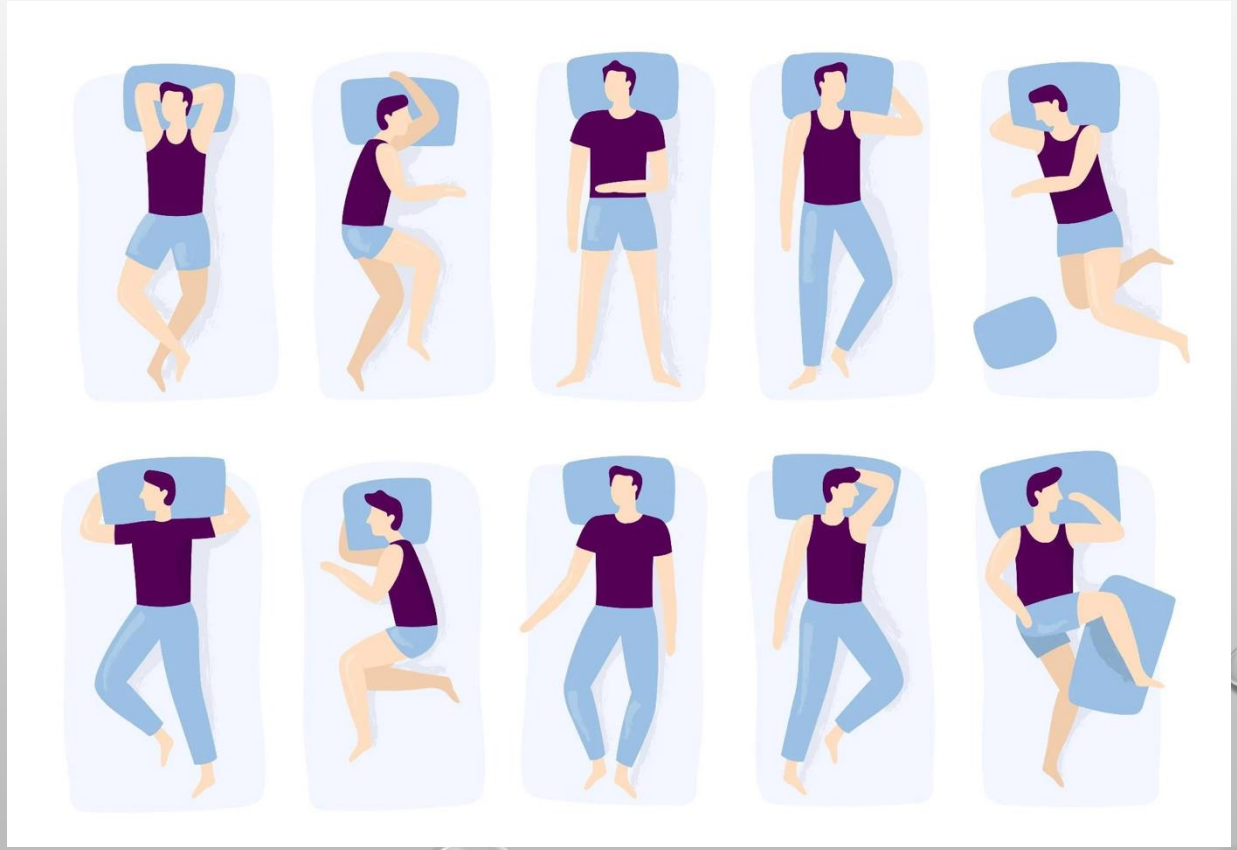
- PT UNDERGOES A SERIES OF ESI'S @ TARGET LEVEL AND IMPROVES >80% ON NRS, IS ABLE TO SLEEP AND FUNCTION
- AT F/U VISIT TO GO OVER IMAGING RESULTS DISCUSSED, PT EDUCATED ON PATHOLOGY W/ TREATMENT PLAN EXTRAPOLATED OVER THE LONG TERM

TREATMENT PLAN

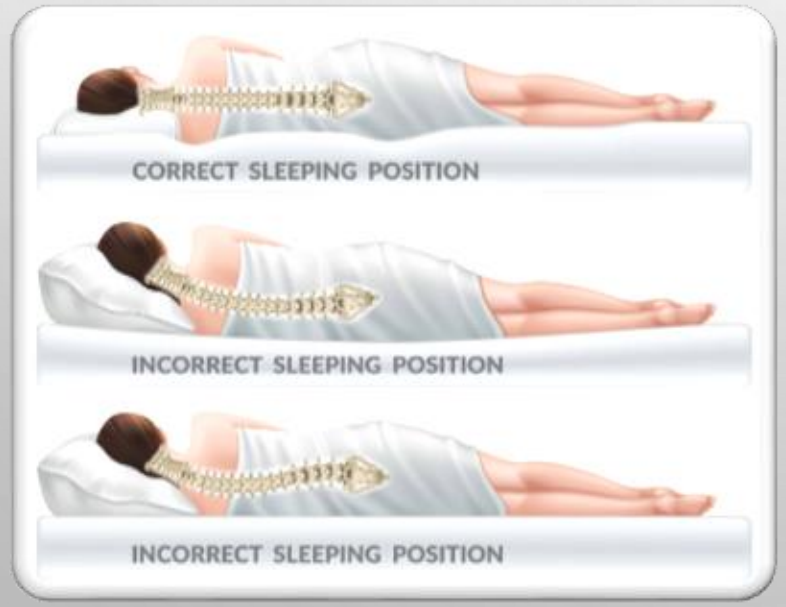
- PT VERBALIZED UNDERSTANDING THAT AXIAL LOADING W/ TRUNCAL FLEXION WILL REPRODUCE SYMPTOMS
- PT ADHERED TO STRATEGY OF EXTENSION EXERCISE TO MOBILIZE DISC BACK INTO ALIGNMENT
- PT MAXIMIZED STANDING AND LAYING DOWN SUPINE/PRONE WHILE MINIMIZING SITTING
- PT STARTED A SWIMMING PROGRAM AND ADHERED TO A HEALTHY DIET AND MAINTAINED A HEALTHY BODY WEIGHT RESULTING IN LONG LASTING IMPROVEMENT

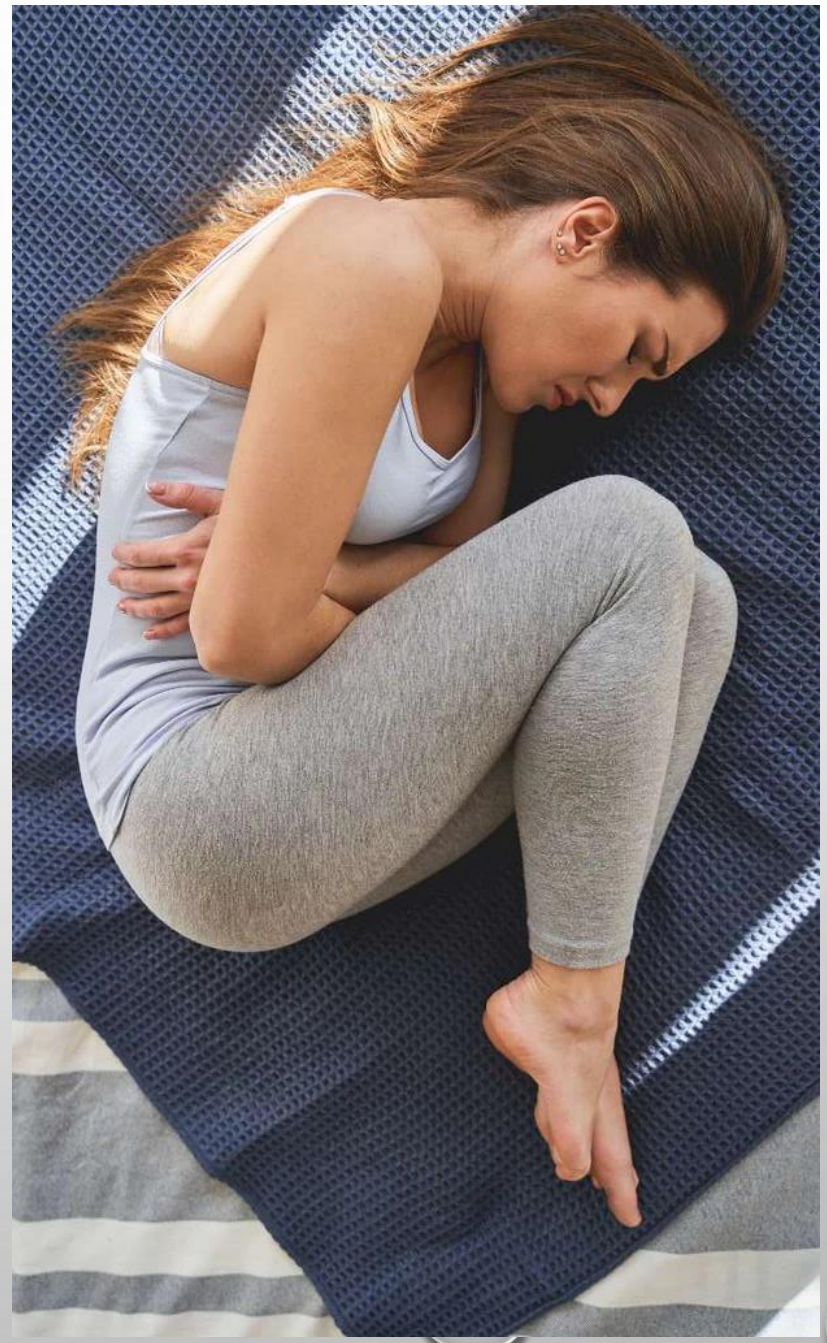

A At presentation
B 1 mo After presentation
C 8 mo After presentation
P

*** SLEEPING POSITION ***




THE MOST POPULAR SLEEPING POSITIONS
Starfish
Yearner
Foetus
Freefaller
5%
13%
41%
7%


CORRECT SLEEPING POSITION
INCORRECT SLEEPING POSITION
INCORRECT SLEEPING POSITION



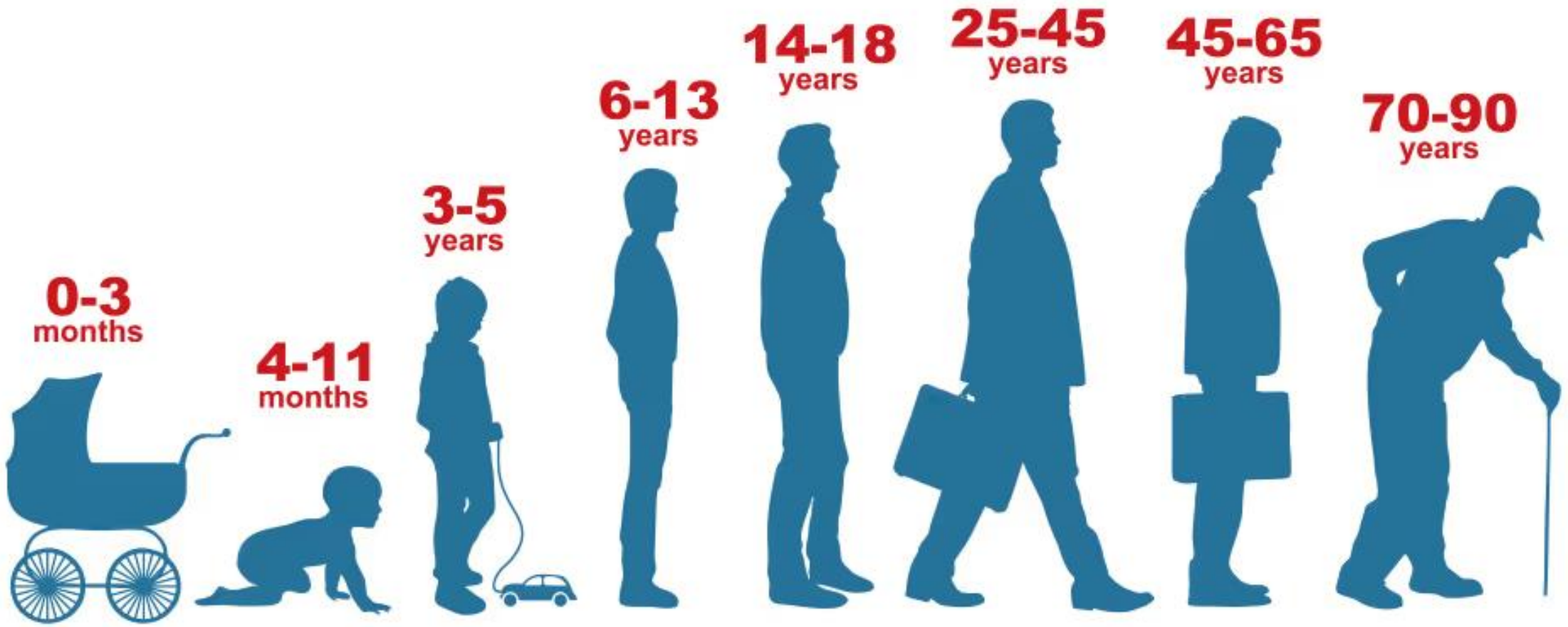
CASE 3

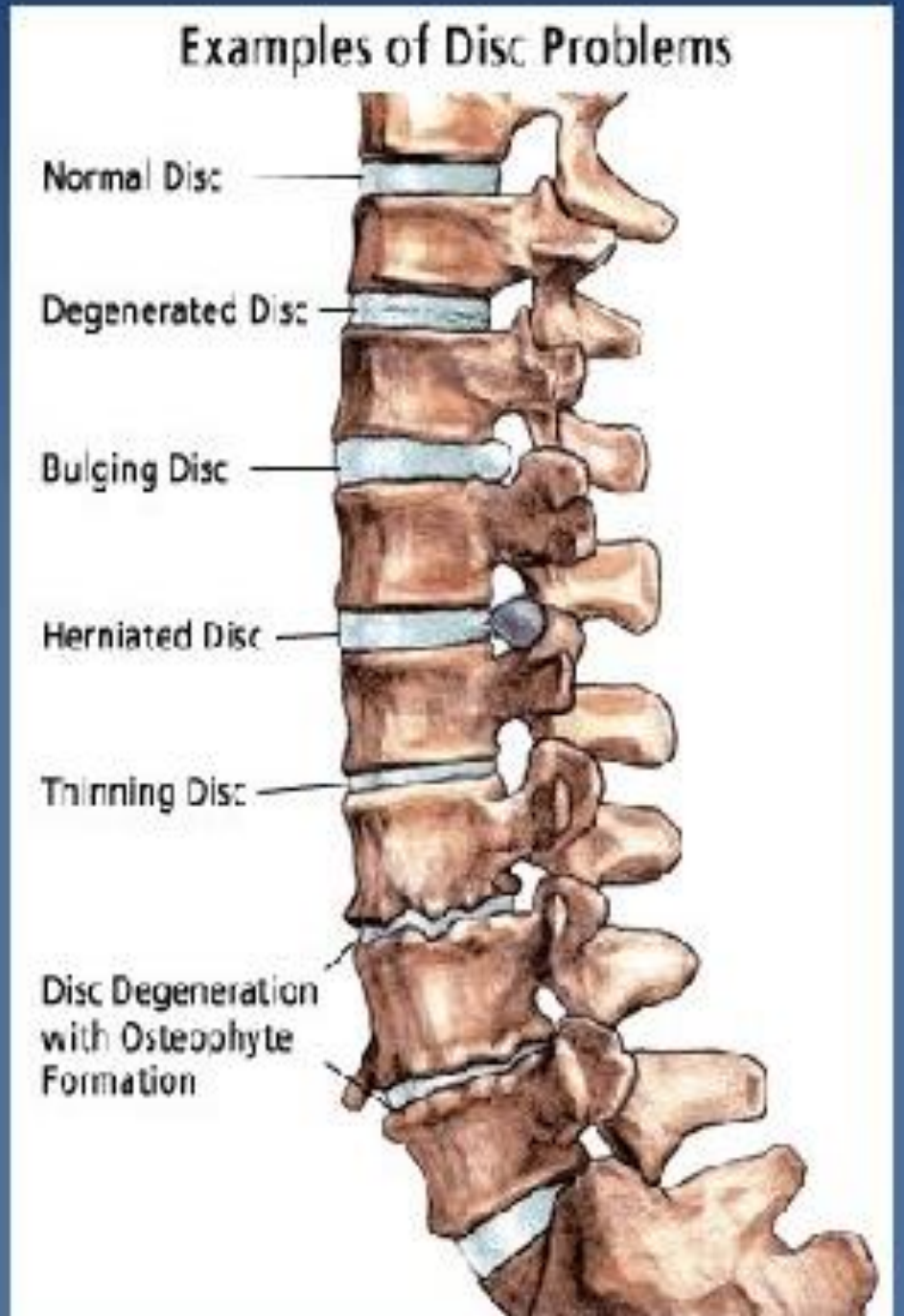
- 73 YO M W/ MULTIPLE MEDICAL PROBLEMS PRESENTS W/ 30 YEAR DURATION OF PROGRESSIVELY WORSENING LBP W/O RADICULOPATHY OR LEG WEAKNESS. PT STATES THAT PAIN IS ALWAYS PRESENT WITH A WAXING AND WANING DULL/ACHY SENSATION AGGRAVATED BY WEIGHT BEARING AND RELIEVED SOMEWHAT W/ OTC NSAID'S. NSAID'S HAVE BEEN DISCONTINUED AS PT WAS TREATED FOR RECURRING STOMACH ULCER. BASIC IMAGING DEPICTS MULTILEVEL DDD W/ MODERATE TO SEVERE FACET ARTHROPATHY.

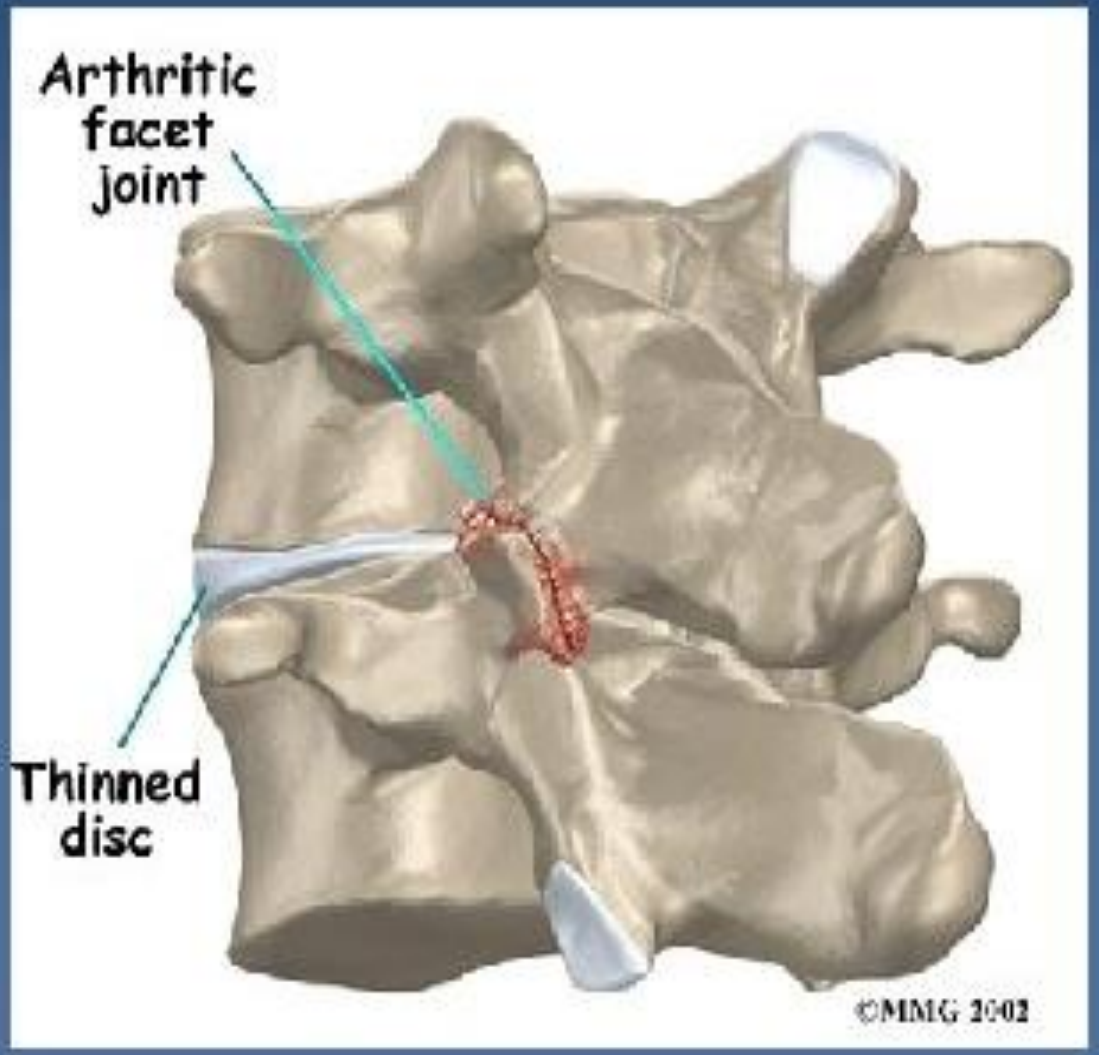
- IMPORTANT TO NOTE THAT WHILE PREVIOUS PATHOLOGIES CAN POTENTIALLY BE RESOLVED W/ APPROPRIATE TREATMENT, SPONDYLOARTHROPATHY IS AN INSIDIOUS PROGRESSIVELY WORSENING CONDITION THAT CAN BE MANAGED BUT NOT ERADICATED

DDD

- MANIFESTATION OF INABILITY TO COUNTERACT GRAVITY
- CONSTANT DOWNFORCES PLACED ON HUMAN BODY SLOWLY ERODE DISCS
- DISCS LOSE WATER AND PROTEIN CONTENT
- THIS PROVIDES FOR LESSER ‘SHOCK ABSORPTIVE’ FUNCTION
- DISC DEGENERATION CAN INCREASE STRESS ON FACET JOINTS
- IS ONE OF THE FACTORS THAT LEAD TO DECREASED HEIGHT OVER TIME


0-3
months
4-11
months
3-5
years
6-13
years
14-18
years
25-45
years
45-65
years
70-90
years


Examples of Disc Problems
Normal Disc
Degenerated Disc
Bulging Disc
Herniated Disc
Thinning Disc
Disc Degeneration with Osteophyte Formation

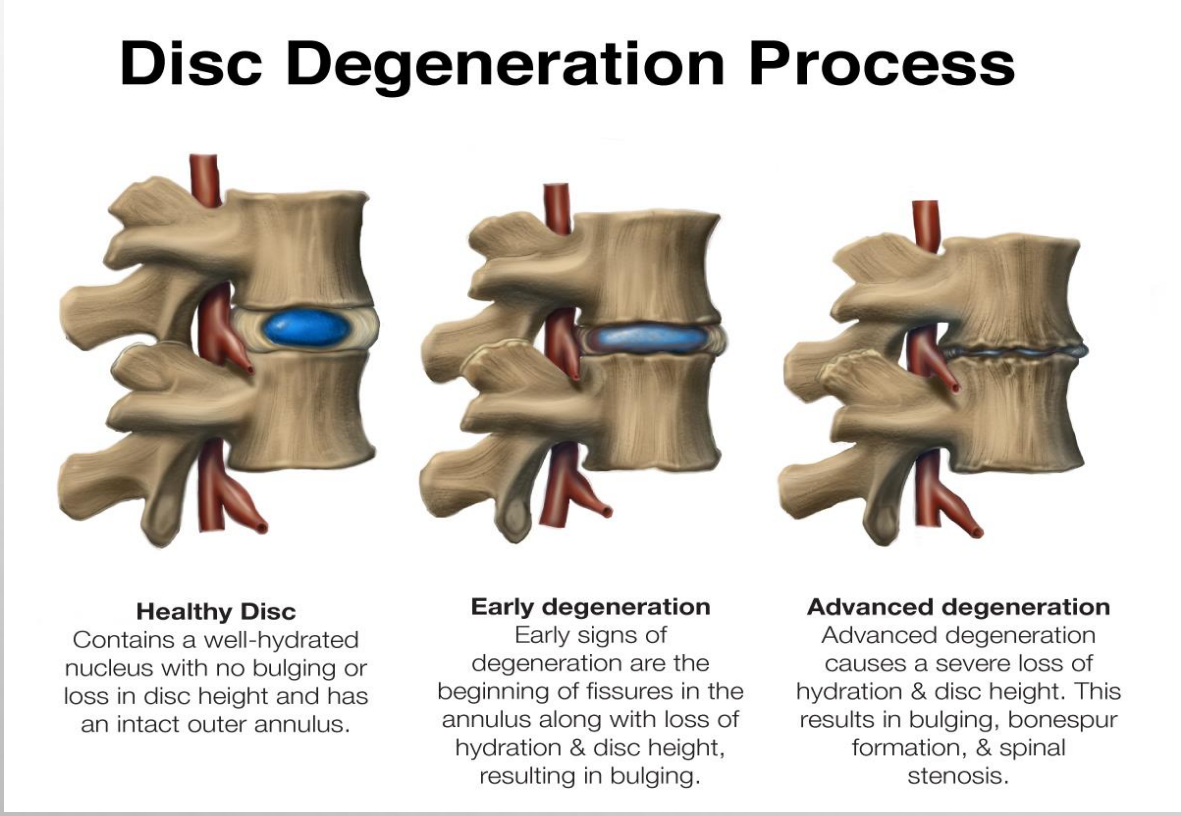

Arthritic facet joint
Thinned disc
©MMG 2002

WORK UP

- HIGHLIGHTS OF INTERVIEW:
  - WEIGHTBEARING PAIN, AM>PM, BETTER W/ AMBULATION, NO RED FLAGS

- OBJECTIVE
  - PRESENTATION (PREFERS SLIGHTLY FORWARD POSTURE), SLOW TO MOVE FROW SITTING TO STANDING/LAYING TO SITTING, USES UE TO HELP FROM SITTING TO STANDING, DIFFICULTY W/ LUMBAR EXTENSION, WITHOUT LE SYMPTOMS
- PE
  - PAIN W/ LUMBAR EXTENSION OR PAIN W/ RETURNING TO UPRIGHT POS FROM BENT OVER START
  - FACET LOADING → APPROXIMATION AND 'GRINDING' OF FACETS
  - PAIN ELICITED ON PARASPINAL MUSCULATURE

FACET ARTHROPATHY



OBJECTIVES

- UNDERSTANDING PATHOLOGY
- APPLICATION
- MAINTENANCE

- **UNDERSTANDING PATHOLOGY**
  - FOR THE PROVIDER
    - PATHOLOGY 2/2 DETERIORATION OF THE DISC, BONE TO BONE APPROXIMATION VIA FACET JOINTS CREATING PAIN W/ AXIAL LOADING
  - FOR THE PATIENT
    - DOES THE PATIENT UNDERSTAND THE CULPRIT OF HIS PAIN/PROGNOSIS AND ULTIMATE OUTCOME
- **APPLICATION**
  - ONCE TREATMENT ENSUES – WILL PT BE CURED LIKE THE COMMON COLD OR WILL PT HAVE PERSISTENT OR ON/OFF SYMPTOMS
  - ARE THERE THINGS TO LOOK OUT FOR AND TREATMENT MODALITIES THAT PATIENT SHOULD BE ADHERING TO
- **MAINTENANCE**
  - DOES THE PATIENT REQUIRE PERSISTENT STRATEGIES IN DEALING WITH PAIN
  - IF PAIN RECURS WHAT THEN

- **DEGENERATIVE DISC DISEASE (DDD)**

  - OCCURS WHEN INTERVERTEBRAL DISCS IN THE SPINE BEGIN TO DETERIORATE, LOSING HEIGHT AND FLEXIBILITY.
  - ALTHOUGH CALLED A "DISEASE" → IT IS A NATURAL PART OF AGING AND NOT EVERYONE WITH DISC DEGENERATION EXPERIENCES PAIN
  - THE CONDITION MOST OFTEN AFFECTS THE LUMBAR AND CERVICAL REGIONS, DUE TO BEING THE MOST MOBILE PARTS OF THE SPINE

CAUSES AND RISK FACTORS

- DISC DEGENERATION CAN RESULT FROM A COMBINATION OF FACTORS:
  - *AGING*: DISCS NATURALLY LOSE WATER AND PROTEIN CONTENT RESULTING IN DECREASED ELASTICITY OVER TIME
  - *INJURY OR TRAUMA*: PREVIOUS SPINAL INJURIES CAN ACCELERATE DISC WEAR
  - *REPETITIVE STRAIN*: HEAVY LIFTING, BENDING OR TWISTING INCREASE STRESS ON DISCS
  - *GENETICS*: FAMILY HISTORY OF SPINE PROBLEMS MAY INCREASE SUSCEPTIBILITY
  - *LIFESTYLE FACTORS*: SMOKING, OBESITY, AND SEDENTARY HABITS CAN CONTRIBUTE TO DISC DEGENERATION

SYMPTOMS

- LOCALIZED PAIN IN AFFECTED REGION, RANGING FROM MILD TO SEVERE
- STIFFNESS AND REDUCED FLEXIBILITY, ESPECIALLY AFTER SITTING, BENDING, OR LIFTING → TRANSITIONAL MOVEMENTS
- PAIN THAT COMES AND GOES, OFTEN WORSENING WITH ACTIVITY AND IMPROVING WITH REST

TREATMENT

- CONSERVATIVE MANAGEMENT: PT, ICE/HEAT, ACTIVITY MODIFICATION, STRETCHING, AND EXERCISE TO STRENGTHEN SUPPORTING MUSCLES
- MEDICATIONS: OTC'S →ACETAMINOPHEN OR NSAIDS FOR INFLAMMATION AND DISCOMFORT
- LIFESTYLE MODIFICATIONS: WEIGHT MANAGEMENT, QUITTING SMOKING, AND ERGONOMIC ADJUSTMENTS
- INTERVENTIONAL PROCEDURES: STEROID INJECTIONS, ABLATIONS OR MINIMALLY INVASIVE PROCEDURES
- SURGERY: RESERVED FOR PERSISTENT PAIN OR SIGNIFICANT NERVE COMPRESSION, OPTIONS INCLUDE SPINAL FUSION OR DISC REPLACEMENT

SCENARIO

- PT RETURNS TO WORK AFTER SUCCESSFUL ABLATION
- PT MAINTAINS DURABILITY OF PROCEDURE FOR 1.5 YRS AND THEN SUFFERS RECURRENCE OF SYMPTOMS
- PT UNDERSTANDS PATHOLOGY AND NOW IS PREPARED
- HAS WORKED WITH CARE TEAM IN IDENTIFYING TRIGGERS
- HAS INSIGHT INTO PROGNOSIS AND TREATMENT
- ADHERES TO REGIMEN
  - ADAPTS/LIFESTYLE CHANGES → HEALTHIEST BMI POSSIBLE, INCLUDING ABSTAINING FROM PRO-INFLAMMATORY TRIGGERS
  - AQUA-THERAPY
  - ADHERES TO LOW IMPACT EXERCISES
  - RETURNS FOR MORE TREATMENT TO DECREASE INFLAMMATION AND CONTROL PAIN WHILE MAINTAINING ADHERENCE TO REGIMEN

OBJECTIVES

UNDERSTANDING PATHOLOGY

APPLICATION

MAINTENANCE

Understanding pathology

- Provider
  - Disc degeneration/mechanical mov't of the disc/is this persistent irritation/compression of spinal nerves/is this a stress induced insult to the disc itself
- For the patient
  - Does the patient understand the culprit of his pain/prognosis, treatment options and potential outcome

Application

- Once treatment ensues – will pt be cured like the common cold or will pt have persistent or on/off symptoms vs persistent symptoms that can be controlled/managed
- Are there things to look out for and treatment modalities that patient should be adhering to

Maintenance

- 'Continued Application'
- Does the patient require persistent strategies in dealing with pain
- If pain recurs – is there a fallback plan/cycling of therapy

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