

Neck pathologies



Original Research

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Clinical Practice Guideline for Physical Therapy Assessment and Treatment in Patients With Nonspecific Neck Pain

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Learning goals

- ✓ Specific neck pain vs nonspecific neck pain vs WAD
- ✓ Most common pathologies fall under nonspecific neck pain
- ✓ Prognosis & treatment
 - ✓ Good natural history
 - ✓ Address psychosocial factors
 - ✓ Exercise
 - ✓ Manual therapy



Learning goals

- ✔ **Specific neck pain vs nonspecific neck pain vs WAD**

Specific vs Nonspecific neck pain vs WAD

- ✓ Specific neck pain is from fracture, vertebral artery dissection, spinal cord injury, cancer, infection or systemic disease
- ✓ Nonspecific neck pain is from disk bulge, degeneration, spondylosis & all other causes
- ✓ Radicular pain is usually nonspecific
- ✓ WAD (whiplash associated disorder) is from rapid deceleration of the head.



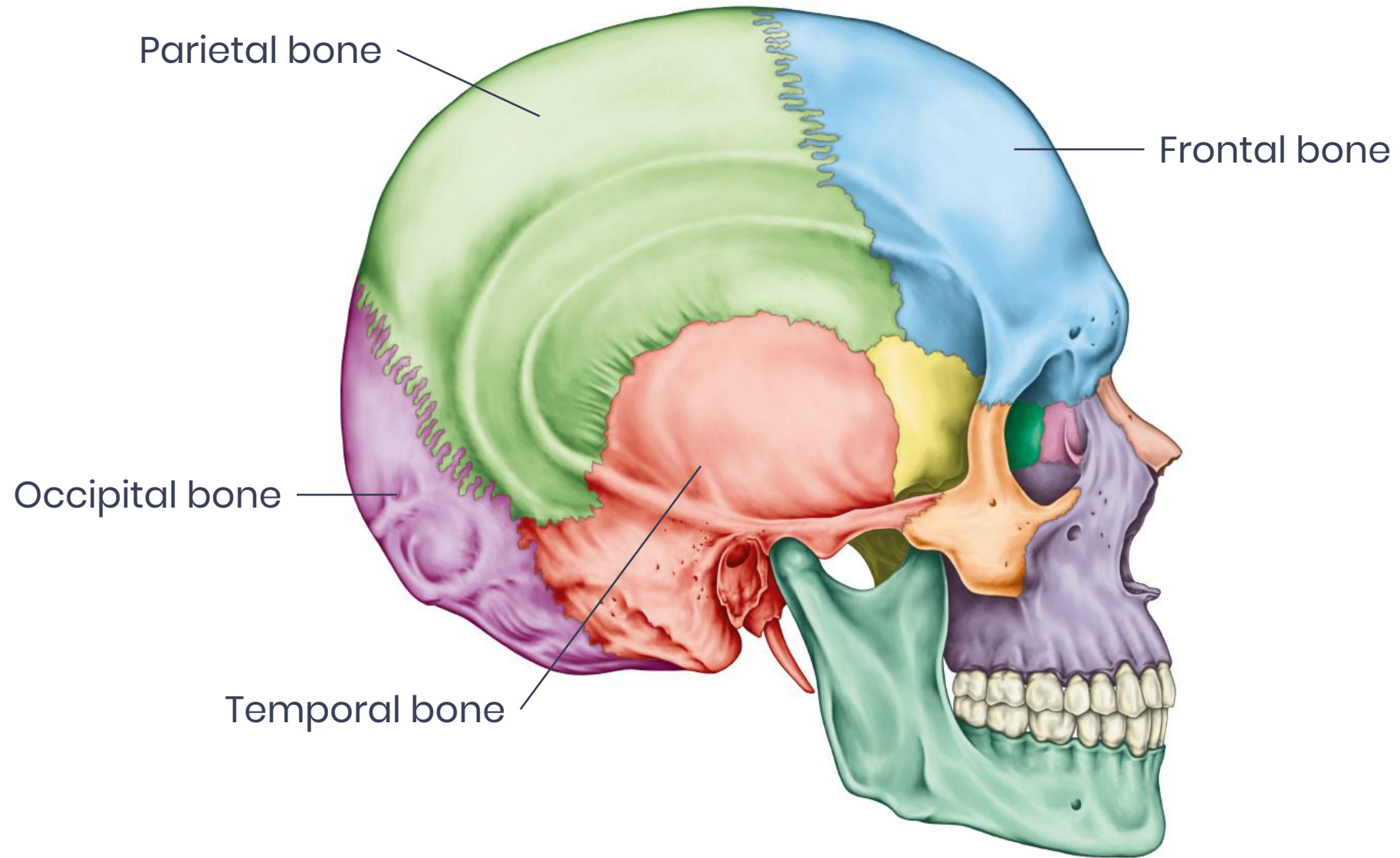
Neck pain

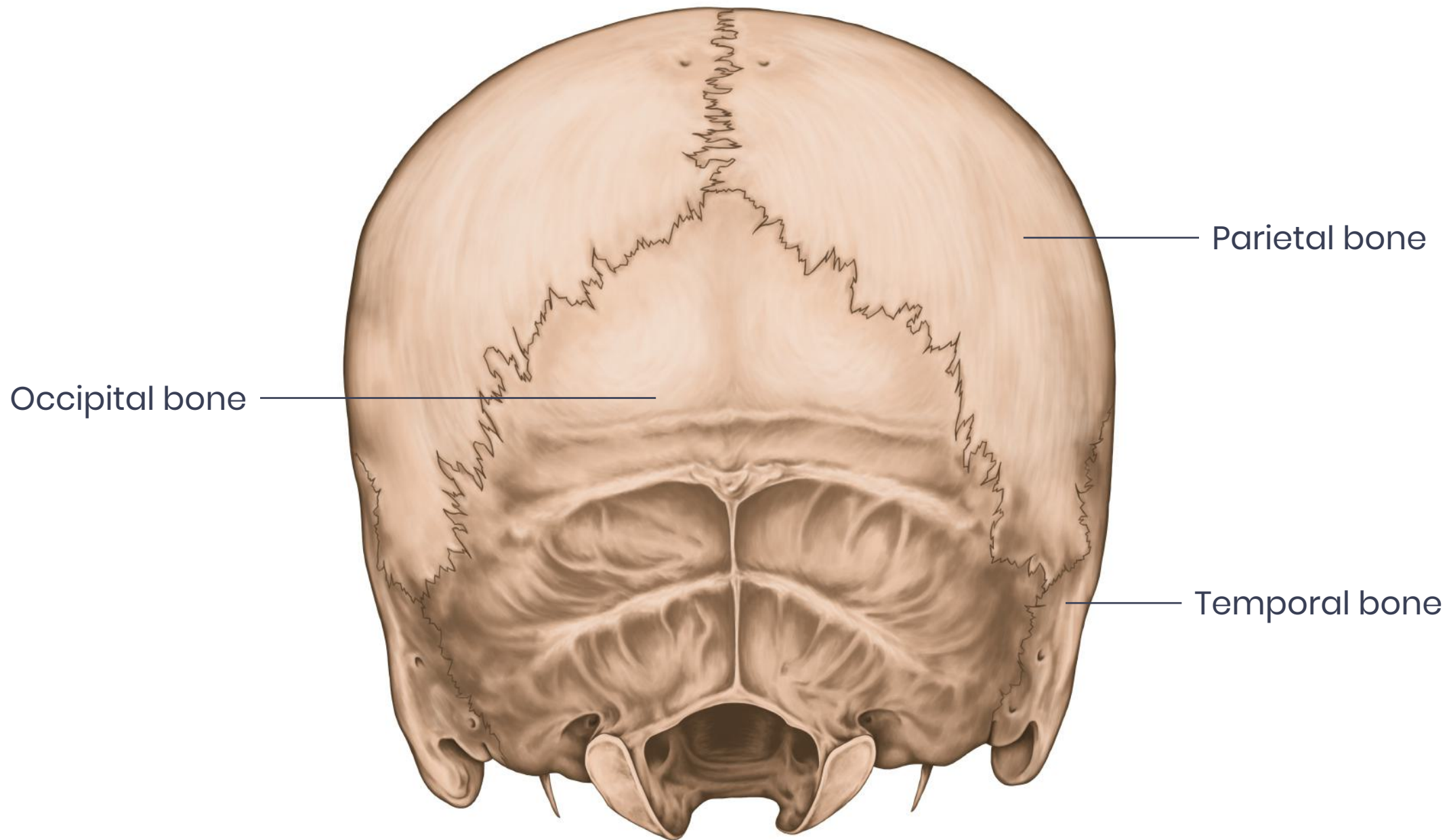
“An unpleasant sensory & emotional experience associated with actual or potential tissue damage”

Between superior nuchal line & scapular spine

With or without radiculopathy

Bier, J. D., Scholten-Peeters, W. G. M., Staal, J. B., Pool, J., van Tulder, M. W., Beekman, E., . . . Verhagen, A. P. (2017). Clinical Practice Guideline for Physical Therapy Assessment and Treatment in Patients With Nonspecific Neck Pain. *Physical therapy*, 98(3), 162-171. doi:10.1093/ptj/pzx118. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Bier-2017-Clinical%20Practice%20Guideline%20for%20Phys.pdf>

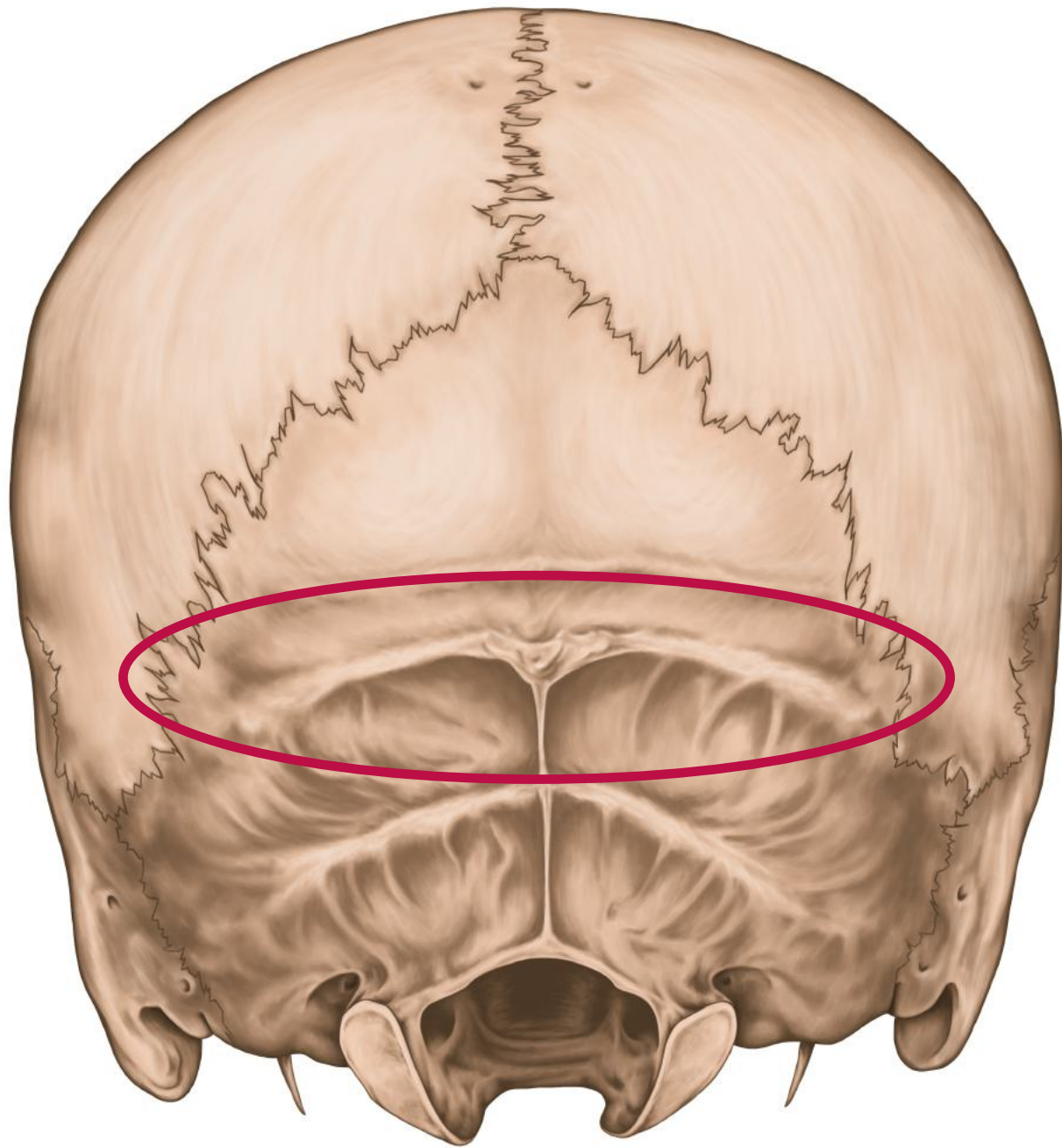




Occipital bone

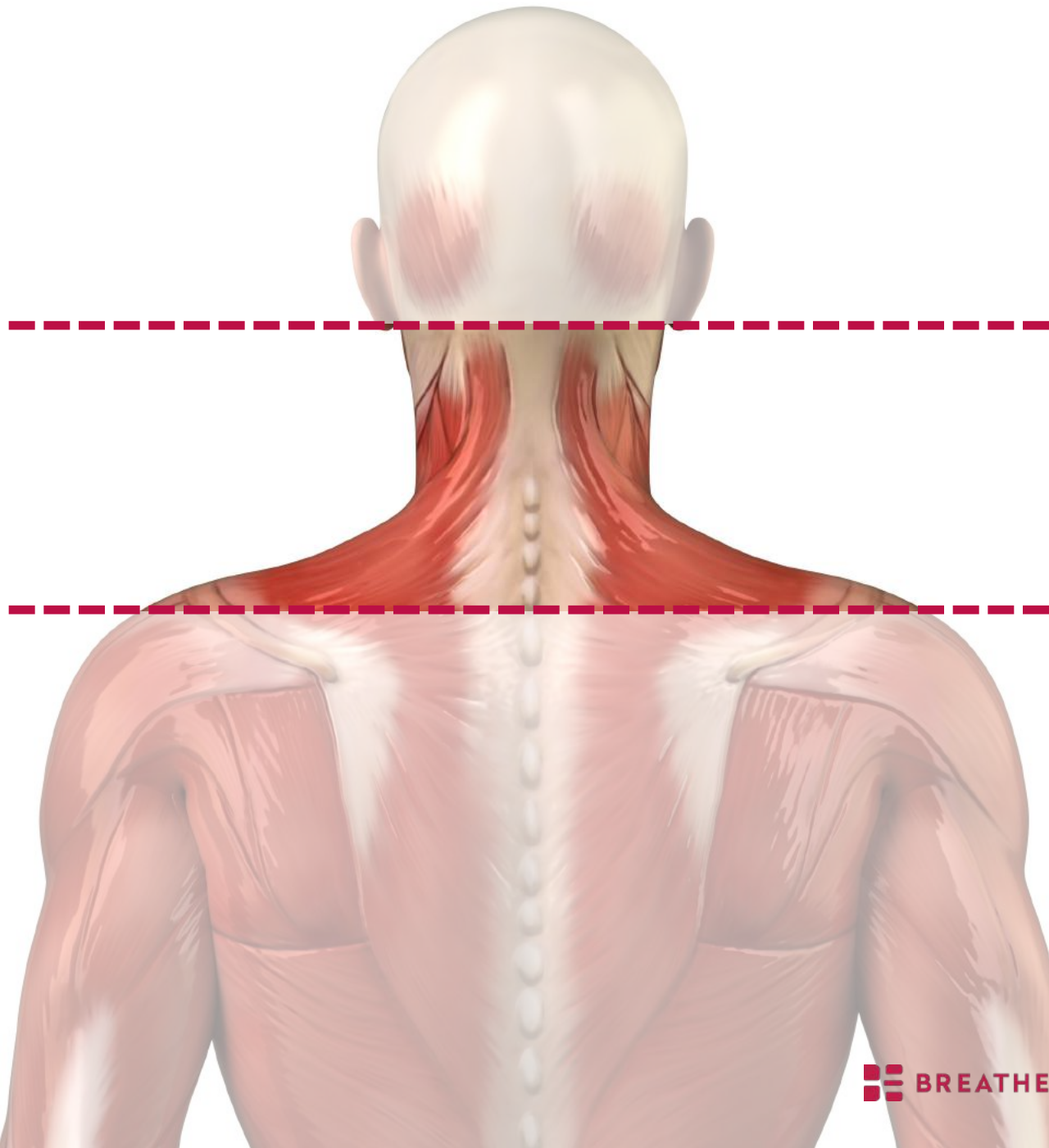
Parietal bone

Temporal bone

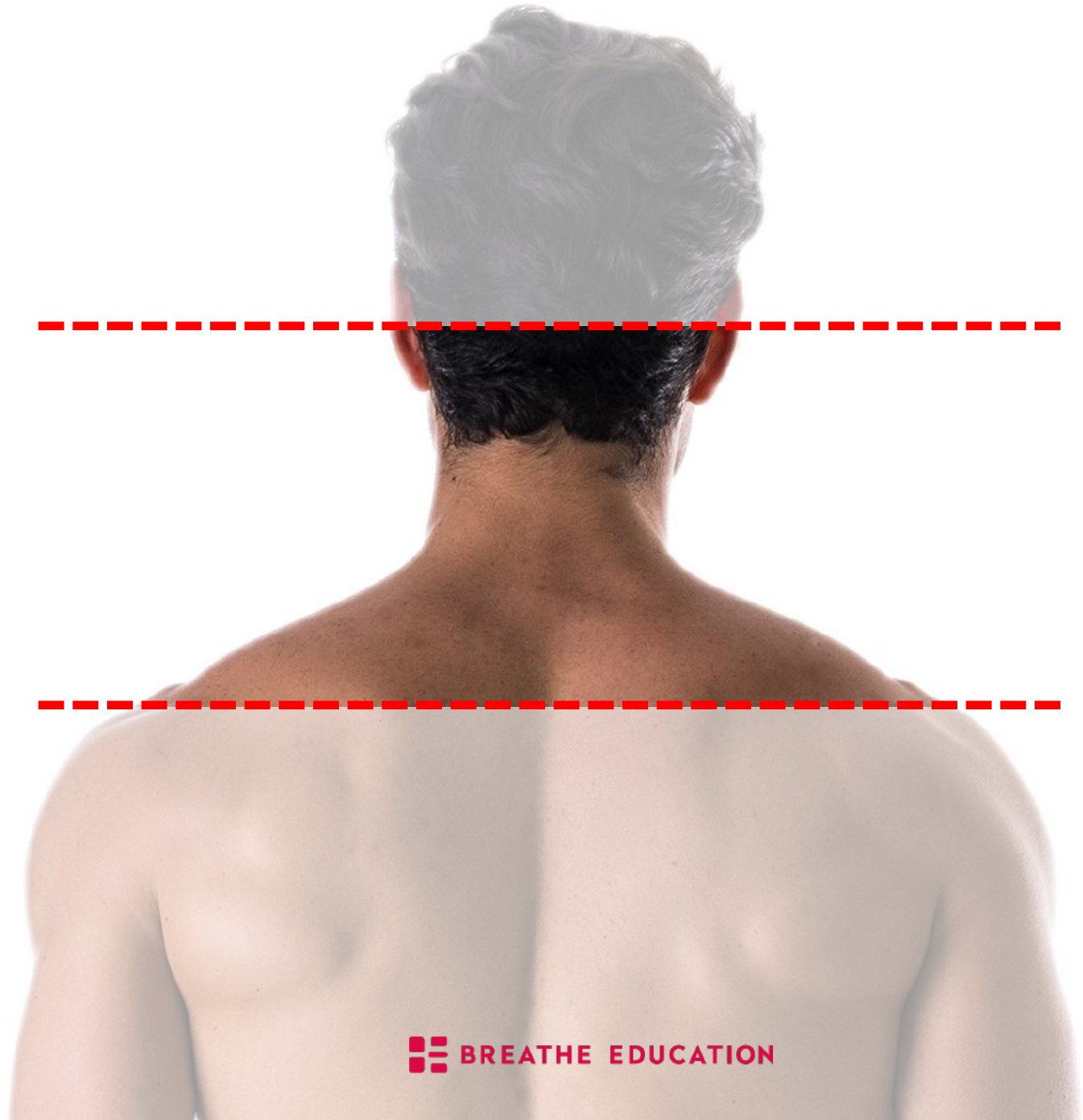


Superior nuchal line

Insertion of upper trapezius & sub
occipitals



Between the
superior nuchal
line & the
scapular spine





Specific neck pain

Neck pain related to:

- ✓ Fracture
- ✓ Vertebral artery dissection
- ✓ Spinal cord injury
- ✓ Spinal infection, ankylosing spondylitis
- ✓ Cancer
- ✓ Systemic diseases

Bier, J. D., Scholten-Peeters, W. G. M., Staal, J. B., Pool, J., van Tulder, M. W., Beekman, E., ... Verhagen, A. P. (2017). Clinical Practice Guideline for Physical Therapy Assessment and Treatment in Patients With Nonspecific Neck Pain. *Physical therapy*, 98(3), 162-171. doi:10.1093/ptj/pzx118 <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Bier-2017-Clinical%20Practice%20Guideline%20for%20Phys.pdf>

Pathology	Corresponding Red Flags
Fracture	Age>70, history of trauma, corticosteroid use, osteoporosis
Vertebral artery dissection	Cerebrovascular (stroke) symptoms or signs
Spinal cord injury	Widespread neurologic signs in both arms or in the legs such as sensory deficits, loss of muscle function or bladder/bowel dysfunction
Infection	Symptoms & signs of infection e.g., fever, night sweats. Risk factors for infection e.g., immune suppression, penetrating wound, underlying disease process, IV drug use, exposure to infectious disease
Cancer	History of cancer, failure to improve with 1 month of treatment, unexplained weight loss, age >50, vomiting, headache
Systemic disease e.g., herpes, ankylosis spondylitis	Headache, fever, unilateral skin rash, burning pain, itching

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Nonspecific neck pain

- ✓ Spondylosis
- ✓ Disk bulge
- ✓ Disk degeneration
- ✓ Stenosis
- ✓ Radicular pain / radiculopathy
- ✓ Whiplash
- ✓ Text neck / forward head posture

Bier, J. D., Scholten-Peeters, W. G. M., Staal, J. B., Pool, J., van Tulder, M. W., Beekman, E., . . . Verhagen, A. P. (2017). Clinical Practice Guideline for Physical Therapy Assessment and Treatment in Patients With Nonspecific Neck Pain. *Physical therapy*, 98(3), 162-171. doi:10.1093/ptj/pzx118 <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Bier-2017-Clinical%20Practice%20Guideline%20for%20Phys.pdf>



Radicular pain & radiculopathy

Radix = root

Opathy = disorder (from pathos)

Radicular pain = pain in the arm caused by irritation of the cervical nerve root

Radiculopathy = umbrella term meaning a problem with the nerve root causes pain, sensory loss or motor loss



Arm pain results from a complex interaction of inflammation & compression

Kelly, J. C., Groarke, P. J., Butler, J. S., Poynton, A. R., & O'Byrne, J. M. (2012). The natural history and clinical syndromes of degenerative cervical spondylosis. *Advances in orthopedics*, 2012. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Kelly-2012-The%20natural%20history%20and%20clinical%20sy.pdf>



It can be caused by a combination of

- ✓ Disk degeneration
- ✓ Disk bulge
- ✓ Canal or foraminal stenosis
- ✓ Inflammation

Kelly, J. C., Groarke, P. J., Butler, J. S., Poynton, A. R., & O'Byrne, J. M. (2012). The natural history and clinical syndromes of degenerative cervical spondylosis. *Advances in orthopedics*, 2012. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Kelly-2012-The%20natural%20history%20and%20clinical%20sy.pdf>

Arm pain worse than neck pain

Aggravated by ironing

Alleviated by walking with hand in pocket

Positive Spurling test

Reduced reflexes

Signs of radicular pain

More signs = more likelihood arm pain is “from” the neck

Sleijser-Koehorst, M. L., Coppieters, M. W., Epping, R., Rooker, S., Verhagen, A. P., & Scholten-Peeters, G. G. (2021). Diagnostic accuracy of patient interview items and clinical tests for cervical radiculopathy. *Physiotherapy*, 111, 74-82. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Sleijser-Koehor-2021-Diagnostic%20accuracy%20of%20pa.pdf>

Spurling's Test



Assessment

Self Test

- ? What is radicular pain?
- ? What is radiculopathy?
- ? List 5 signs of radicular pain
- ? Describe the Spurling test
- ? Is radicular pain specific or nonspecific?



Specific or
nonspecific?

History

- ✓ Neck pain & R arm pain
- ✓ Aggravated by overhead exercises & ironing
- ✓ Alleviated with hand in pocket

Diagnosis

- ✓ C5/6 Radiculopathy
- ✓ Degenerative disk disease
- ✓ Loss of disk height
- ✓ Reduced signal intensity
- ✓ Osteophyte formation
- ✓ Central canal stenosis

specific or nonspecific?

- Subtle acute fracture of C7 and T1 with no vertebral body compression
- Small central disc herniation at C5-C6
- C4-C5 through C6-7 interspinous signal hyperintensity suggesting ligamentous injury

3T MRI Cervical Spine

MRI of the cervical spine was performed in the sagittal and axial planes using T1 & T2 weighted sequences.

Normal alignment and curvature of the cervical vertebrae is maintained.

Mild scoliosis of the cervical spine is seen with its convexity towards right side.

A large right posterolateral focal disc herniation with peridiscal osteophytes are seen at C6-7 level which compromises the right C6-7 neural foramen and compresses the exiting nerve roots.

Broad based posterocentral and right paramedian disc protrusion with peridiscal osteophytes are seen at C5-6 level which indent the thecal sac and the right ventral nerve root.

TECHNIQUE:

Imaging was performed in the sagittal plane using T1-weighted, T2-weighted and STIR imaging sequences, in addition to the axial plane using balanced FFE and T2-weighted DRIVE sequences.

FINDINGS:

The vertebral bodies are normally aligned. There is straightening of the normal cervical lordosis. The cranio-cervical junction and cervical spinal cord are normal. No intra or extradural mass lesions are seen. There is mild multilevel disc degeneration with disc space narrowing, desiccation and spondylitic ridging.

At C2-C3 and C3-C4, there are small central disc protrusions minimally impressing upon the ventral thecal sac with no nerve root impingement or spinal cord compression. The neural foramina are patent bilaterally.

At C4-C5, there is a more prominent central and right para midline disc protrusion that mildly flattens the ventral margin of the spinal cord. The neural foramina are patent bilaterally.

At C5-C6, there is a small central disc protrusion with more pronounced flattening of the ventral margin of the spinal cord. The neural foramina are patent bilaterally.

At C6-C7, there is a small central disc protrusion mildly impressing upon the ventral thecal sac with no nerve

Self Test

- ? What is neck pain?
- ? List up to 6 specific causes of neck pain
- ? List up to 7 pathologies or diagnoses associated with nonspecific neck pain



Whiplash

Whiplash injury = injury due to forceful, rapid back-and-forth movement of the head

WAD = whiplash associated disorder: the symptoms resulting from whiplash injury

Many similarities to NSNP, some differences



WAD

- ✓ Headaches & dizziness
- ✓ Impaired cognitive function
- ✓ Central sensitization
- ✓ Altered joint positional sense
- ✓ Neck & thoracic pain

Al-Khazali, H. M., Ashina, H., Iljazi, A., Lipton, R. B., Ashina, M., Ashina, S., & Schytz, H. W. (2020). Neck pain and headache after whiplash injury: a systematic review and meta-analysis. *PAIN*, 161(5), 880-888.

Heneghan, N. R., Smith, R., Tyros, I., Falla, D., & Rushton, A. (2018). Thoracic dysfunction in whiplash associated disorders: A systematic review. *PloS one*, 13(3), e0194235. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/heneghan2018.pdf>

Coppieters, I., De Pauw, R., Caeyenberghs, K., Danneels, L., Kregel, J., Pattyn, A., ... Cagnie, B. (2017). Decreased regional grey matter volume in women with chronic whiplash-associated disorders: Relationships with cognitive deficits and disturbed pain processing. *Pain physician*, 20(7), E1025-E1051. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Coppieters-2017-Decreased%20regional%20grey%20matter.pdf>



Whiplash & mTBI overlap a lot

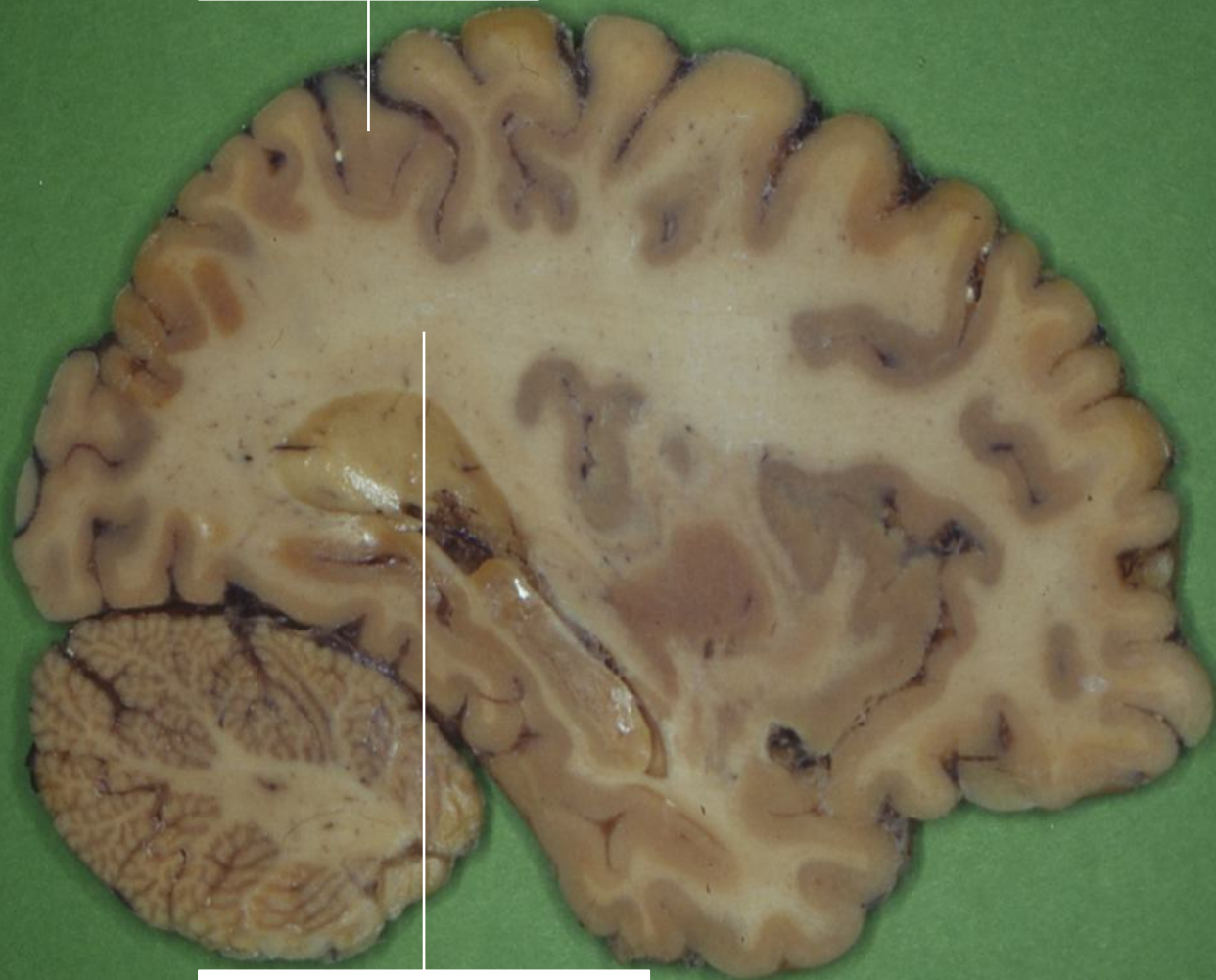
mTBI = mild traumatic brain injury

- ✓ Common mechanism (deceleration)
- ✓ Many symptoms in common

Gil, C., & Decq, P. P. (2021). How similar are whiplash and mild traumatic brain injury? A systematic review. Neurochirurgie. <https://dip2022.s3.amazonaws.com/Lecture%2021/gil2021.pdf>

Grey matter

Cell bodies



White matter

Myelinated axons

Grey-matter volume reduces in chronic WAD

Grey-matter volume loss correlates with:

- ✓ Cognitive impairment
- ✓ Central sensitization
- ✓ Negative pain beliefs

Coppieters, I., De Pauw, R., Caeyenberghs, K., Danneels, L., Kregel, J., Pattyn, A., ... Cagnie, B. (2017). Decreased regional grey matter volume in women with chronic whiplash-associated disorders: Relationships with cognitive deficits and disturbed pain processing. *Pain physician*, 20(7), E1025-E1051. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Coppieters-2017-Decreased%20regional%20grey%20matter.pdf>

Self Test

- ? What is whiplash?
- ? What are the signs / symptoms of WAD?
- ? WAD overlaps with both NSNP and...



Learning goals

- ✓ Specific neck pain vs nonspecific neck pain vs WAD
- ✓ **Most common pathologies fall under nonspecific neck pain**

Pathologies

- ✓ Spondylosis
- ✓ Disk bulge
- ✓ Disk degeneration
- ✓ Osteophytes
- ✓ Annular tears
- ✓ Stenosis
- ✓ Radicular pain & radiculopathy
- ✓ Text neck



Spondylosis

Spondylo = related to the spine

Osis = something wrong

Spondylosis is an umbrella term
not a specific diagnosis

Self Test

- ? What does spondylo mean?
- ? What does osis mean?
- ? What is spondylosis?
- ? Is disk degeneration a spondylosis?
- ? What might spondylotic cervical hyperalgesia mean?
- ? Is neck pain with spondylosis specific or nonspecific?



Disk bulge

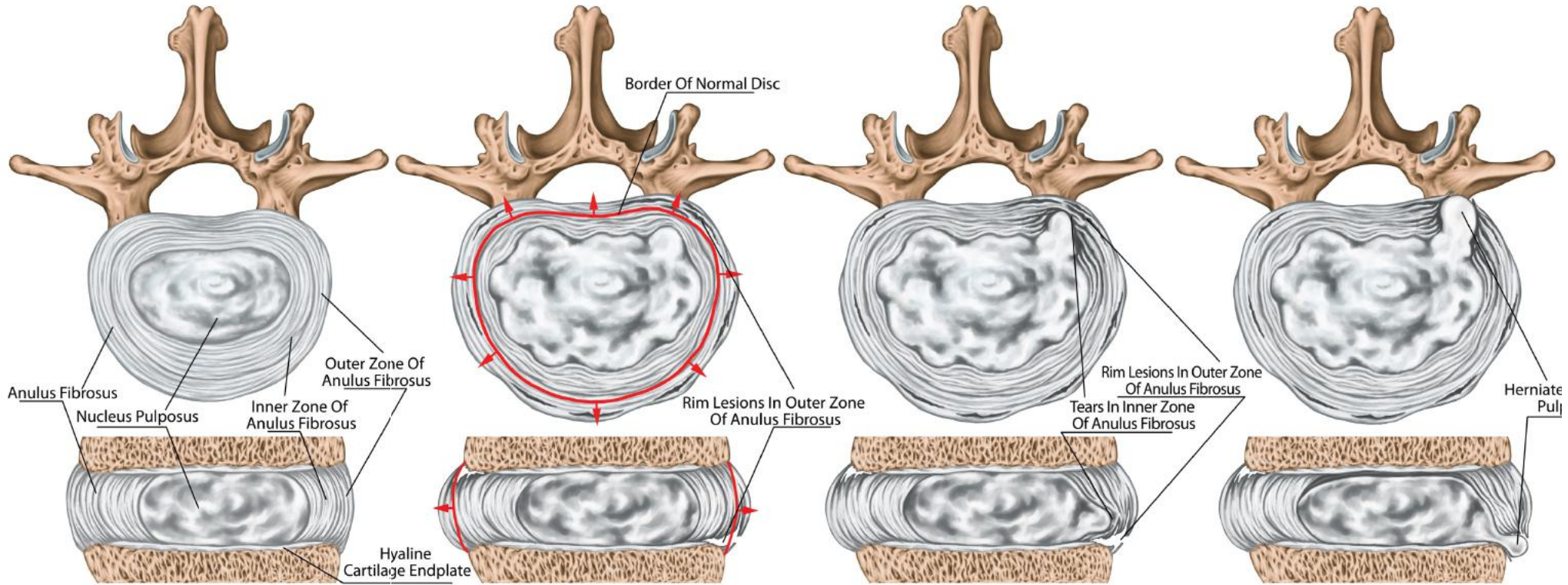
Aka disk herniation, protrusion, extrusion, prolapse, sequestration

No bulge

Bulge w nuclear
desiccation &
annular fissures

Protrusion

Extrusion



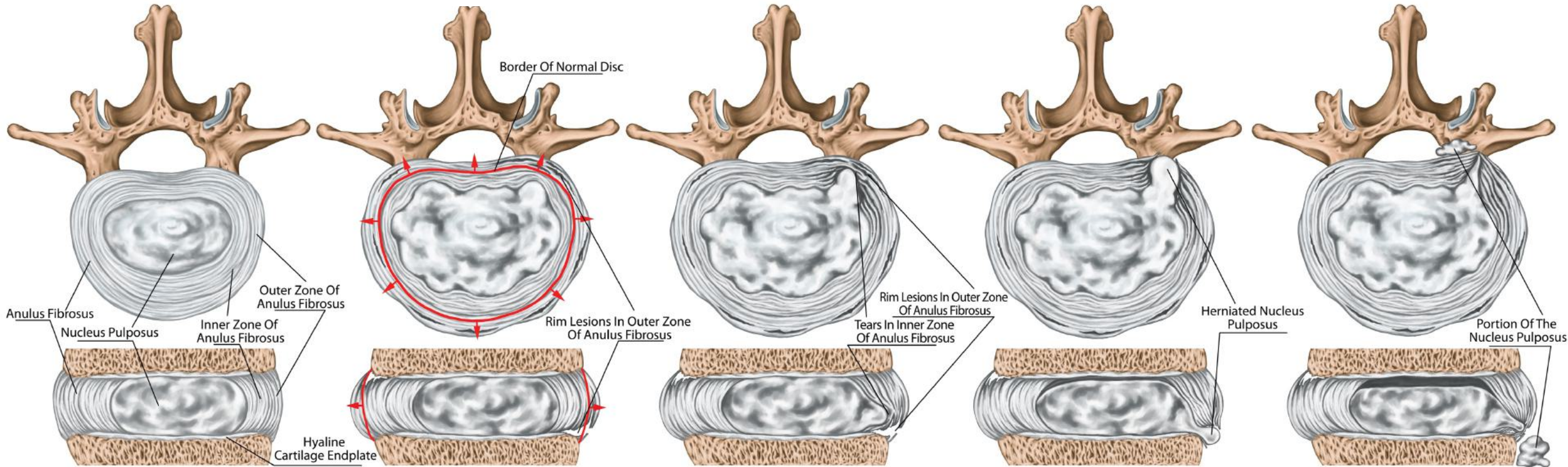
No bulge

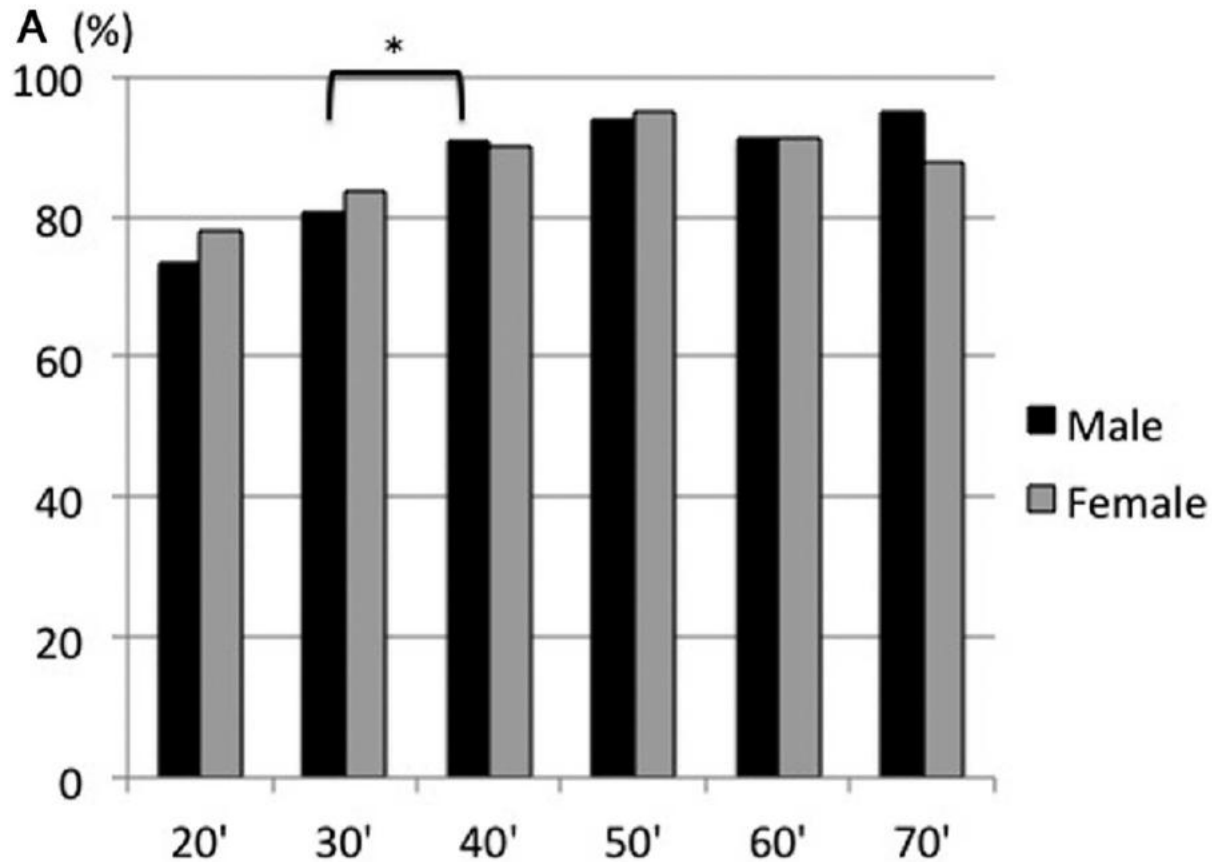
Bulge w nuclear
desiccation &
annular fissures

Protrusion

Extrusion

Sequestration





88% of pain-free people have cervical disk bulges

Nakashima, H, Yukawa, Y., Suda, K, Yamagata, M, Ueta, T., & Kato, F. (2015). Abnormal findings on magnetic resonance images of the cervical spines in 1211 asymptomatic subjects. Spine, 40(6), 392-398. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Nakashima-2015-Abnormal%20findings%20on%20magnetic%20r.pdf>

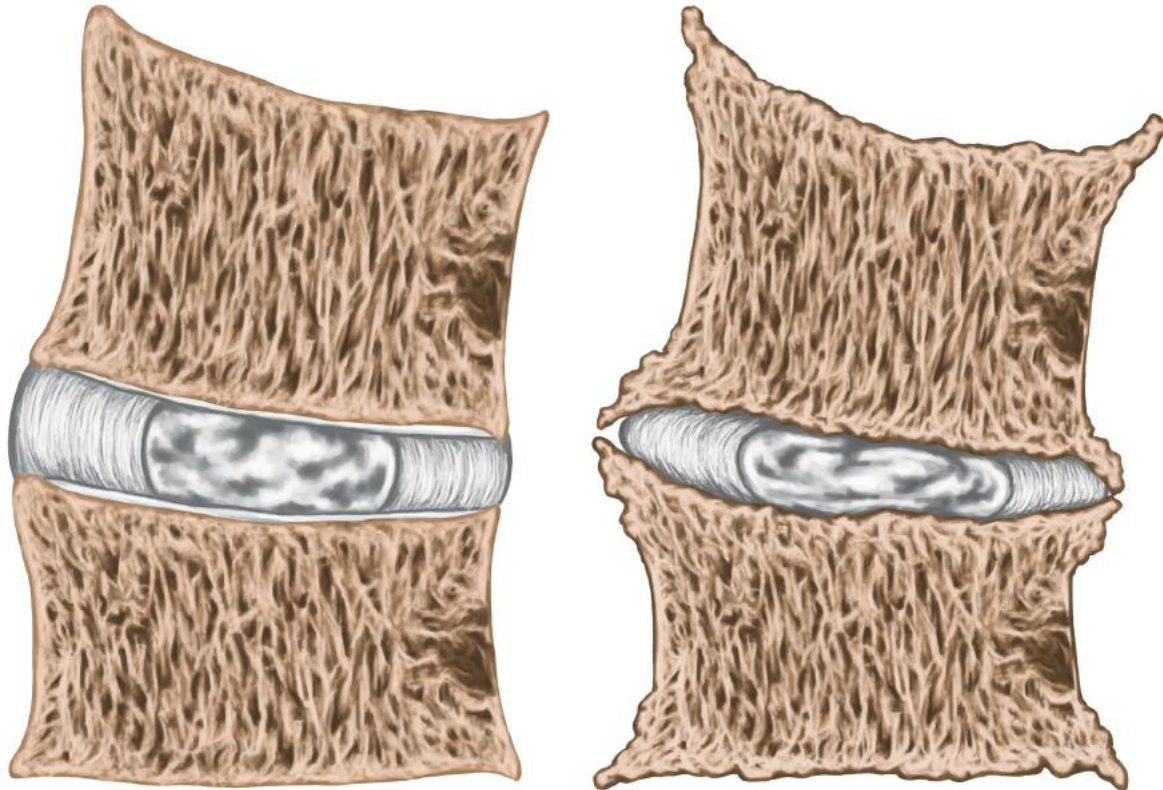


24% of pain-free people have cervical cord compression

Smith, S. S., Stewart, M. E., Davies, B. M., & Kotter, M. R. (2021). The prevalence of asymptomatic and symptomatic spinal cord compression on magnetic resonance imaging: a systematic review and meta-analysis. *Global Spine Journal*, 11(4), 597-607. <https://dip2022.s3.amazonaws.com/Lecture%2021/Smith-2021-The%20prevalence%20of%20asymptomatic%20and.pdf>

Self Test

- ? What percentage of pain-free people have cervical disk bulges?
- ? What percentage of pain-free people have cervical cord compression?
- ? Is neck pain with disk bulge specific or nonspecific?



Disk degeneration

Majority of papers investigating disk degeneration do not define it

Variety of definitions including

- ✓ Loss of height
- ✓ Desiccation (drying out)
- ✓ Osteophyte formation
- ✓ Radiculopathy
- ✓ Only back/neck pain
- ✓ Broad range of findings & diagnoses

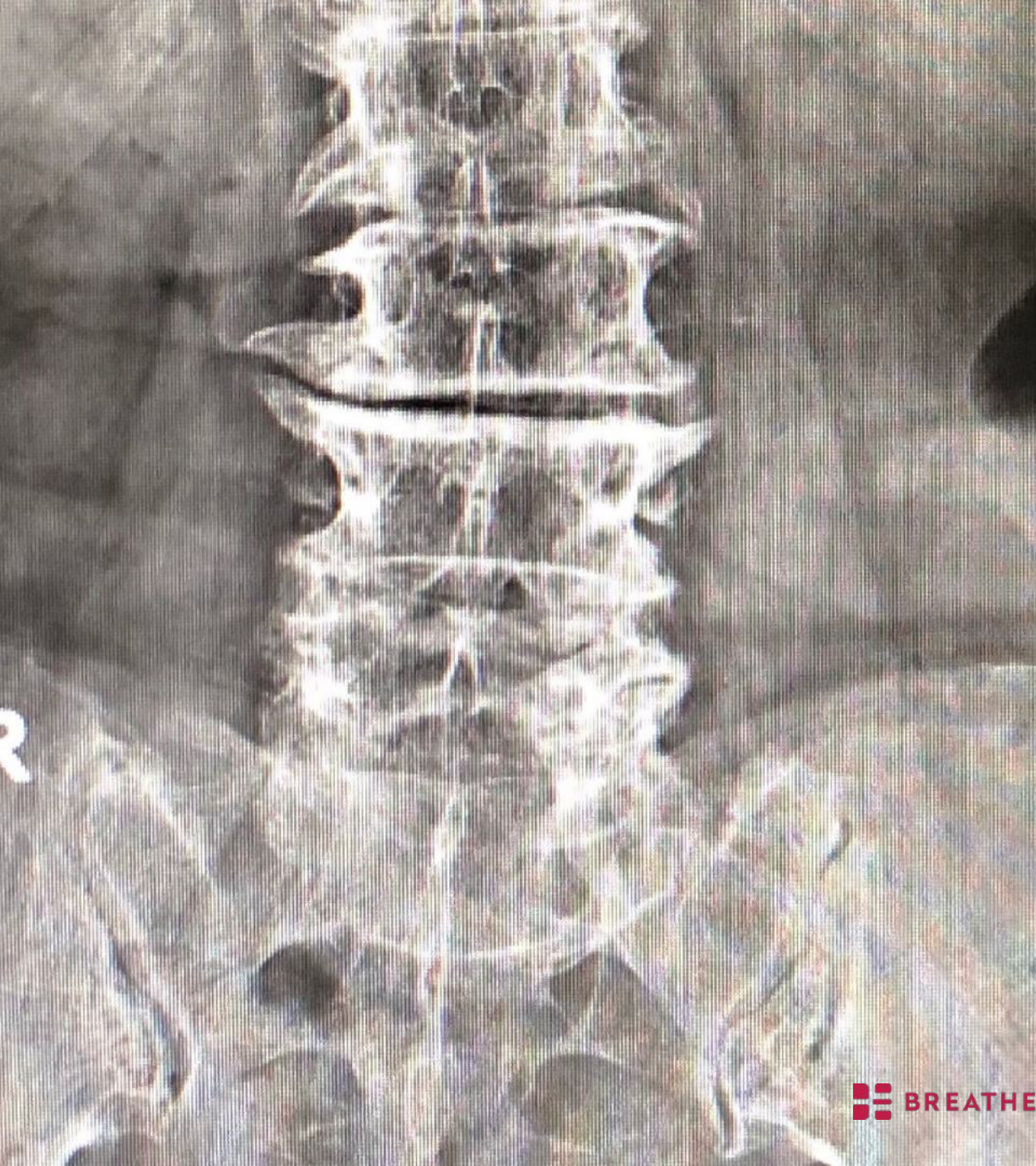
Battié, M. C., Joshi, A. B., & Gibbons, L. E. (2019). Degenerative disk disease: what is in a name? *Spine*, 44(21), 1523-1529.



disk degeneration is largely genetic

Cervical disk degeneration is 73% heritable

Sambrook, P., MacGregor, A., & Spector, T. (1999). Genetic influences on cervical and lumbar disk degeneration: a magnetic resonance imaging study in twins. *Arthritis & Rheumatism: Official Journal of the American College of Rheumatology*, 42(2), 366-372. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Sambrook-1999-Genetic%20influences%20on%20cervical%20a.pdf>

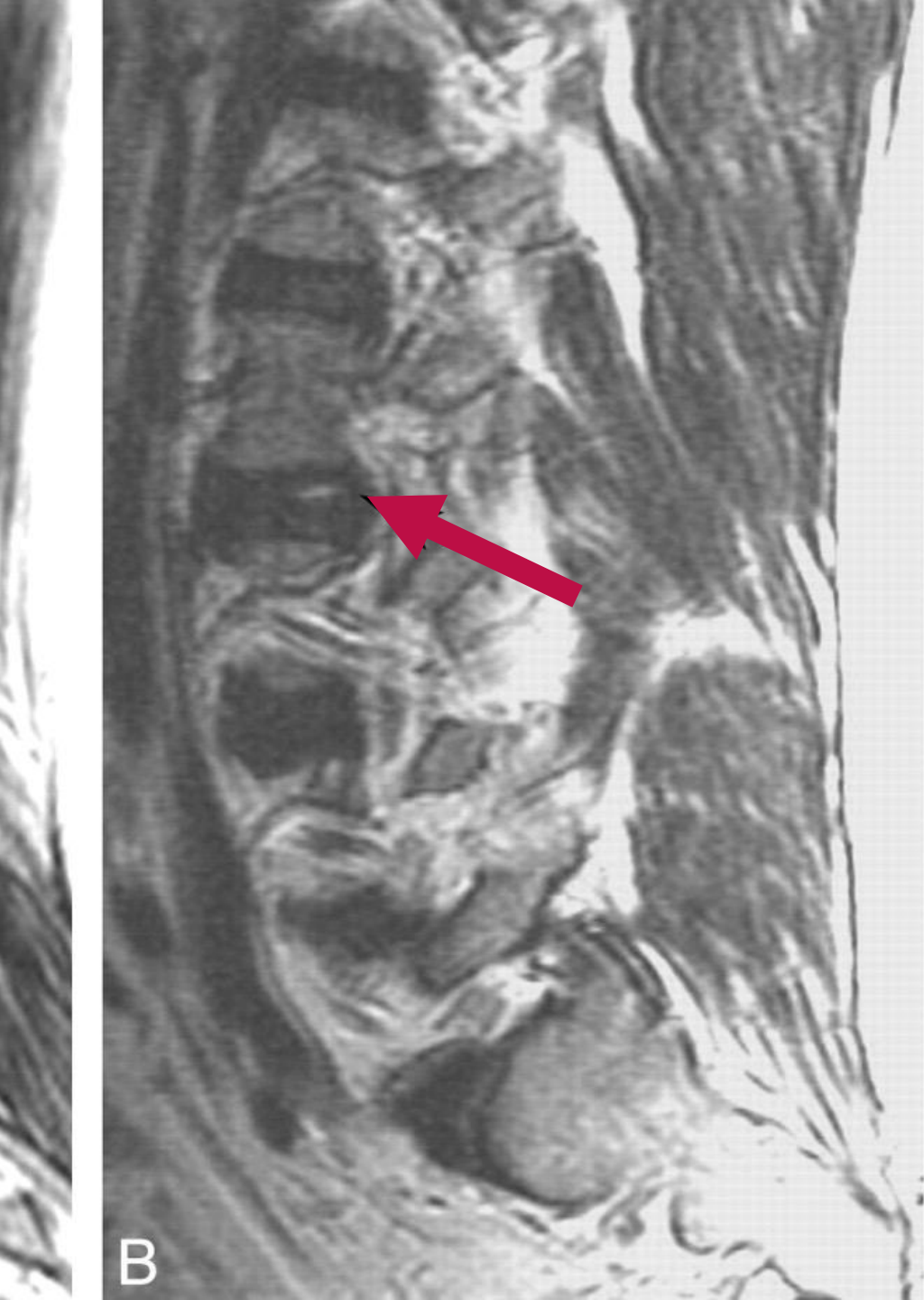


Osteophytes

Bony projection associated with cartilage degeneration at joints

Osteo = bone

Phyte = growth



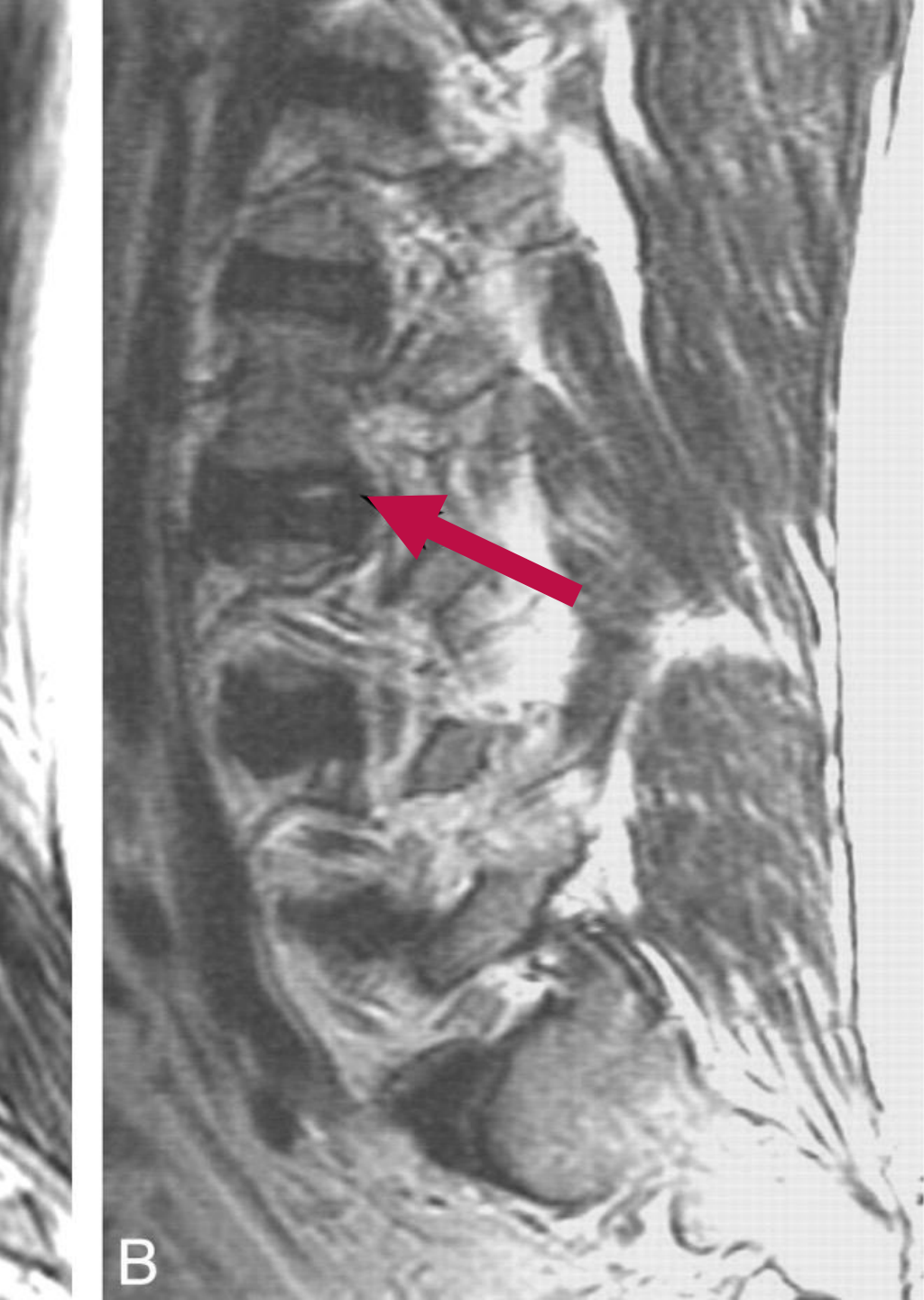
B

Annular tears are a feature of disk degeneration

Aka annular fissure

Sharma, A., Pilgram, T., & Wippold, F. (2009). Association between annular tears and disk degeneration: a longitudinal study. *American Journal of Neuroradiology*, 30(3), 500-506. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/sharma2009.pdf>

C



B

Annular tears are sometimes referred to as HIZ

HIZ = high intensity zones

Areas where the signal intensity of the MRI or CT is higher, because the tissue is less dense

Sharma, A., Pilgram, T., & Wippold, F. (2009). Association between annular tears and disk degeneration: a longitudinal study. *American Journal of Neuroradiology*, 30(3), 500–506. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/sharma2009.pdf>

C



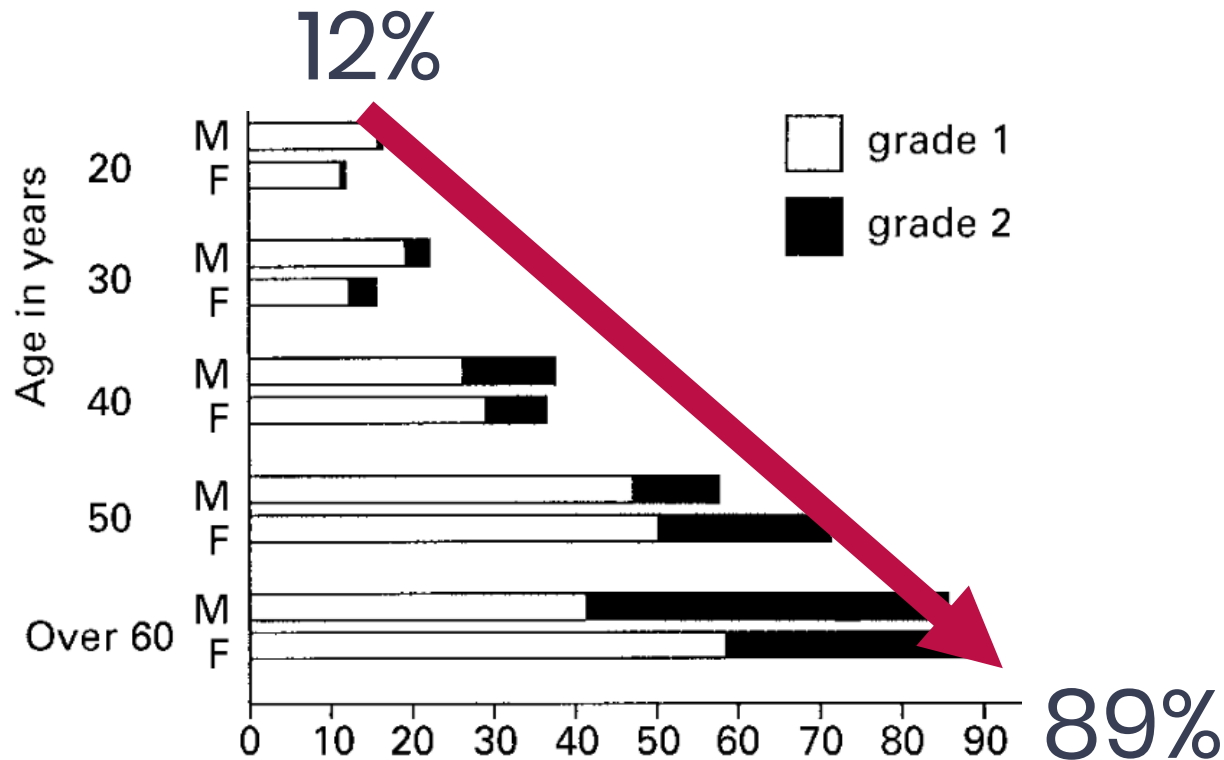
37% of pain-free people have cervical disk annular tears

Ernst, C., Stadnik, T., Peeters, E., Breucq, C., & Osteaux, M. (2005). Prevalence of annular tears and disk herniations on MR images of the cervical spine in symptom free volunteers. *European Journal of Radiology*, 55(3), 409–414. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/ernst2005.pdf>

Prevalence of cervical disk degeneration in pain-free people

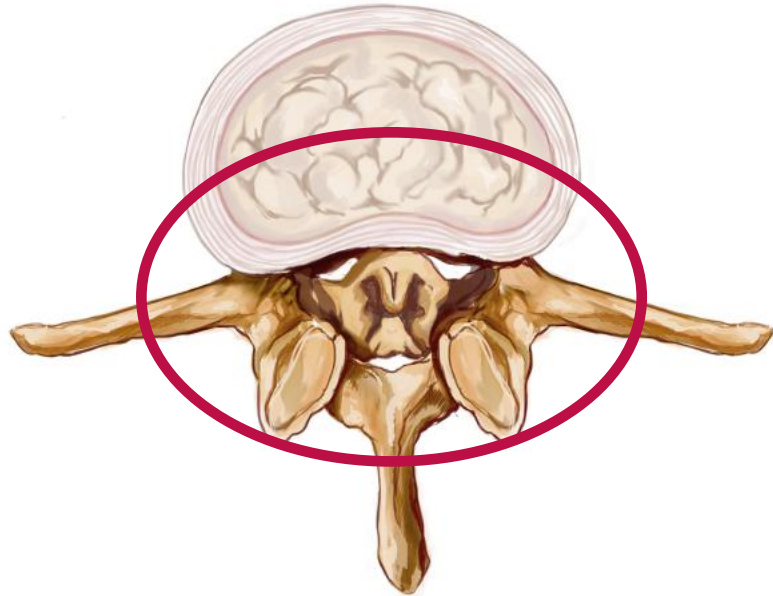
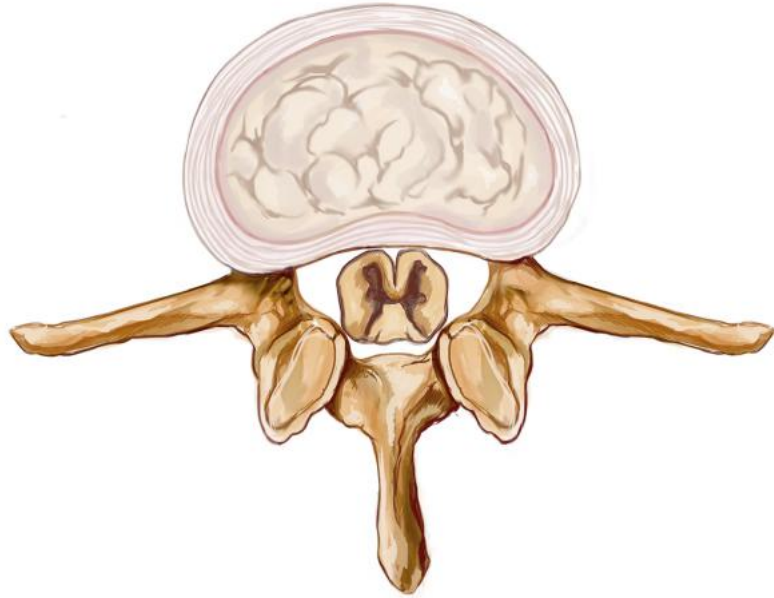
Degeneration = some combination of loss of disk height, osteophytes & annular tears

Matsumoto, M., Fujimura, Y., Suzuki, N., Nishi, Y., Nakamura, M., Yabe, Y., & Shiga, H. (1998). MRI of cervical intervertebral disks in asymptomatic subjects. The Journal of bone and joint surgery. British volume, 80(1), 19-24. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Matsumoto1998.pdf>



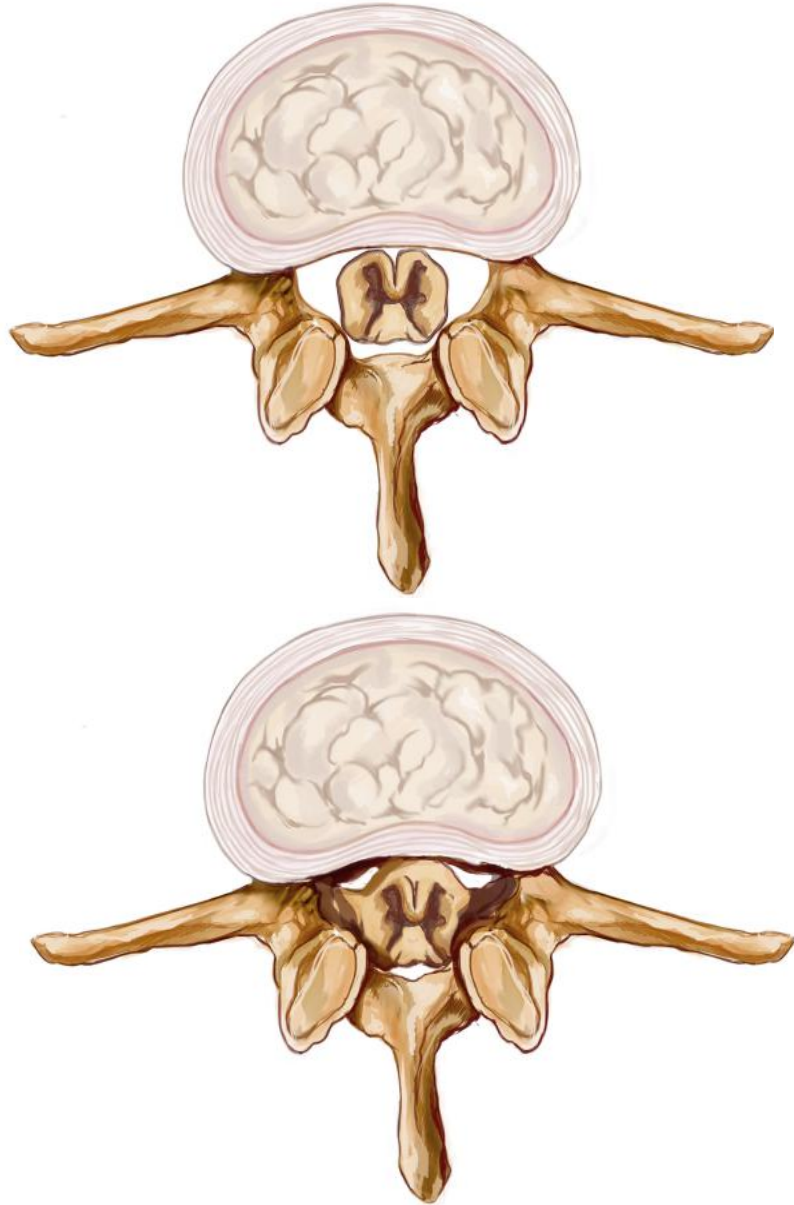
Self Test

- ? What are osteophytes?
- ? What is an annular tear?
- ? What are 2 alternate names for annular tear?
- ? What is a HIZ?
- ? What percentage of pain-free people have cervical annular tears?
- ? What is the prevalence of disk degeneration in pain-free people?
- ? Is neck pain with disk degeneration specific or nonspecific?



Stenosis

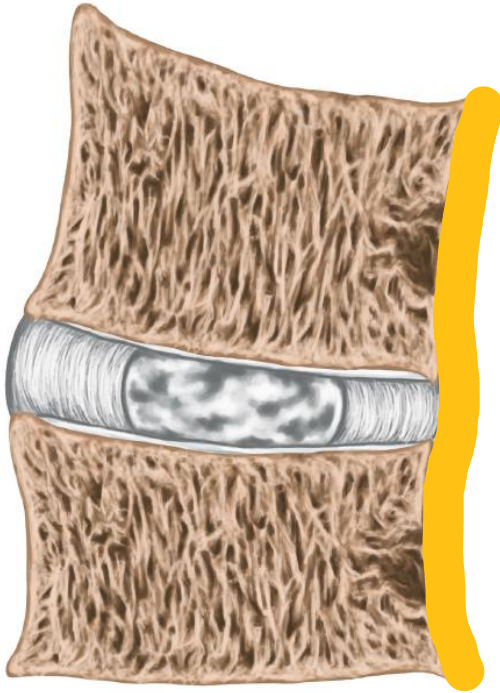
Stenosis = narrowing



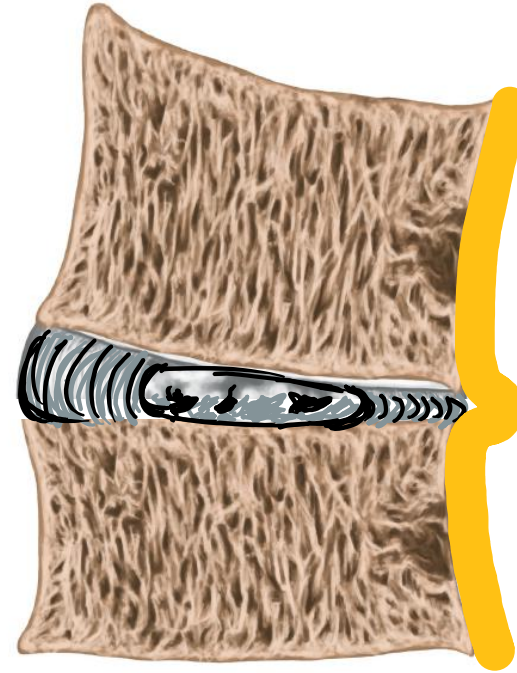
Stenosis has several causes

- ✓ Disk bulge
- ✓ Osteophyte formation
- ✓ Disk degeneration
- ✓ Inflammation
- ✓ Thickening of ligamentum flavum & posterior longitudinal ligament

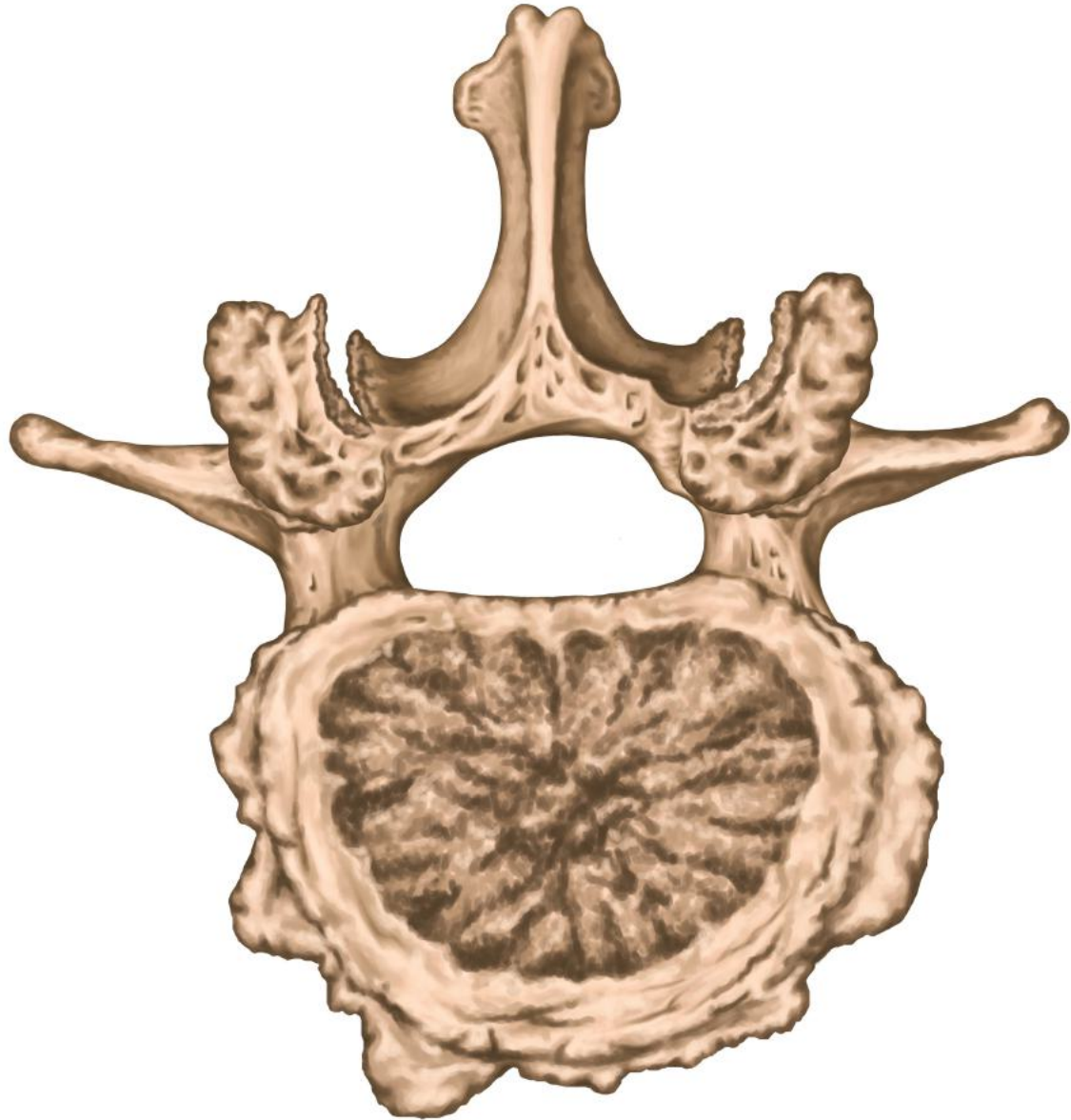
How disk degeneration can cause canal stenosis



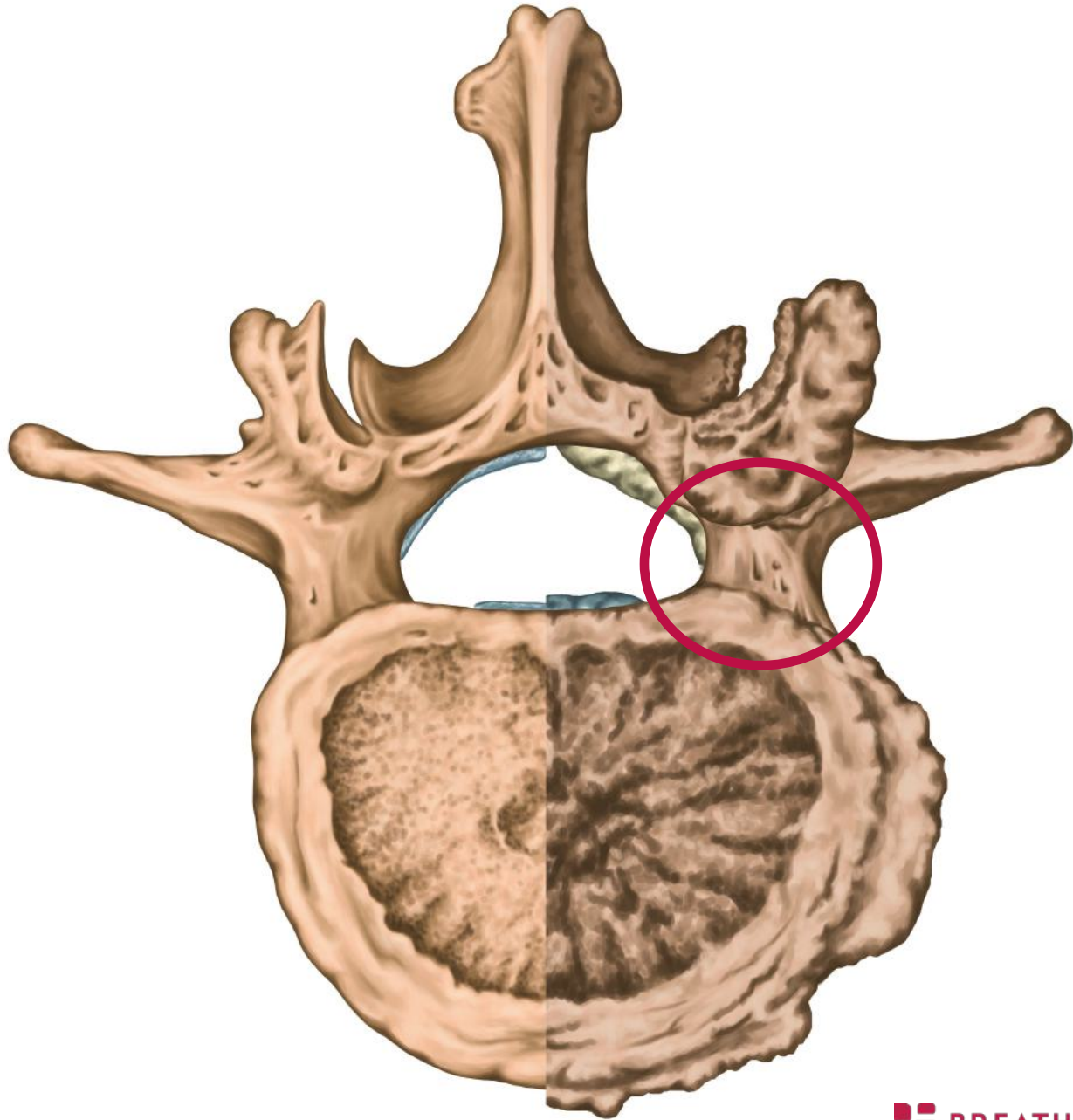
As we age chemical changes in the nucleus cause it to become less springy & lose height (aka degeneration)



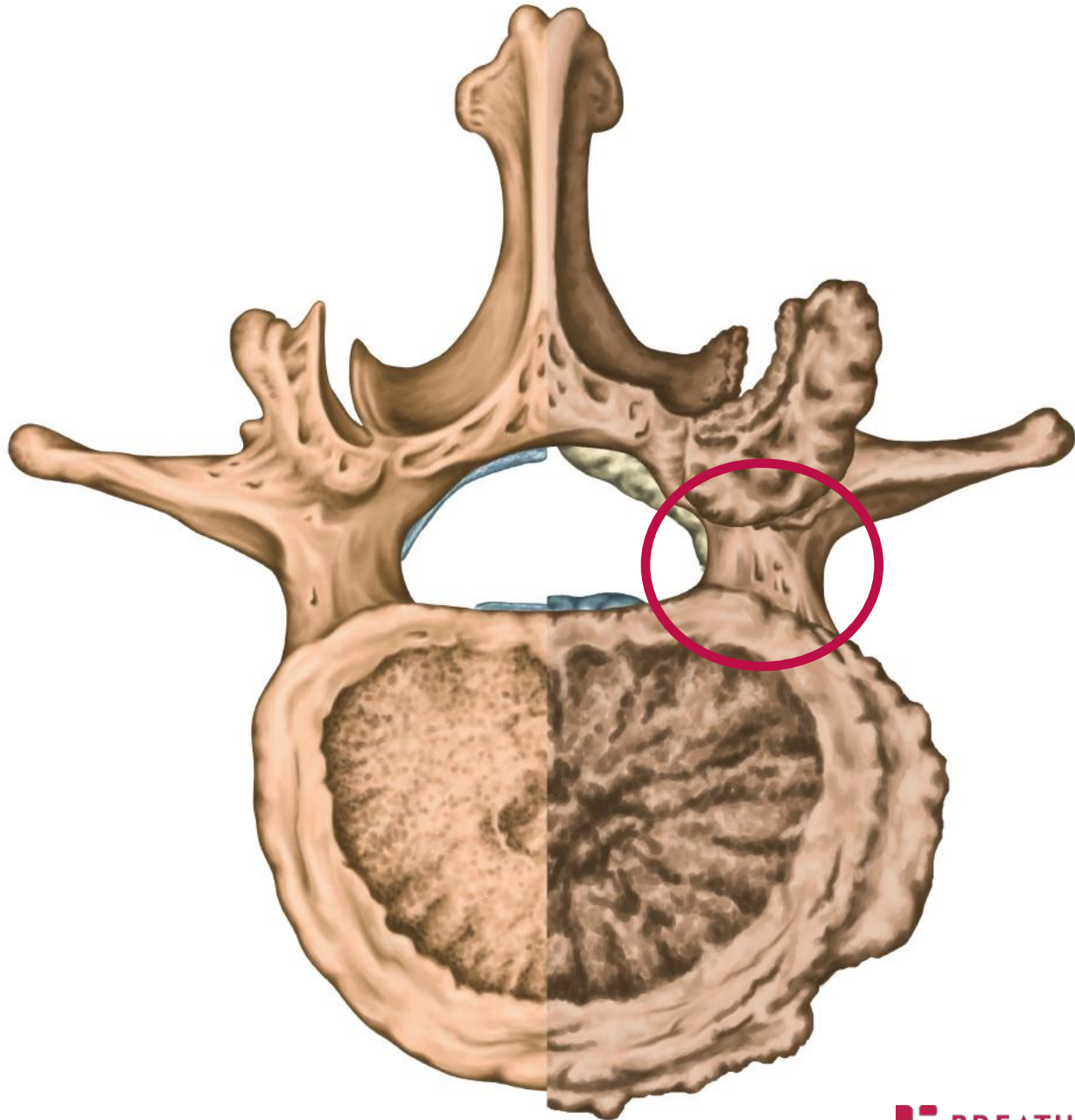
The posterior longitudinal ligament & ligamentum flavum fold over on themselves, narrowing the spinal canal



Canal stenosis
can also be
caused by
osteophytes



Foraminal stenosis can be caused by disk bulge or osteophytes



Stenosis increases risk of arm pain **5x**

Okada, E., Daimon, K., Fujiwara, H., Nishiwaki, Y., Nojiri, K., Watanabe, M., ... Fujita, N. (2018). Twenty-year Longitudinal Follow-up MRI Study of Asymptomatic Volunteers. *Clinical spine surgery*, 31(10), 446-451. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Daimon-2018-A%2020-Year%20Prospective%20Longitudinal.pdf>

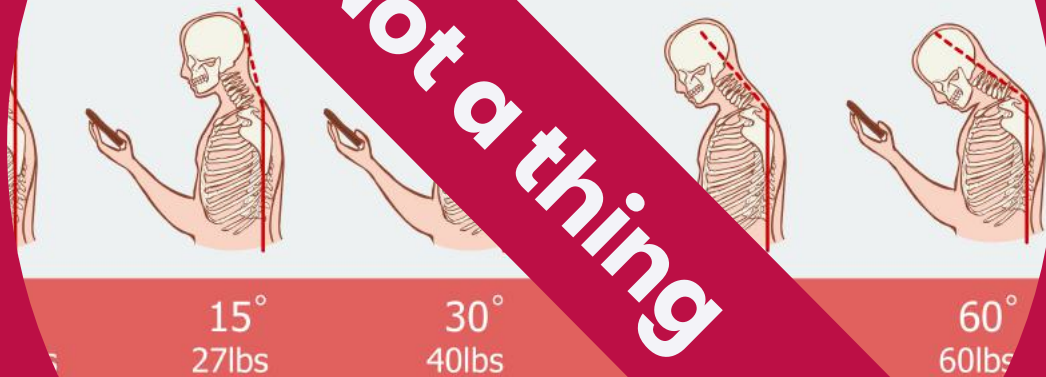
Self Test

- ? What is stenosis?
- ? What causes canal stenosis?
- ? What causes foraminal stenosis?
- ? Is neck pain with stenosis specific or nonspecific?
- ? Is stenosis associated with radicular pain?



Text neck & head
forwards posture

Smartphones and tablets increase the weight of the head and stiffen our necks



Text neck

“Text neck was not associated with prevalence of neck pain, neck pain frequency or maximum neck pain intensity”

Correia, I. M. T., de Sá Ferreira, A., Fernandez, J., Reis, F. J. J., Nogueira, L. A. C., & Meziat-Filho, N. (2021). Association Between Text Neck and Neck Pain in Adults. *Spine*, 46(9), 571-578. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Correia-2021-Association%20Between%20Text%20Neck%20and.pdf>

It's just how people see objects in their
hands







100,000 BC



Sitting with slumped posture correlates with LESS neck pain

Richards, K. V., Beales, D. J., Smith, A. L., O'Sullivan, P. B., & Straker, L. M. (2021). Is Neck Posture Subgroup in Late Adolescence a Risk Factor for Persistent Neck Pain in Young Adults? A Prospective Study. Physical therapy. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Richards-2016-Neck%20Posture%20Clusters%20and%20Their.PDF>



For blue collar workers

More sitting time at work is associated with **less** neck pain

Øverås, C. K., Villumsen, M., Axén, I., Cabrita, M., Leboeuf-Yde, C., Hartvigsen, J., & Mork, P. J. (2020). Association between objectively measured physical behaviour and neck-and/or low back pain: A systematic review. *European Journal of Pain*. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/%C3%98ver%C3%A5s-2020-Association%20between%20objectively%20m.pdf>



Cervical degeneration **not** associated with pain over 20-year follow up

Okada, E., Daimon, K., Fujiwara, H., Nishiwaki, Y., Nojiri, K., Watanabe, M., ... Fujita, N. (2018). Twenty-year Longitudinal Follow-up MRI Study of Asymptomatic Volunteers. *Clinical spine surgery*, 31(10), 446-451. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Daimon-2018-A%2020-Year%20Prospective%20Longitudinal.pdf>

Self Test

- ? True/false: Text neck is a thing
- ? True/false: Sitting with upright posture protects against neck pain
- ? True/false: Too much sitting or incorrect sitting causes neck pain
- ? True/false: Head forwards posture is associated with neck pain



Learning goals

- ✓ Specific neck pain vs nonspecific neck pain vs WAD
- ✓ Most common pathologies fall under nonspecific neck pain
- ✓ **Prognosis & treatment**
 - ✓ Good natural history
 - ✓ Address psychosocial factors
 - ✓ Exercise
 - ✓ Manual therapy

Prognosis & treatment

- ✓ Favorable prognosis
- ✓ Address psychosocial factors as they are the biggest predictors of outcomes for NSNP & WAD
- ✓ Most forms of exercise help NSNP but not WAD
- ✓ A little bit of exercise helps, more is not better



Majority of NSNP & WAD improve a lot over 3-6 months

Vasseljen, O., Woodhouse, A., Bjørngaard, J. H., & Leivseth, L. (2013). Natural course of acute neck and low back pain in the general population: the HUNT study. *PAIN*, 154(8), 1237-1244. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Vasseljen-2013-Natural%20course%20of%20acute%20neck%20an.pdf>

Shearer, H. M., Carroll, L. J., Côté, P., Randhawa, K., Southerst, D., Varatharajan, S., ... van der Velde, G. (2020). The course and factors associated with recovery of whiplash-associated disorders: an updated systematic review by the Ontario protocol for traffic injury management (OPTIMa) collaboration. *European Journal of Physiotherapy*, 1-16. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Shearer-2020-The%20course%20and%20factors%20associated.pdf>



83% of people
with cervical
radiculopathy
are pain-free
within 36 months

Wong, J. J., Côté, P., Quesnele, J. J., Stern, P. J., & Mior, S. A. (2014). The course and prognostic factors of symptomatic cervical disk herniation with radiculopathy: a systematic review of the literature. *The Spine Journal*, 14(8), 1781-1789. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Wong-2014-The%20course%20and%20prognostic%20factors%20of.pdf>



Poor sleep quality & quantity increase risk of neck pain **4x**

Auvinen, J. P., Tammelin, T. H., Taimela, S. P., Zitting, P. J., Järvelin, M.-R., Taanila, A. M., & Karppinen, J. I. (2010). Is insufficient quantity and quality of sleep a risk factor for neck, shoulder and low back pain? A longitudinal study among adolescents. *European Spine Journal*, 19(4), 641-649. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Auvinen-2010-Is%20insufficient%20quantity%20and%20qual.pdf>



Depressive symptoms also increase risk of neck pain **4x**

Carroll, L. J., Cassidy, J. D., & Côté, P. (2004). Depression as a risk factor for onset of an episode of troublesome neck and low back pain. PAIN, 107(1-2), 134-139. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Carroll-2004-Depression%20as%20a%20risk%20factor%20for%20o.pdf>



Other prognostic factors

- ✓ Severe activity limitation
- ✓ High pain intensity
- ✓ Poor coping ability
- ✓ Negative expectation
- ✓ Fear-avoidance

Mansell, G., Corp, N., Wynne-Jones, G., Hill, J., Stynes, S., & van der Windt, D. (2021). Self-reported prognostic factors in adults reporting neck or low back pain: An umbrella review. *Eur J Pain*. doi:10.1002/ejp.1782
<https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20paper/Lecture%2021%20Neck%20pathology/Mansell%202021.pdf>



Anxiety & initial pain, not physical factors predict outcome in WAD

Sarrami, P., Armstrong, E., Naylor, J. M., & Harris, I. A. (2017). Factors predicting outcome in whiplash injury: a systematic meta-review of prognostic factors. *Journal of Orthopaedics and Traumatology*, 18(1), 9-16. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Sarrami-2017-Factors%20predicting%20outcome%20in%20whi.pdf>



Expectation & coping predict outcome in WAD

Shearer, H. M., Carroll, L. J., Côté, P., Randhawa, K., Southerst, D., Varatharajan, S., . . . van der Velde, G. (2020). The course and factors associated with recovery of whiplash-associated disorders: an updated systematic review by the Ontario protocol for traffic injury management (OPTIMA) collaboration. *European Journal of Physiotherapy*, 1-16. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Shearer-2020-The%20course%20and%20factors%20associated.pdf>



No evidence centralization is prognostic in neck pain

May, S., Runge, N., & Aina, A. (2018). Centralization and directional preference: An updated systematic review with synthesis of previous evidence. *Musculoskeletal Science and Practice*, 38, 53-62. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/May-2018-Centralization%20and%20directional%20prefer.pdf>

Self Test

- ❓ What is the natural history of NSNP and WAD?
- ❓ What is the natural history of radicular pain?
- ❓ Which factors are prognostic in neck pain and WAD?



Treatments that **don't** work for neck pain

- ✘ Education alone
- ✘ Dry needling
- ✘ Ergonomic interventions
- ✘ Stretching & ROM interventions
- ✘ Exercise & physiotherapy for WAD



Education alone is not effective for neck pain

Ainpradub, K., Sithipornvorakul, E., Janwantanakul, P., & van der Beek, A. J. (2016). Effect of education on non-specific neck and low back pain: a meta-analysis of randomized controlled trials. *Manual Therapy*, 22, 31-41. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Ainpradub-2016-Effect%20of%20education%20on%20non-spec.pdf>



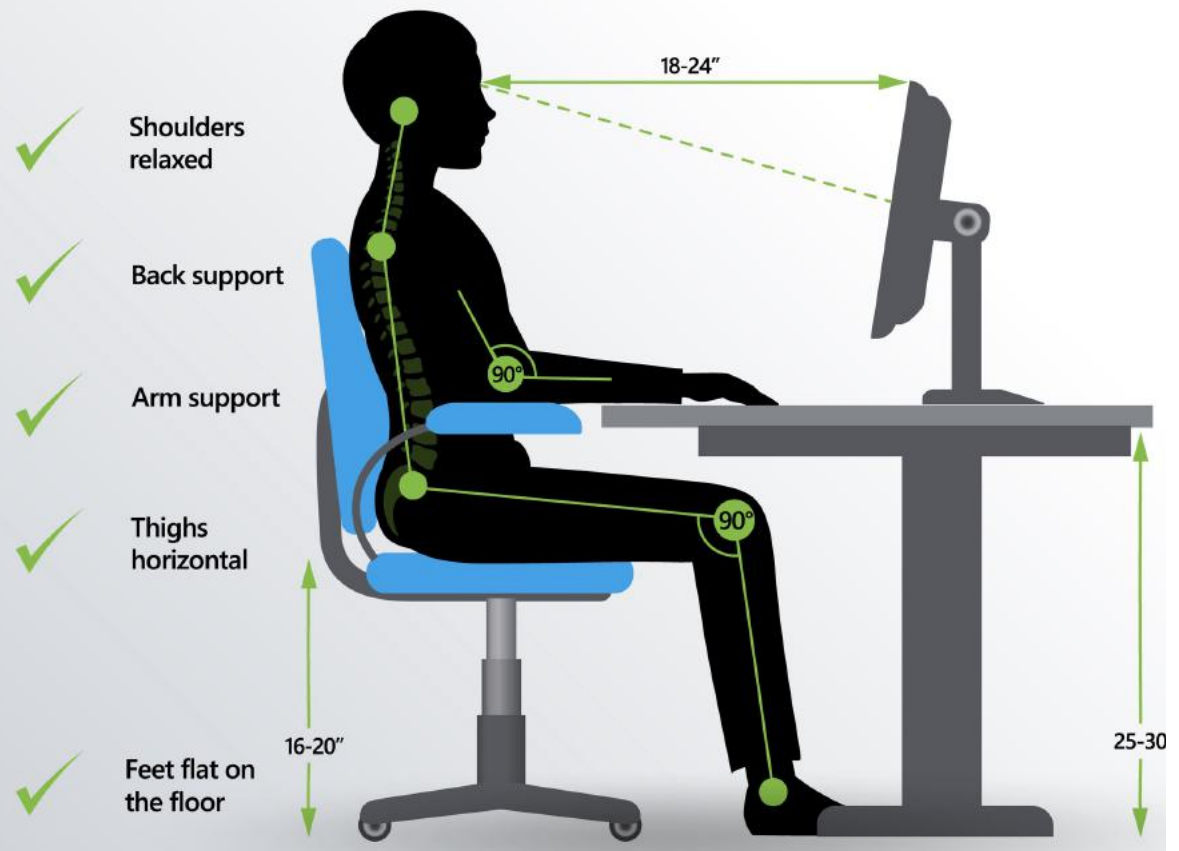
Dry needling & sham dry needling give the same results

Aka = dry needling IS a sham

Gattie, E., Cleland, J. A., Pandya, J., & Snodgrass, S. (2021). Dry Needling Adds No Benefit to the Treatment of Neck Pain: A Sham-Controlled Randomized Clinical Trial With 1-Year Follow-up. *Journal of Orthopaedic & Sports Physical Therapy*, 51(1), 37-45.

<https://dip2022.s3.amazonaws.com/Lecture%2021/Gattie-2021-Dry%20Needling%20Adds%20No%20Benefit%20to%20th.pdf>

CORRECT SITTING POSTURE



Ergonomic interventions have very weak evidence

Chen, X., Coombes, B. K., Sjøgaard, G., Jun, D., O'leary, S., & Johnston, V. (2017). Workplace-Based Interventions for Neck Pain in Office Workers: Systematic Review and Meta-Analysis. *Physical therapy*, 98(1), 40-62. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Chen-2017-Workplace-Based%20Interventions%20for%20Ne.PDF>



For **WAD**

General exercise & physiotherapy are both ineffective

Michaleff, Z. A., Maher, C. G., Lin, C.-W. C., Rebeck, T., Jull, G., Latimer, J., ... Sterling, M. (2014). Comprehensive physiotherapy exercise programme or advice for chronic whiplash (PROMISE): a pragmatic randomised controlled trial. *The Lancet*, 384(9938), 133-141. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Michaleff-2014-Comprehensive%20physiotherapy%20exe.pdf>

Griffin, A., Leaver, A., & Moloney, N. (2017). General exercise does not improve long-term pain and disability in individuals with whiplash-associated disorders: A systematic review. *Journal of Orthopaedic & Sports Physical Therapy*, 47(7), 472-480. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Griffin-2017-General%20exercise%20does%20not%20improve.pdf>



Increasing the dose of exercise doesn't add more benefit for NSNP

Wilhelm, M. P., Donaldson, M., Griswold, D., Learman, K. E., Garcia, A. N., Learman, S. M., & Cleland, J. A. (2020). The Effects of Exercise Dosage on Neck-Related Pain and Disability: A Systematic Review With Meta-analysis. *Journal of Orthopaedic & Sports Physical Therapy*, 50(11), 607-621. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Wilhelm-2020-The%20Effects%20of%20Exercise%20Dosage%20on.pdf>



Things that **do** work for neck pain

- ✓ Address psychosocial factors
- ✓ Just about any form of exercise
- ✓ Combine exercise with manual therapy for even better results

Conclusion There is not one superior type of physical exercise for people with chronic non-specific neck pain. Rather, there is very low quality evidence that motor control, yoga/Pilates/Tai Chi/Qigong and strengthening exercises are equally effective. These findings may assist clinicians to select exercises for people with chronic non-specific neck pain.

De Zoete, R. M., Armfield, N. R., McAuley, J. H., Chen, K., & Sterling, M. (2021). Comparative effectiveness of physical exercise interventions for chronic non-specific neck pain: a systematic review with network meta-analysis of 40 randomised controlled trials. *British Journal of Sports Medicine*, 55(13), 730-742. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/De%20Zoete-2021-Comparative%20effectiveness%20of%20phy.pdf>



Neck strengthening reduces future neck pain by 55%

Sihawong, R., Janwantanakul, P., & Jiamjarasrangsi, W. (2013). Effects of an exercise programme on preventing neck pain among office workers: a 12-month cluster-randomised controlled trial. *Occup Environ Med*, oemed-2013-101561. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Sihawong-2013-Effects%20of%20an%20exercise%20programme.pdf>

1+1=3

Exercise plus
manual therapy
is better than
either alone

Hidalgo, B., Hall, T., Bossert, J., Dugeny, A., Cagnie, B., & Pitance, L. (2017). The efficacy of manual therapy and exercise for treating non-specific neck pain: A systematic review. *Journal of back and musculoskeletal rehabilitation*, 30(6), 1149-1169. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Hidalgo-2017-The%20efficacy%20of%20manual%20therapy%20an.pdf>



Manual therapy works equally well at the painful joint or any other joint

Hidalgo, B., Hall, T., Bossert, J., Dugeny, A., Cagnie, B., & Pitance, L. (2017). The efficacy of manual therapy and exercise for treating non-specific neck pain: A systematic review. *Journal of back and musculoskeletal rehabilitation*, 30(6), 1149-1169. <https://be-research-papers.s3.amazonaws.com/Diploma%20lecture%20research%20papers/Lecture%2021%20Neck%20pathology/Hidalgo-2017-The%20efficacy%20of%20manual%20therapy%20an.pdf>

Summary: Neck pathology

- ✓ Rule out red flags aka specific causes of pain
- ✓ Nonspecific neck pain has a good natural history
- ✓ Psychosocial factors are the major predictors of recovery in NSNP including WAD
- ✓ Most forms of exercise are effective for NSNP but not WAD
- ✓ Combining exercise with manual therapy is better than either alone

Self Test

- ? True/False: Dry needling is effective for neck pain
- ? What kind of exercise is most effective for neck pain with or without radiculopathy?
- ? What do you do for neck pain?
- ? What is different about exercise programming for WAD?
- ? What predicts outcomes in WAD?



Learning goals

- ✓ Specific neck pain vs nonspecific neck pain vs WAD
- ✓ Most common pathologies fall under nonspecific neck pain
- ✓ Prognosis & treatment
 - ✓ Good natural history
 - ✓ Address psychosocial factors
 - ✓ Exercise
 - ✓ Manual therapy

Self Test

- ? What is specific neck pain?
- ? What is nonspecific neck pain?
- ? What is WAD?
- ? List at least 3 pathologies that fall under nonspecific neck pain
- ? What is the prognosis for nonspecific neck pain?
- ? What is the treatment for nonspecific neck pain?

Questions?