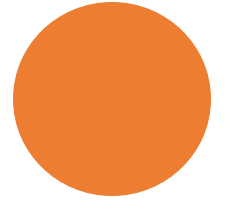


Low back pain

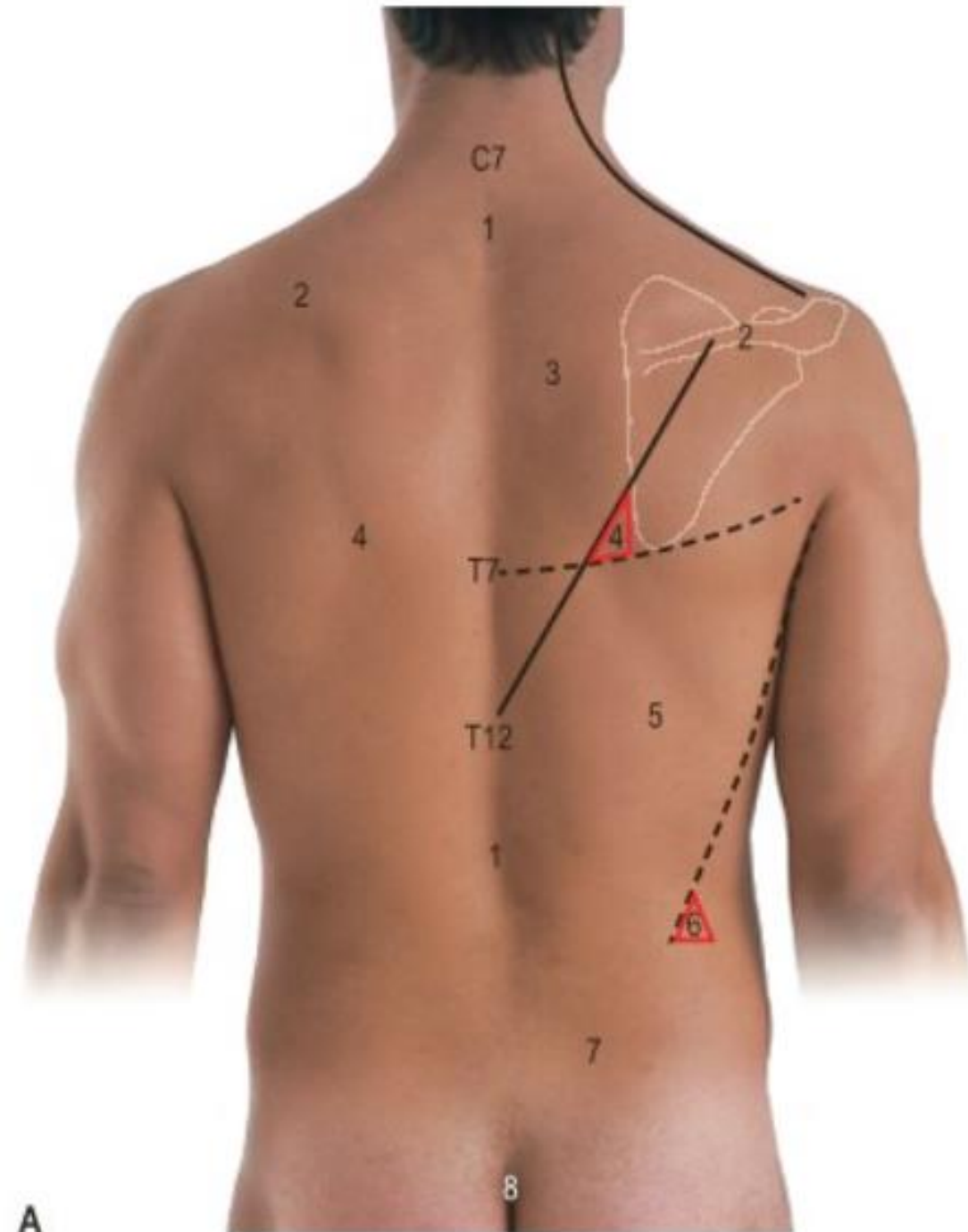


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Definizione

“LBP was defined as pain in the area on the posterior aspect of the body from the lower margin of the twelfth ribs to the lower gluteal folds with or without pain referred into one or both lower limbs that lasts for at least one day.”

Hoy D, March L, Brooks P, et al. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. *Ann Rheum Dis.* 2014;73(6):968-974.
Standring S. *Anatomia Del Gray* 41 Ed.: 2 Volumi. Edra; 2017.



Epidemiologia

years lived with disability (YLDs)

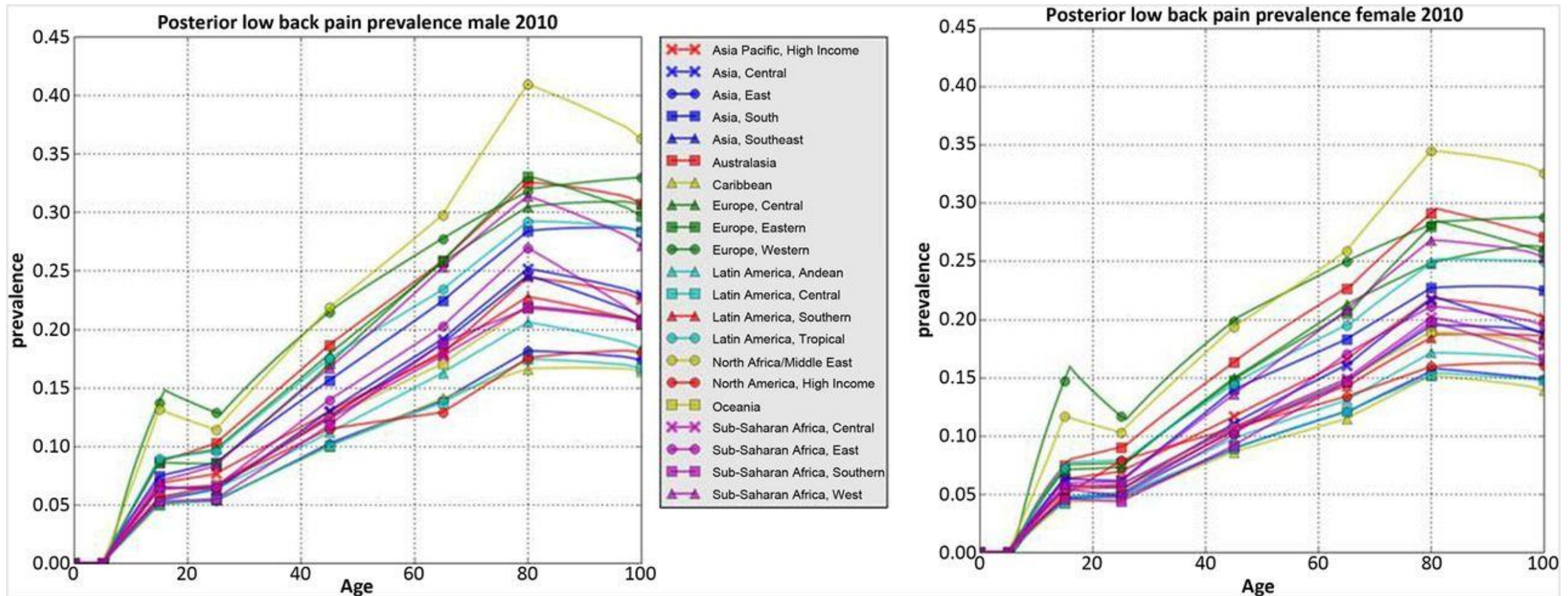


Table 1. Prevalence of low back pain according to prevalence period and case definition variations

Prevalence	No. of estimates	Quantile					Mean \pm SD%
		10%	25%	50%	75%	90%	
Prevalence period							
Point	243	6.3	10.3	15.0	24.2	35.5	18.3 \pm 11.7
1 month	145	14.8	21.3	32.1	38.0	49.0	30.8 \pm 12.7
1 year	271	14.3	21.0	37.4	53.0	64.8	38.0 \pm 19.4
Lifetime	133	6.2	15.1	42.0	60.4	66.4	38.9 \pm 24.3
Anatomic							
Back	268	9.9	15.8	26.6	36.4	53.6	28.5 \pm 16.4
Low back	302	7.2	12.8	26.1	43.1	56.0	29.1 \pm 18.8
R12 to lower GFs*	254	11.0	17.4	35.2	52.0	63.7	35.5 \pm 19.7
Minimum episode duration							
Not specified	661	8.7	15.0	31.5	48.8	62.5	33.2 \pm 20.3
1 day	146	14.1	22.1	34.0	44.0	56.4	33.8 \pm 15.8
3 months/“chronic”	86	8.7	12.8	19.2	24.3	33.6	20.1 \pm 9.8
Activity limitation							
With or without activity limitation	912	9.1	15.8	29.1	45.5	58.2	31.8 \pm 19.0
Activity-limiting only	54	5.0	8.1	12.2	18.8	30.8	17.0 \pm 15.4

* Posterior aspect of the body from the lower margin of the twelfth ribs (R12) to the lower gluteal folds (GFs).

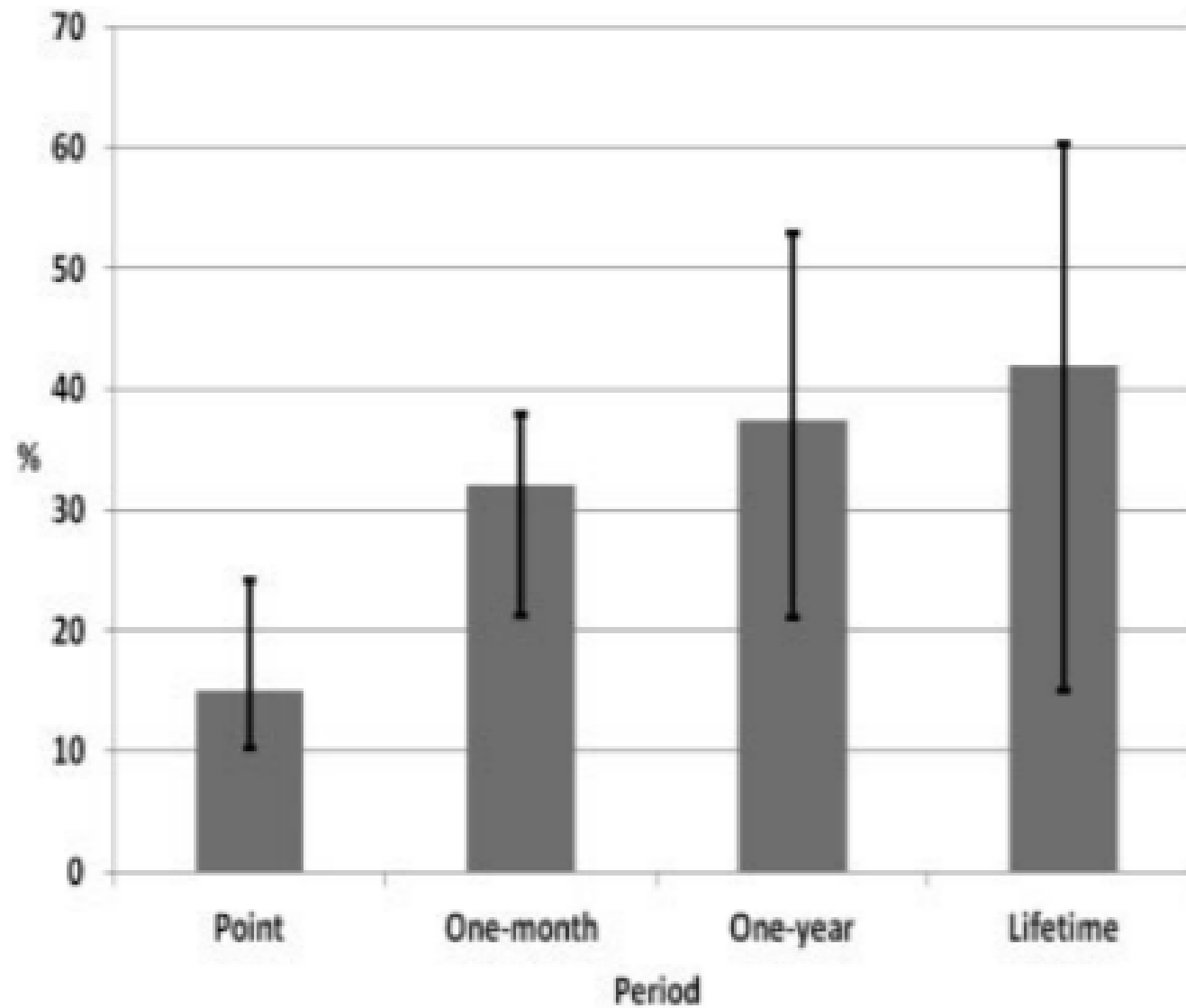


Figure 2. Median prevalence of low back pain, with interquartile range, according to prevalence period.

years lived with disability (YLDs)

CONCLUSION

Globally, LBP causes more YLD than any other condition. Governments, health service and research providers and donors need to pay far greater attention to the burden that LBP causes than what they have done previously. Further research is urgently needed to better understand the predictors and clinical course of LBP across different settings, and the ways in which LBP can be prevented and better managed.

Table 2 Prevalence of spinal pain under different case-definitions among 46,726 Danish children from the Danish National Birth Cohort, 11–14 years of age, born between 1996 and 2003, stratified by child's sex

(chi-squared tests of heterogeneity between boys and girls were statistically significant for all case-definitions) ($N = 46,726$)

Case-definitions of spinal pain	Original data (unweighted data)			Weighted data ^a		
	Total N (%)	Boys N (%)	Girls N (%)	Total (%)	Boys (%)	Girls (%)
Overall spinal pain ^b						
No pain	27,256 (58.3)	13,667 (61.3)	13,589 (55.6)	57.3	60.1	54.7
Moderate pain	13,877 (29.7)	6446 (28.9)	7431 (30.4)	30.0	29.4	30.4
Severe pain	5593 (12.0)	2174 (9.8)	3419 (14.0)	12.8	10.4	14.9
Multiple spinal pain						
No pain	41,133 (88.0)	20,113 (90.2)	21,020 (86.0)	87.2	89.6	85.1
One-sided pain	4266 (9.1)	1705 (7.7)	2561 (10.5)	9.7	8.0	11.2
Multi-sided pain	1327 (2.9)	469 (2.1)	858 (3.5)	3.1	2.4	3.7
Spinal pain-related daily-life consequences ^c						
Never	36,541 (78.2)	17,736 (79.6)	18,805 (77.0)	77.6	79.1	76.2
1–2 times	7561 (16.2)	3471 (15.6)	4090 (16.8)	16.4	15.8	17.0
More than 2 times	2613 (5.6)	1074 (4.8)	1539 (6.3)	6.0	5.0	6.9
Missing	11 (0.02)	6 (0.03)	5 (0.02)	0.02	0.03	0.02

^a Inverse probability weights relative to all children born in Denmark from 1996 to 2003

^b Main outcome of interest based on neck, middle back, and low back pain (see Fig. 3)

^c Defined as follows: “Never” if no experience of any of the daily-life consequences, “1–2 times” if they responded “once or twice” to only one of the daily-life consequences, and the remaining were categorized as “More than 2 times”

Conclusion

A considerable number of children suffer from spinal pain. Spinal pain is more common in girls and the prevalence increases with increasing age. In addition, children in more disadvantaged families are more likely to experience spinal pain. Awareness of the consequences of applying different case-definitions is essential in the assessment of spinal pain. Our findings provide a basis for further in-depth examination of spinal pain etiology with the aim of informing efficient and targeted prevention of spinal pain.

Coping with low back pain



«Gli approcci comuni sono:

1. **procrastinazione** e/o **evitamento** di un'attività, anche a bassi livelli di dolore,
2. tentativo di “**resistere al dolore**” durante una determinata attività, tollerandone livelli da bassi a moderati,
3. **prosecuzione** di un'attività fino al punto in cui il dolore peggiora significativamente (p. es., riacutizzazioni severe del dolore) e
4. persistenza in un'attività fino a quando una grave riacutizzazione del dolore costringe a interrompere l'attività stessa, nota anche come **iperattività**»

Table 4

Final factor solution with factor loadings for the behavioral items, mean and standard deviation (SD) for each item

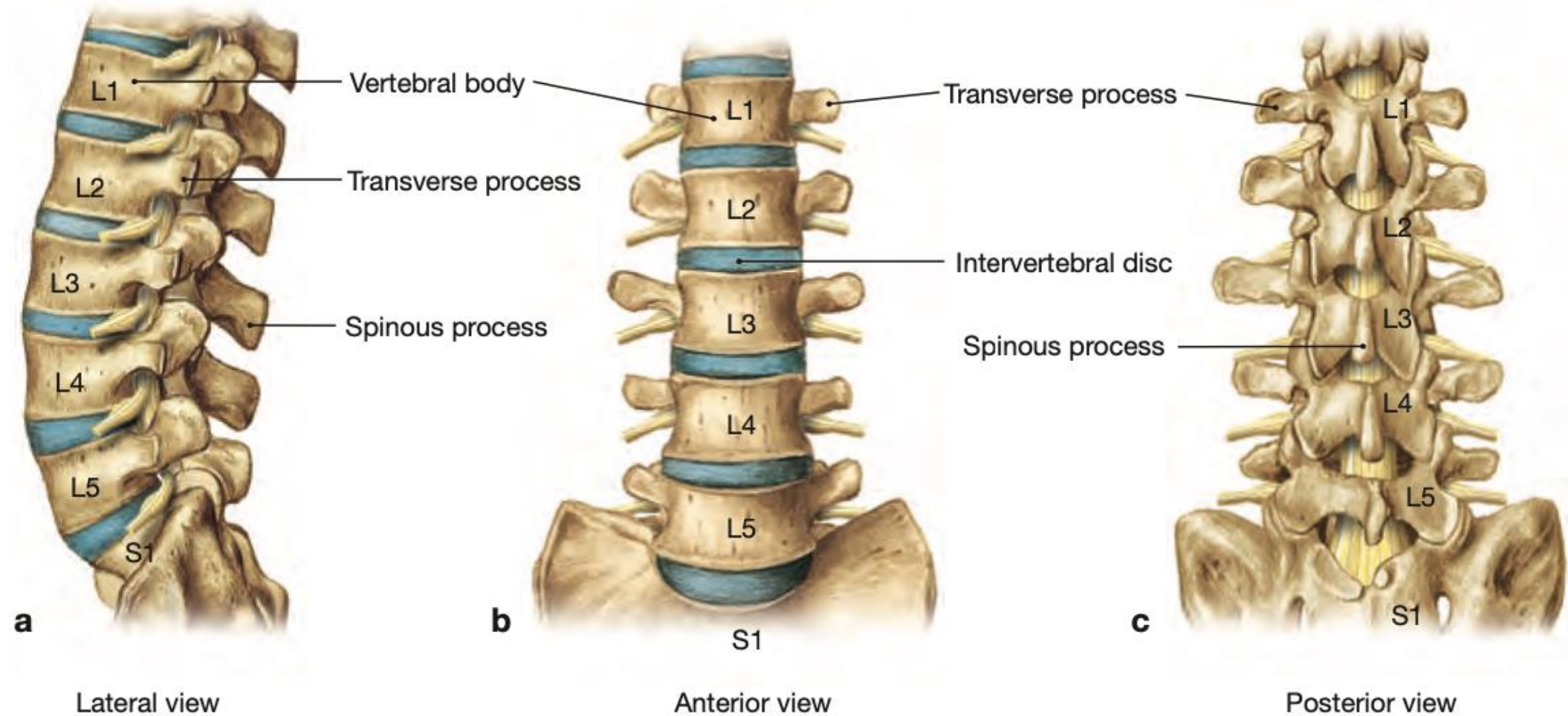
Item/description of item	KPI-CoPRS sub-scale	Factor I Avoidance of social activities	Factor II Avoidance of physical activities	Factor III Humour and distraction	Factor IV Pain persistence	Mean	SD
2. I avoid visiting my friends.	ASAS	0.76	0.12	-0.05	0.14	2.73	1.67
7. I cancel private appointments.	ASAS	0.83	0.08	-0.08	0.16	2.78	1.54
8. I cancel a visit to an event.	ASAS	0.89	0.06	0.29	-0.06	1.96	1.67
14. I break off meeting with friends.	ASAS	0.94	-0.07	0.03	0.03	1.92	1.46
18. I call guests to cancel invitations.	ASAS	0.91	0.01	0.11	-0.01	1.64	1.51
21. I avoid other people's company.	ASAS	0.82	-0.08	-0.08	0.15	2.31	1.56
1. I stop physical demanding activities.	APAS	-0.08	0.88	0.12	0.03	4.26	1.38
3. I take a rest.	APAS	0.09	0.70	0.03	-0.12	3.94	1.27
9. I avoid physical strenuous activities.	APAS	-0.06	0.86	-0.08	0.05	3.99	1.44
10. I avoid doing sports.	APAS	0.12	0.55	-0.35	0.26	4.06	1.64
20. I hand over strenuous activities.	APAS	0.15	0.65	0.08	-0.18	3.37	1.42
13. I laugh heartily anyway.	BES	-0.34	0.25	0.55	-0.03	3.68	1.50
16. I take it with a laugh.	BES	-0.09	0.08	0.67	0.11	2.40	1.64
17. I let my family persuade me into things, even I don't feel like it.	BES	-0.17	-0.14	0.59	-0.05	2.26	1.53
22. I distract with physical activity.	BES	0.19	-0.11	0.83	-0.02	1.75	1.47
23. I distract doing little jobs at home.	BES	0.16	0.11	0.80	0.11	2.65	1.50
4. I take care not to let myself go.	BES	-0.02	0.30	0.04	0.75	3.72	1.68
5. I try not to take any notice of it.	BES	-0.06	-0.05	0.35	0.50	3.07	1.45
6. I clench my teeth.	BES	0.08	-0.20	-0.16	0.63	3.65	1.51
11. I say "Don't make such a fuss!".	BES	-0.07	-0.07	0.19	0.62	2.80	1.71
12. I keep my appointments, even I don't feel up to it.	BES	-0.32	0.00	-0.09	0.69	4.00	1.44
15. I tell myself: "I don't have time for this right now!"	BES	0.16	-0.19	0.12	0.63	2.48	1.71
19. I carry on doing what I am doing, no matter what.	BES	-0.23	-0.19	0.04	0.49	3.46	1.55
Explained variance in percent		36.16%	11.19%	7.99%	6.63%		

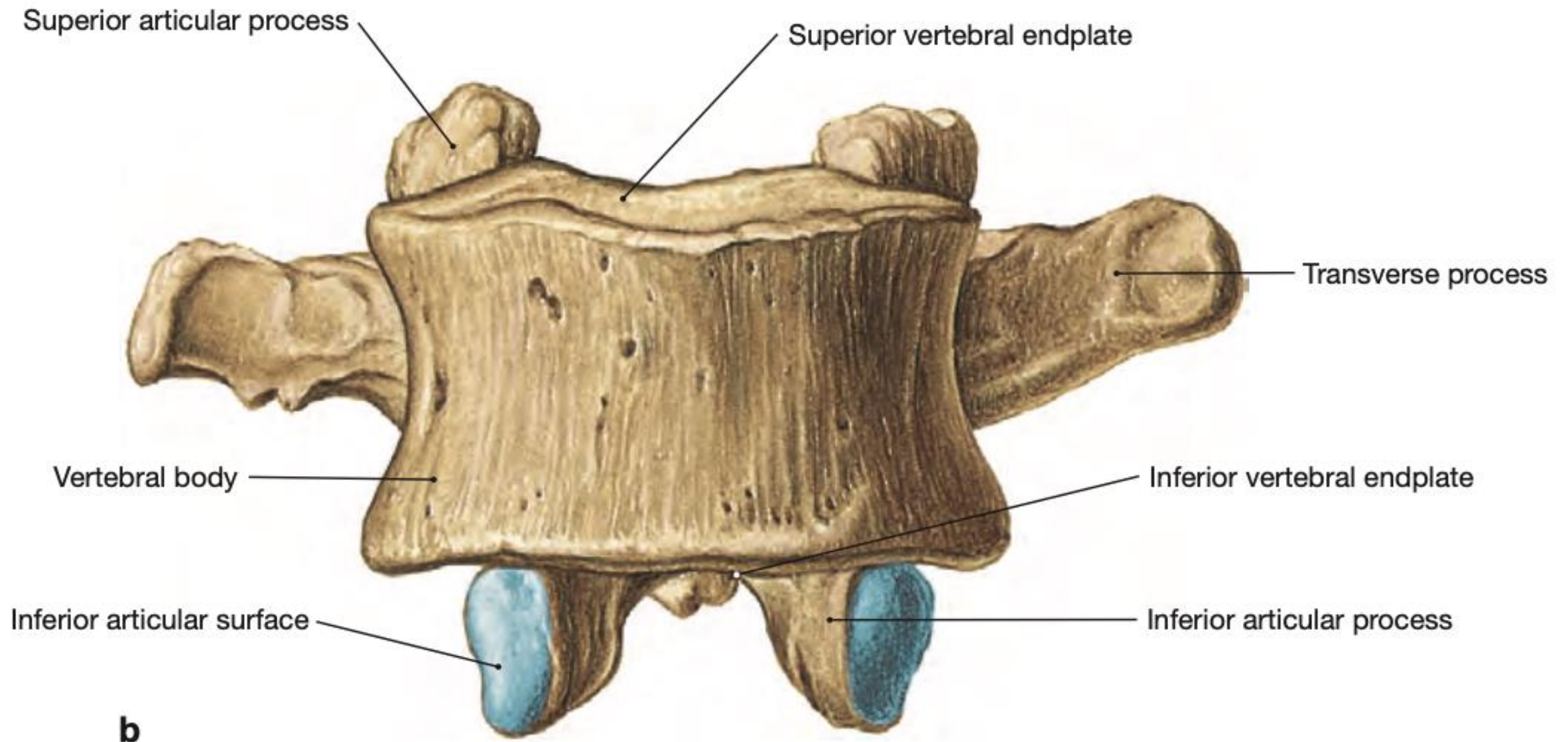
Table 6

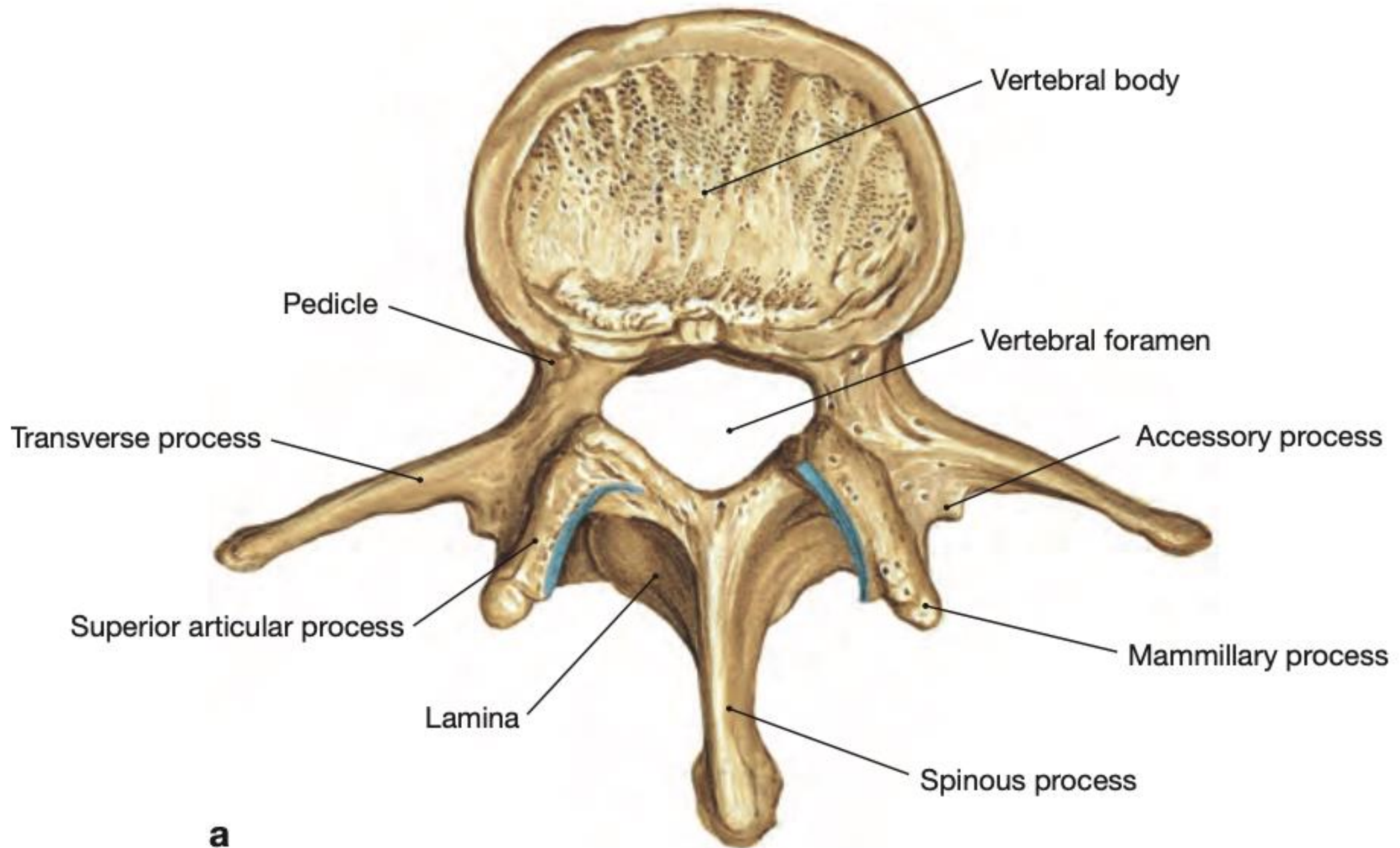
Sub-scales, number of items and internal consistency (Cronbach's α) of the avoidance-endurance questionnaire (AEQ) compared to the original Kiel Pain Inventory (KPI).

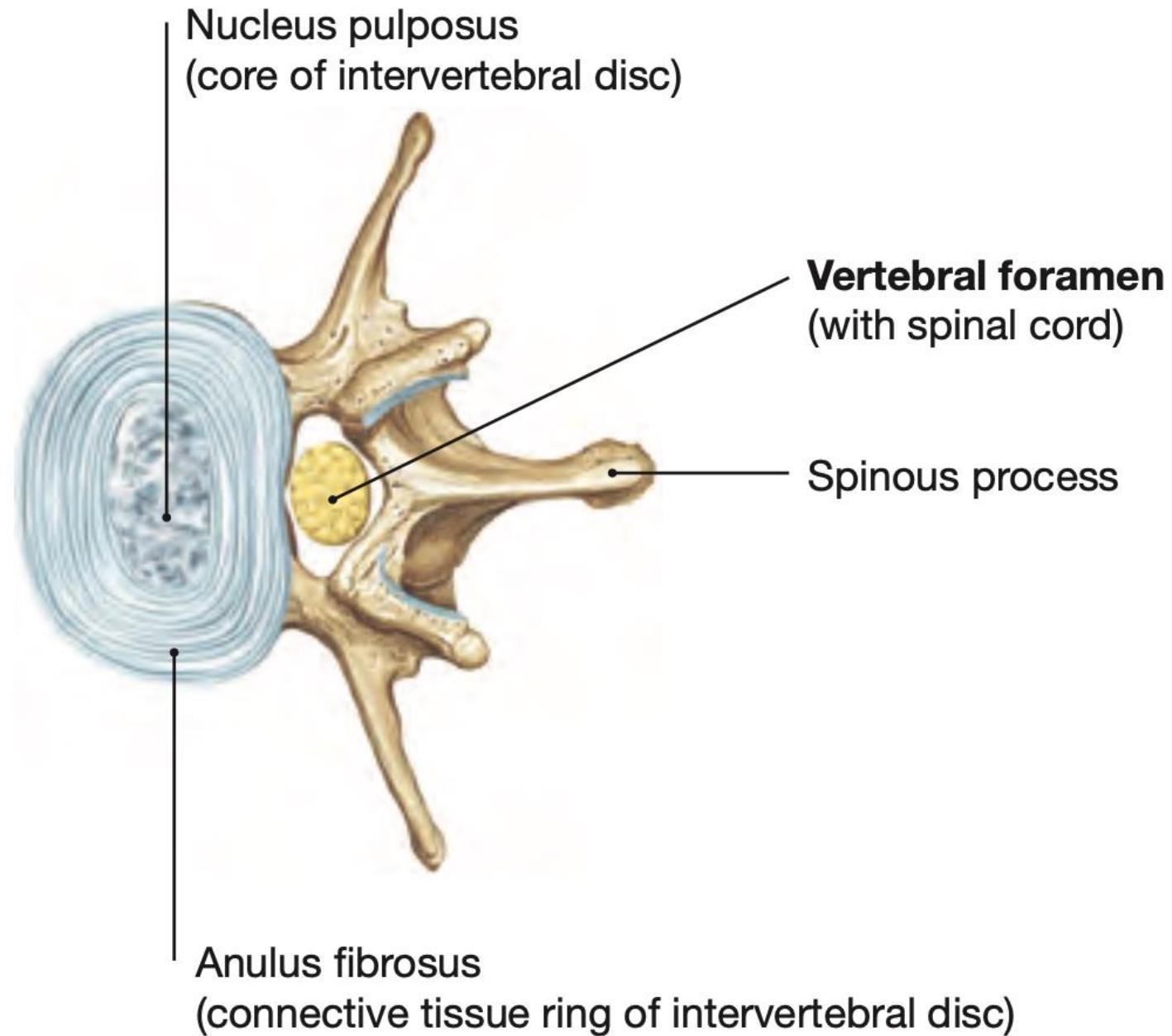
	KPI (Hasenbring, 1994)		AEQ (current study)	
	α	Number of items	α	Number of items
<i>Fear-avoidance scales</i>				
Anxiety/depression	.91	8	.91	7
Help/-hopelessness	.91	9	.91	9
Catastrophizing thoughts	.84	5	.78	3
Avoidance of social activities	.91	9	.92	6
Avoidance of physical activities	.86	10	.83	5
<i>Endurance scales</i>				
Positive mood despite pain	.85	4	.90	3
Thought suppression	.78	4	.80	4
Behavioral endurance	.81	12	.83	12
– Humor/distraction			.78	5
– Pain persistence			.76	7

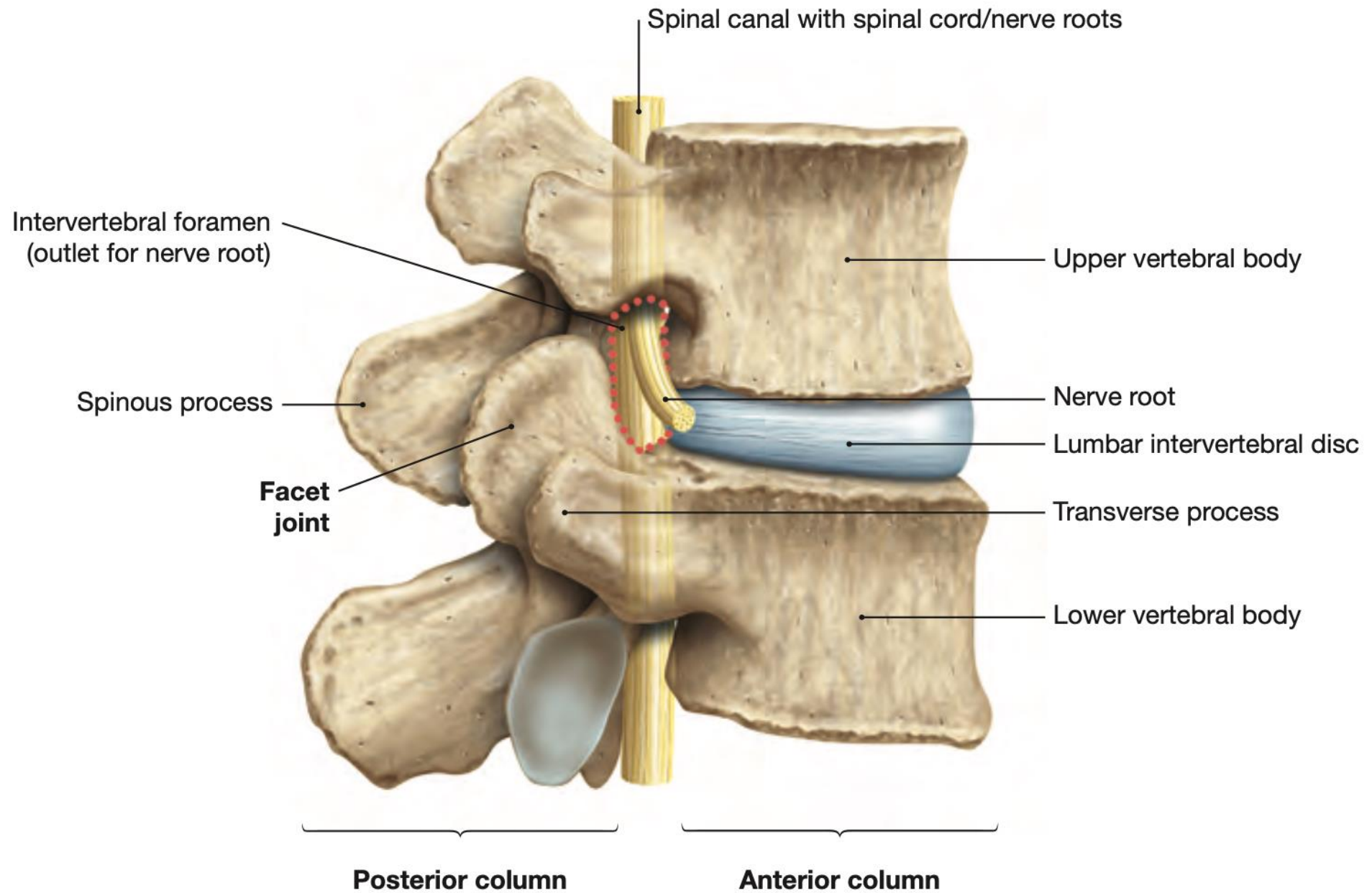
Richiami di Anatomia

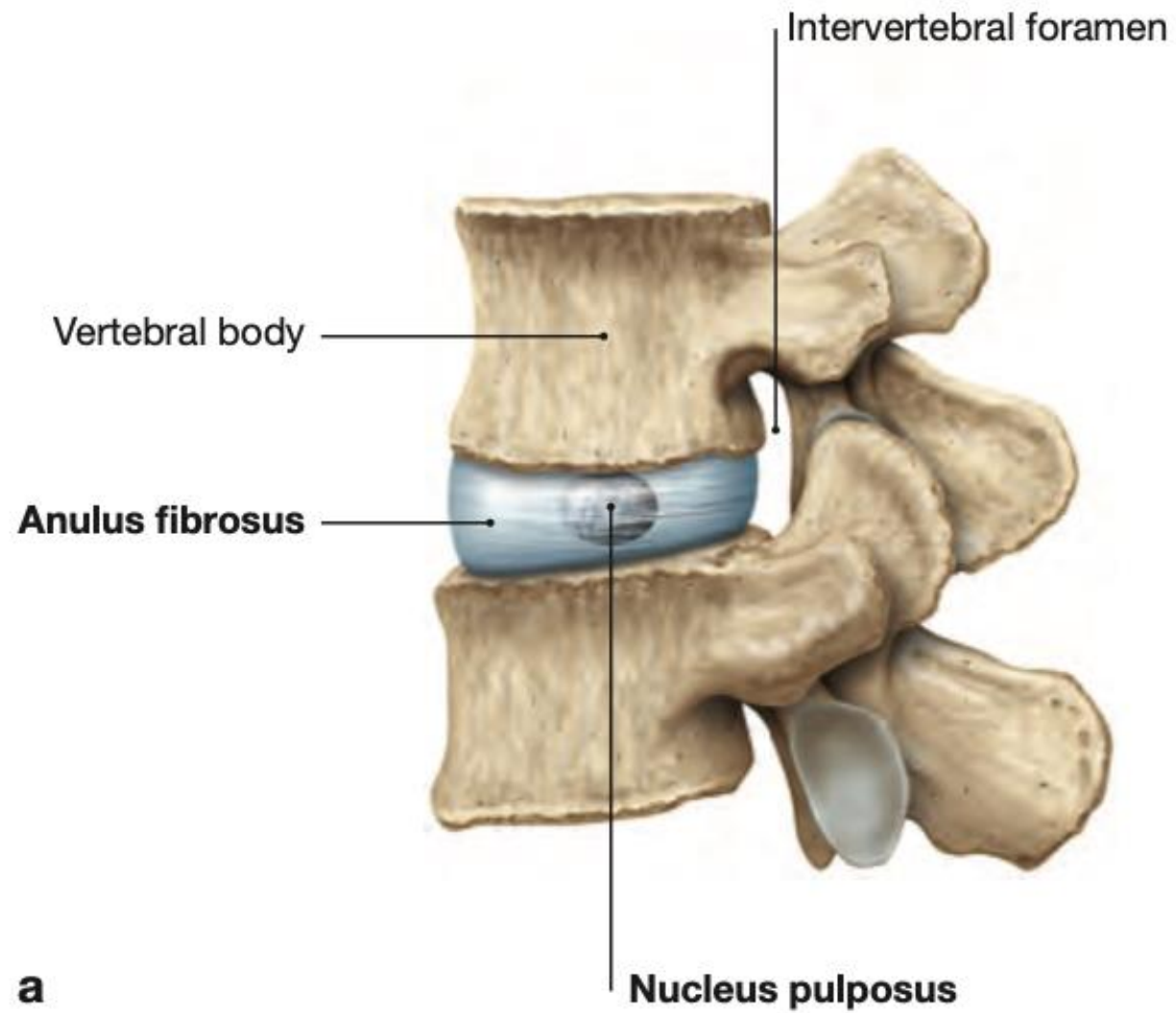


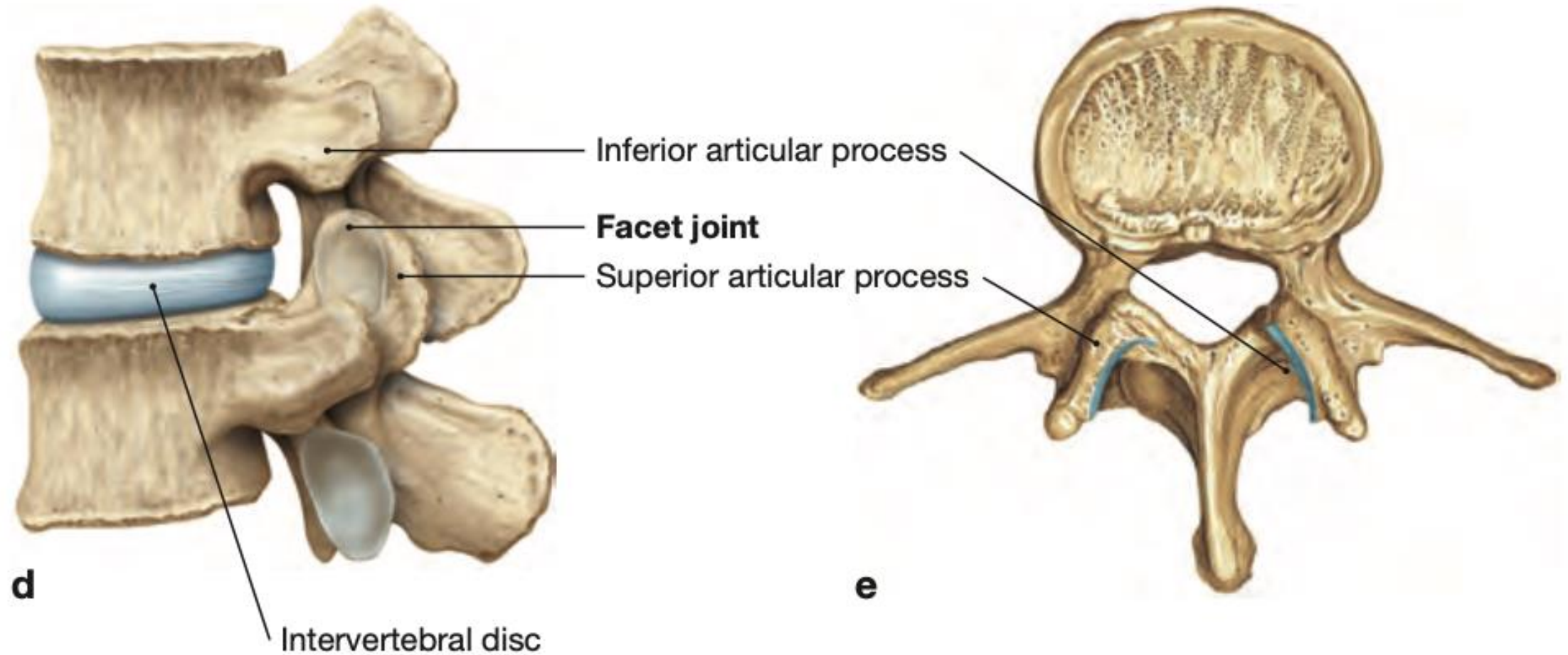


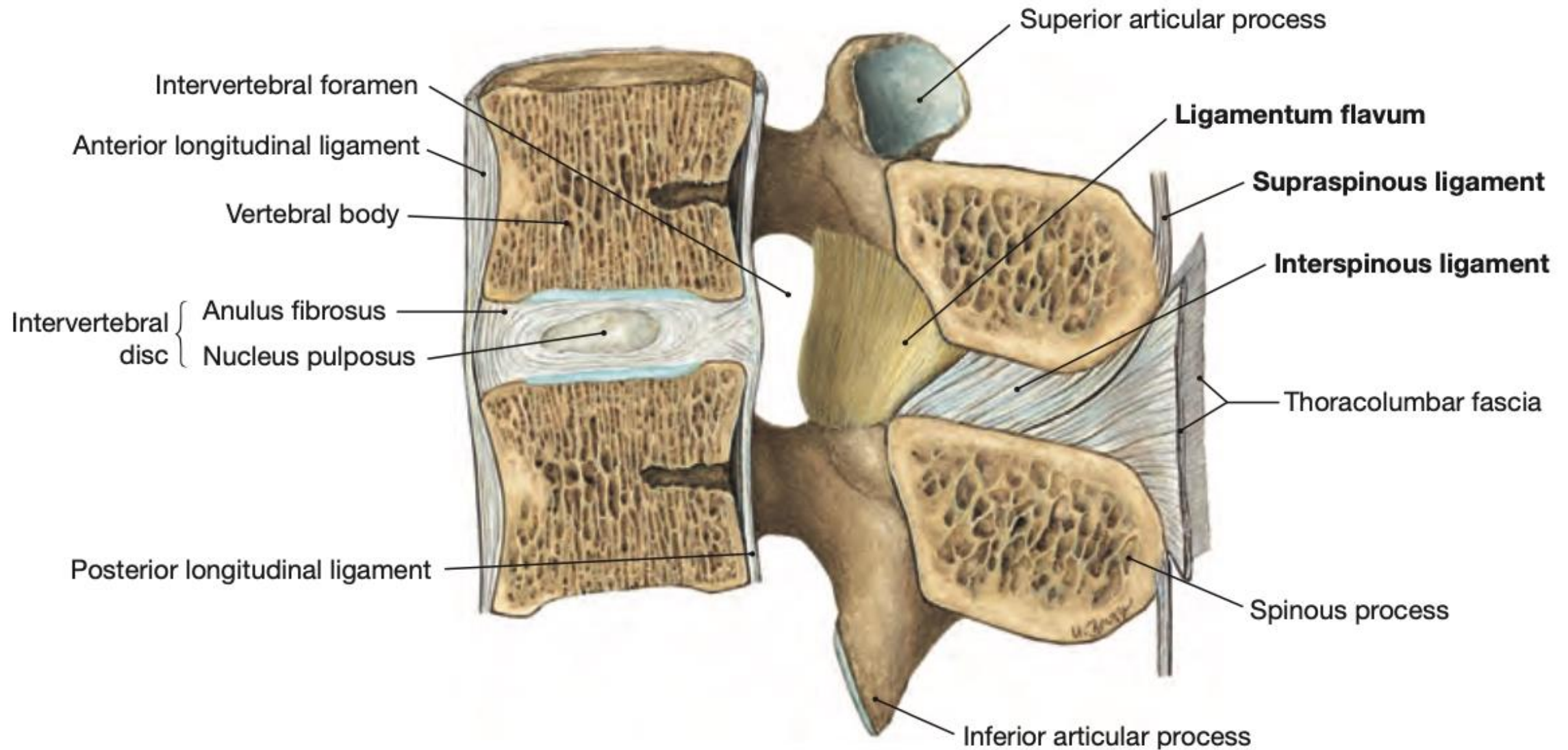


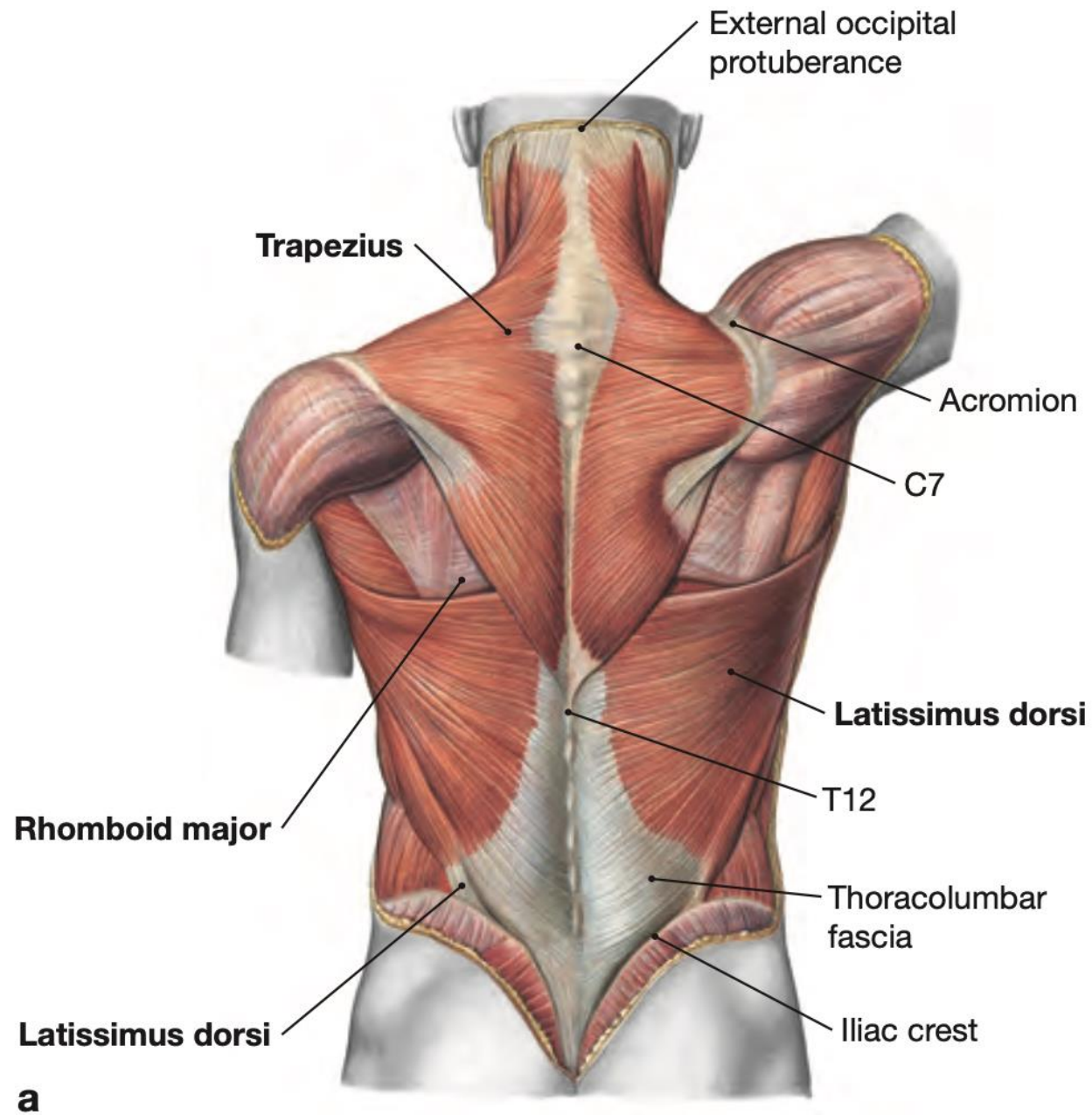


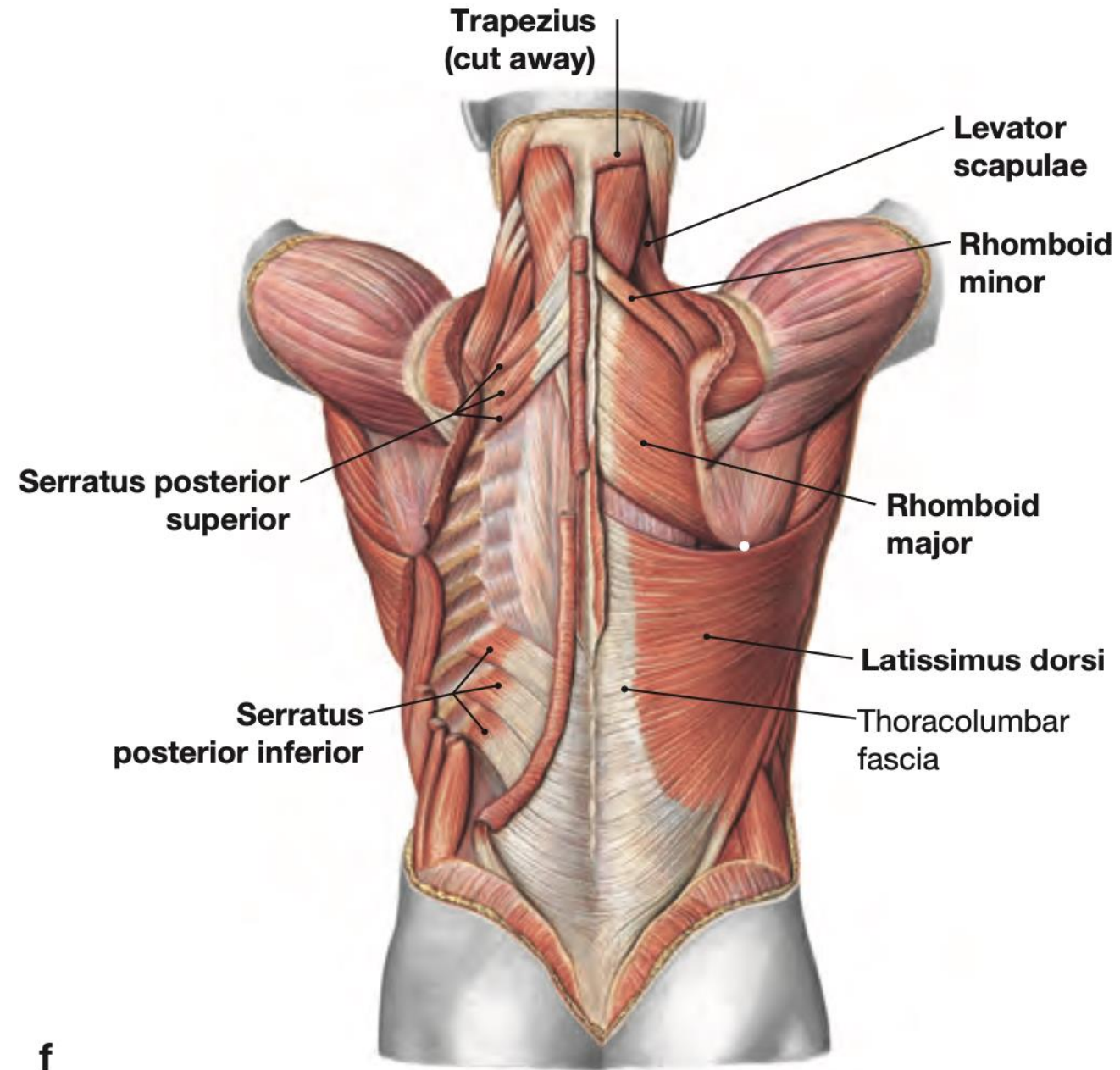




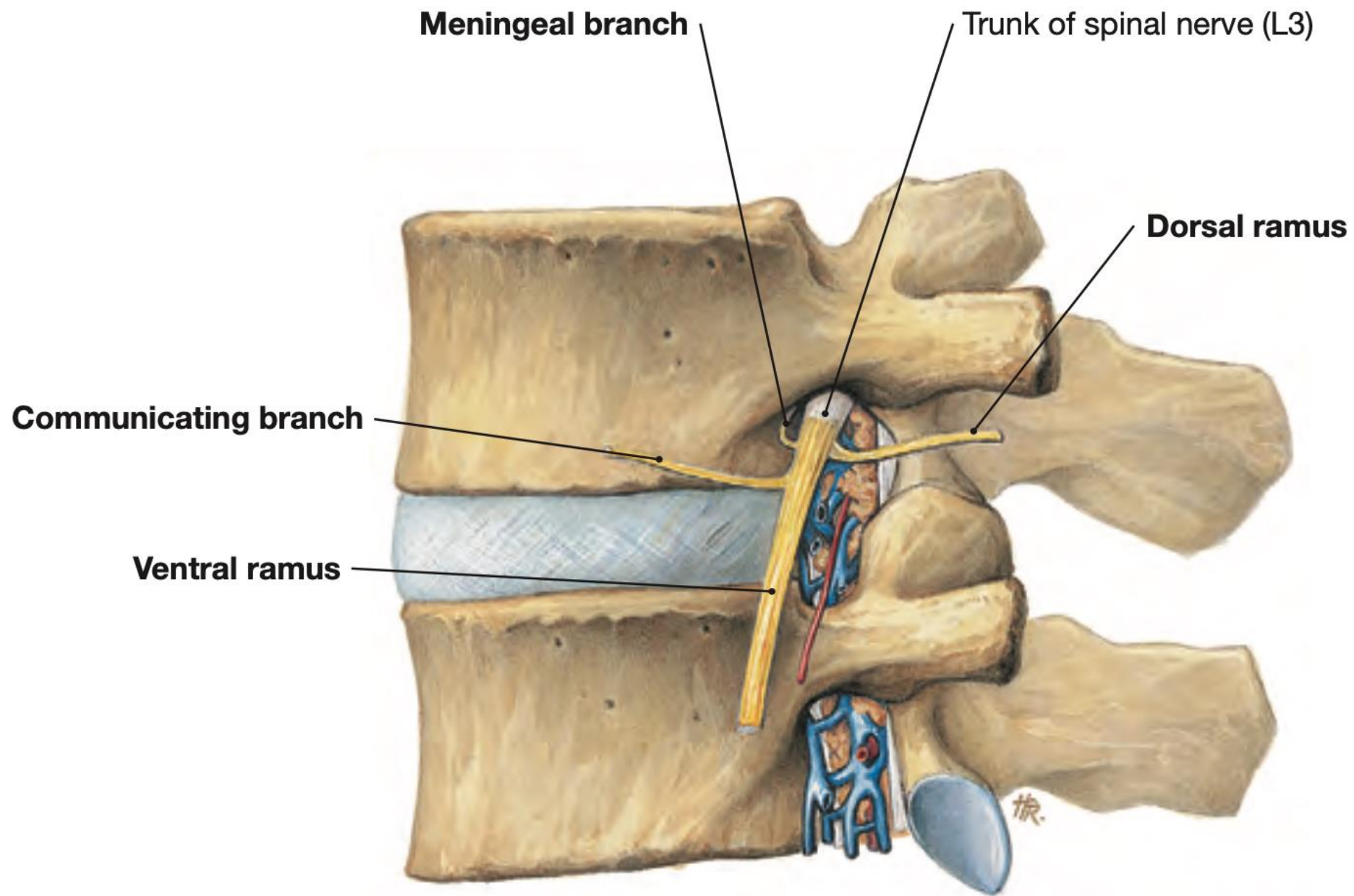


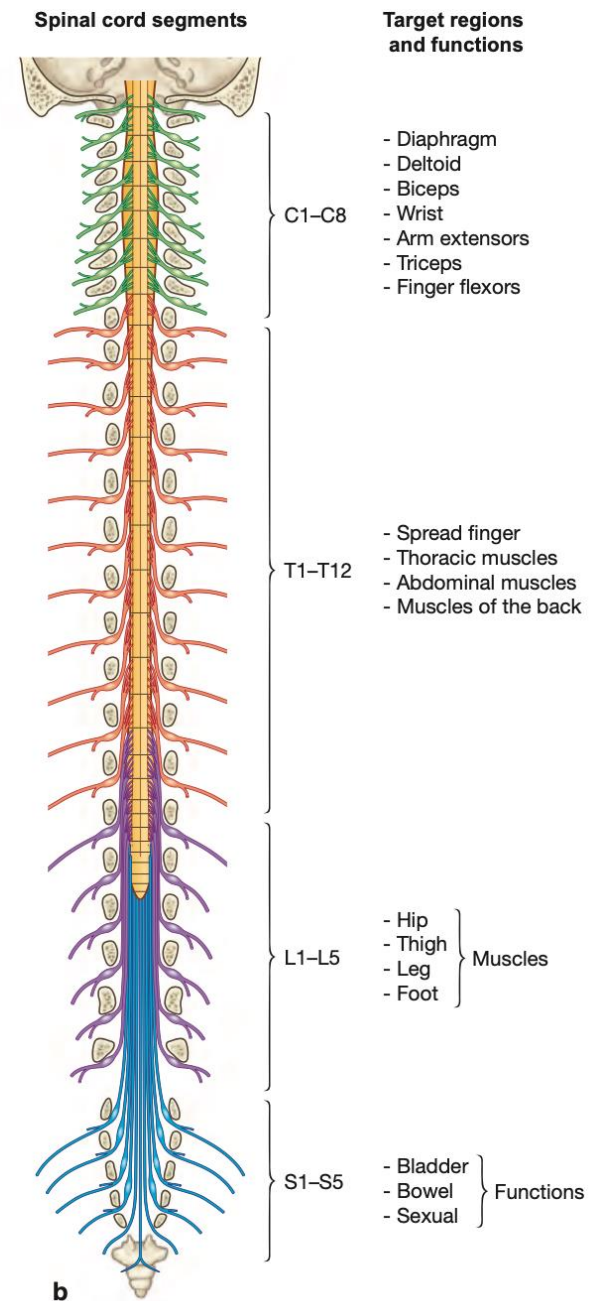
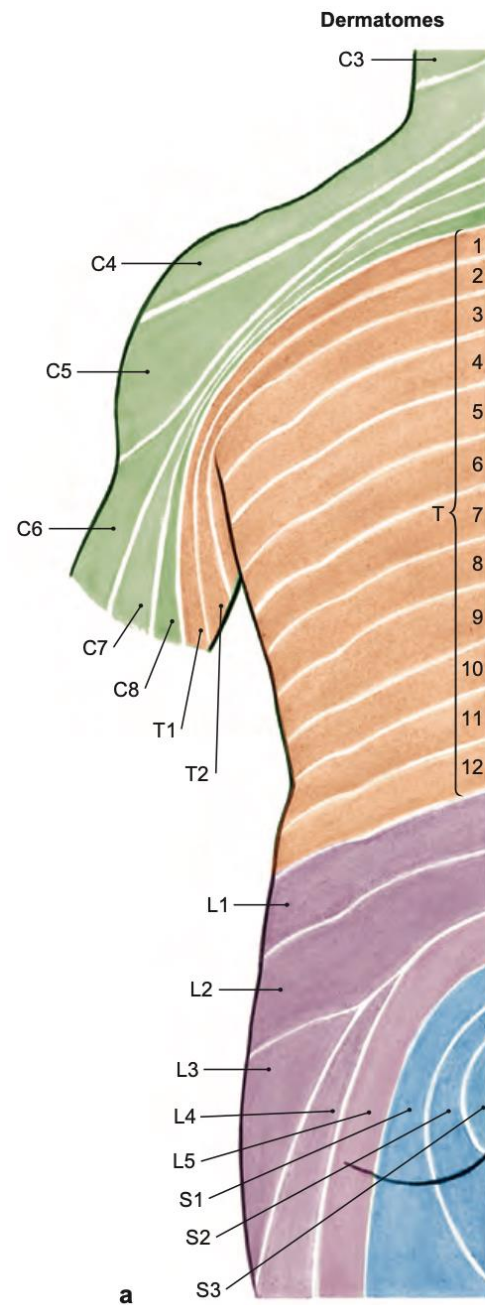


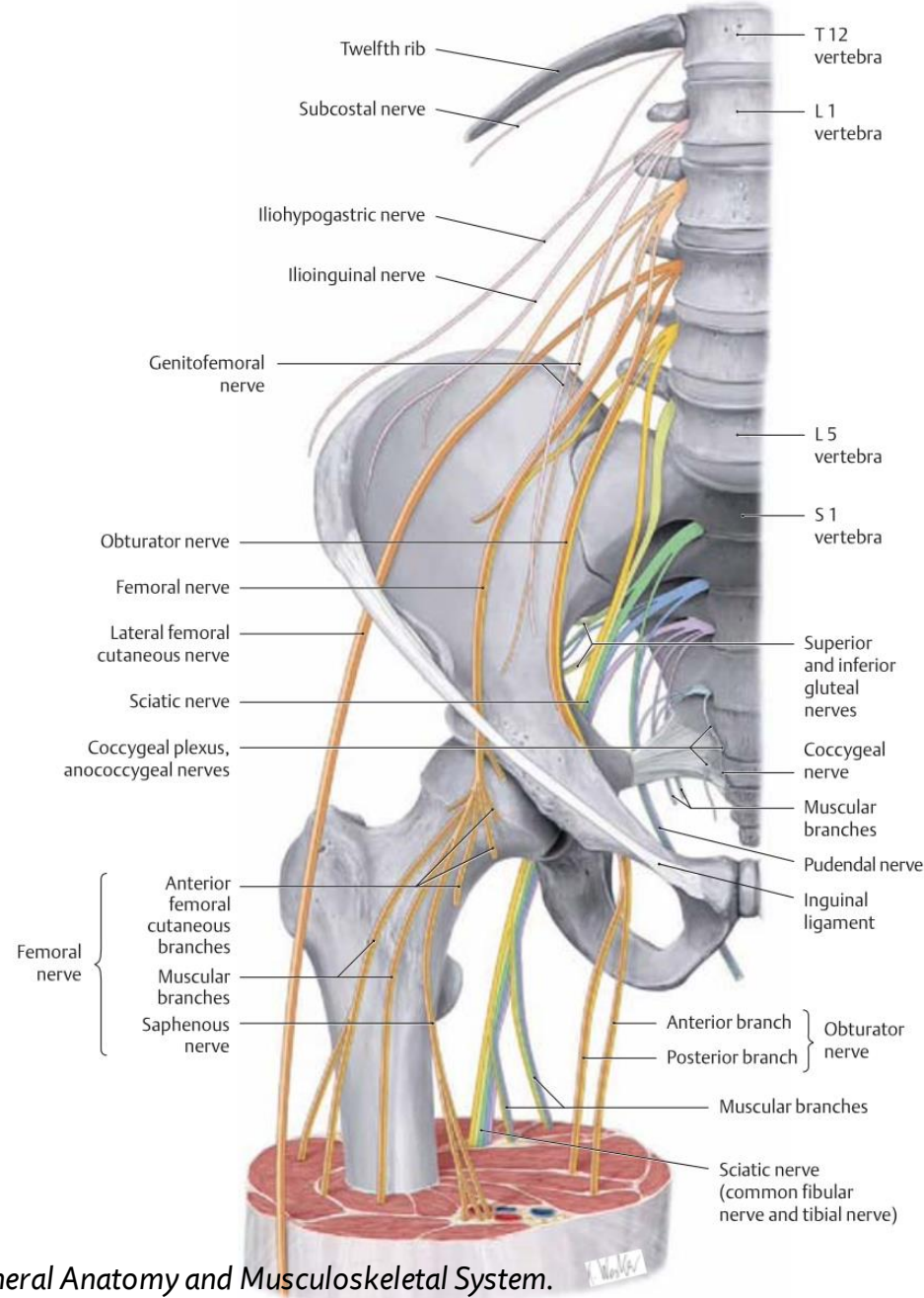
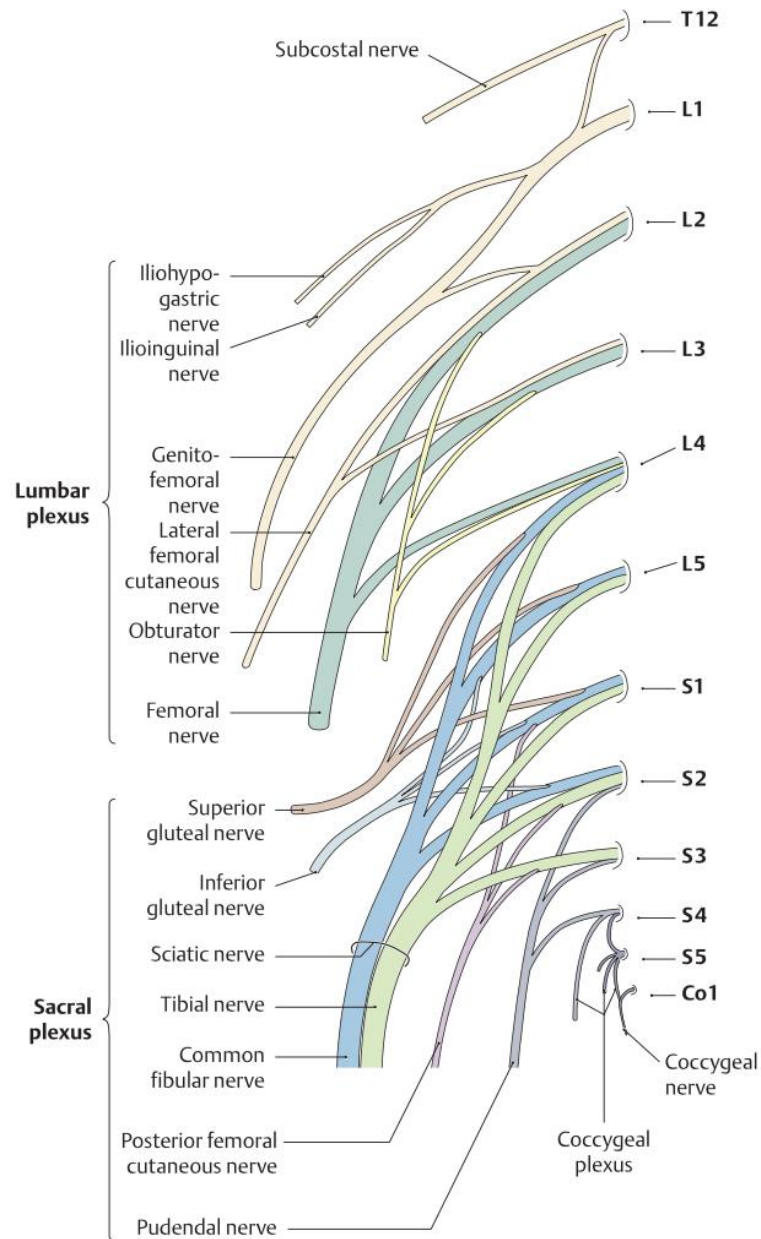




f







B Spinal cord segments and nerves of the lumbosacral plexus

The lumbosacral plexus supplies sensory and motor innervation to the lower limb. It is formed by the ventral rami of the lumbar and sacral spinal nerves, with contributions from the subcostal nerve (T12) and coccygeal nerve (Co1) (see D). The lumbosacral plexus is subdivided into the lumbar plexus and sacral plexus based on its distribution and topography.

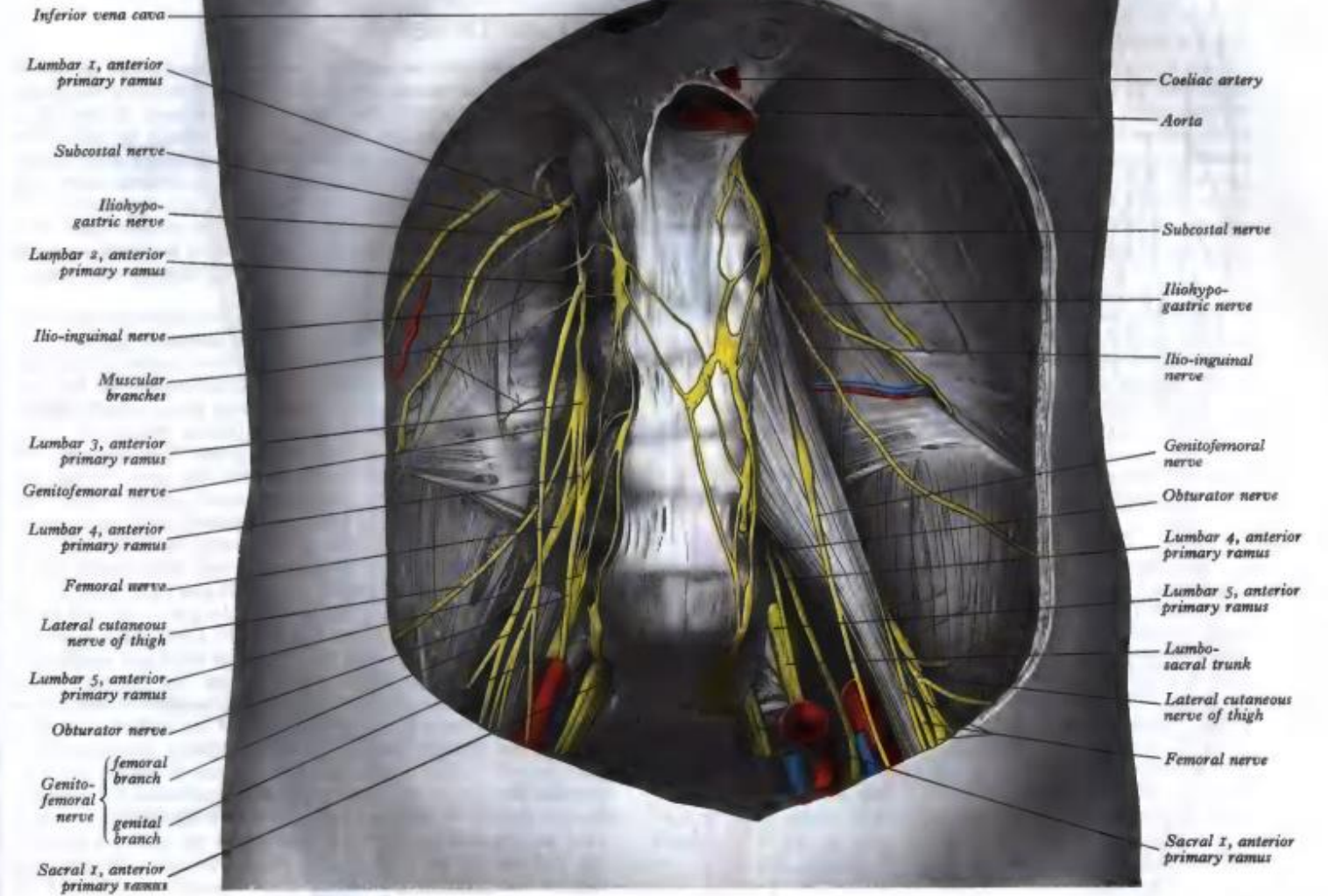
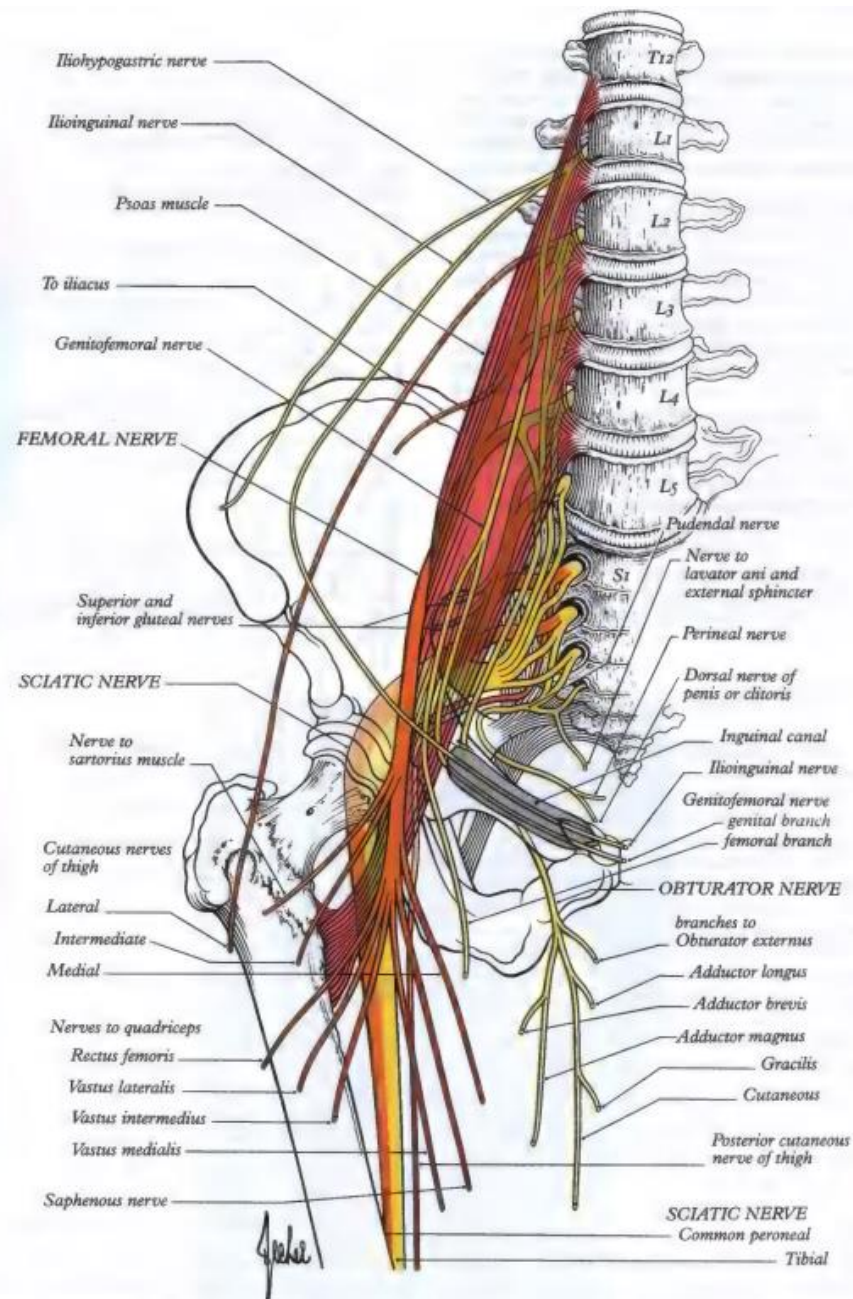
Lumbar plexus (T12–L4)

- Iliohypogastric nerve (T12–L1)
- Ilioinguinal nerve (L1)
- Genitofemoral nerve (L1, L2)
- Lateral femoral cutaneous nerve (L2, L3)
- Obturator nerve (L2–L4)
- Femoral nerve (L2–L4)
- Short, direct muscular branches to specific hip muscles

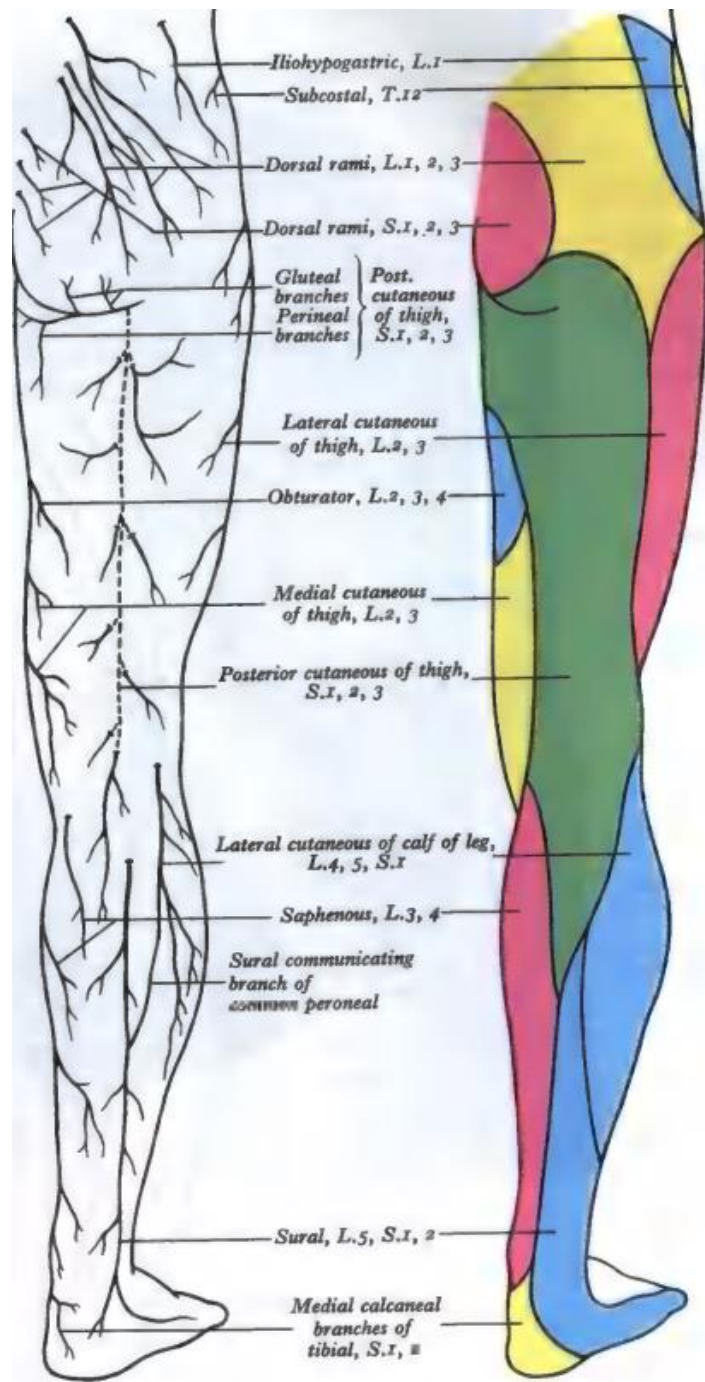
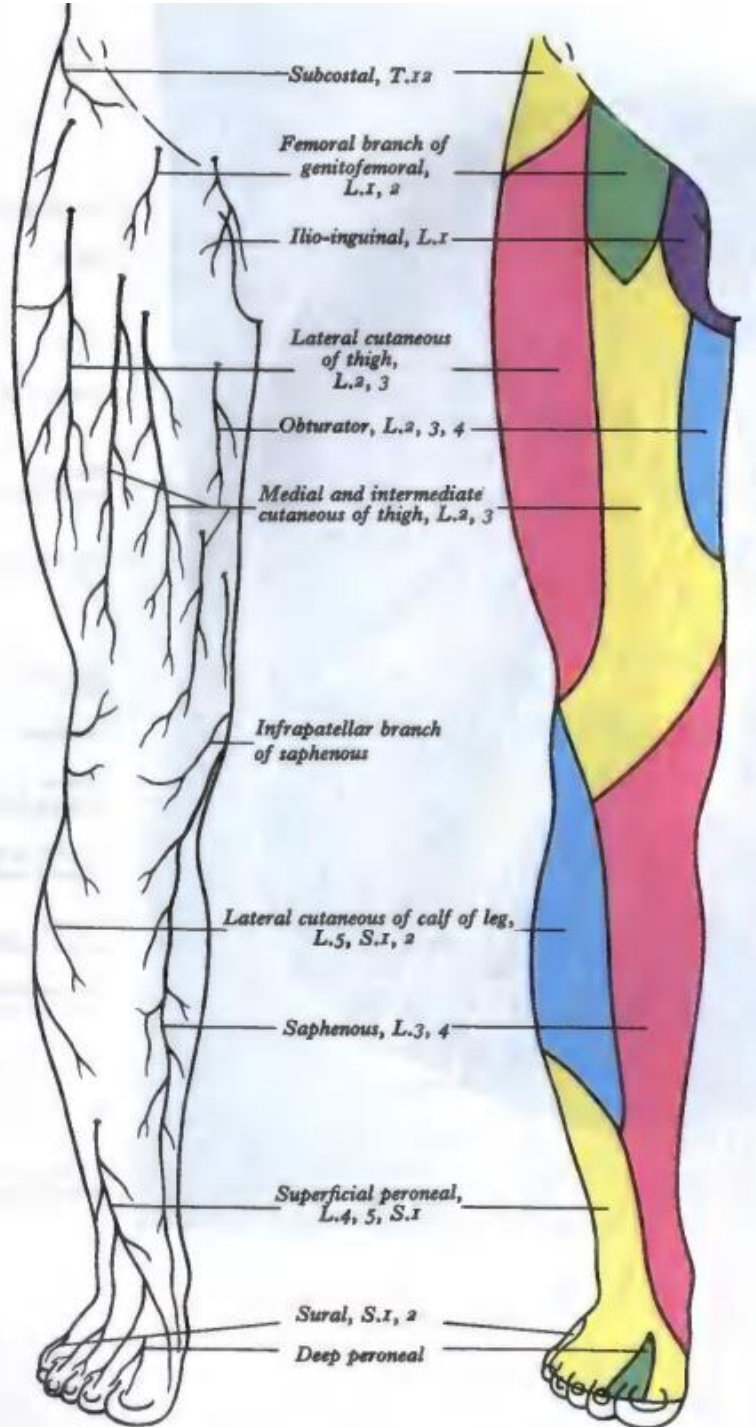
Sacral plexus (L5–S4)*

- Superior gluteal nerve (L4–S1)
- Inferior gluteal nerve (L5–S2)
- Posterior femoral cutaneous nerve (S1–S3)
- Sciatic nerve (L4–S3) with its two large branches:
 - Tibial nerve (L4–S3)
 - Common fibular nerve (L4–S2)
- Pudendal nerve (S2–S4)
- Short, direct muscular branches to specific hip muscles

* Often the sacral plexus is further subdivided into a sciatic plexus and a pudendal plexus. The main branch of the pudendal plexus, the pudendal nerve, supplies the skin and muscles of the pelvic floor, perineum, and external genitalia.

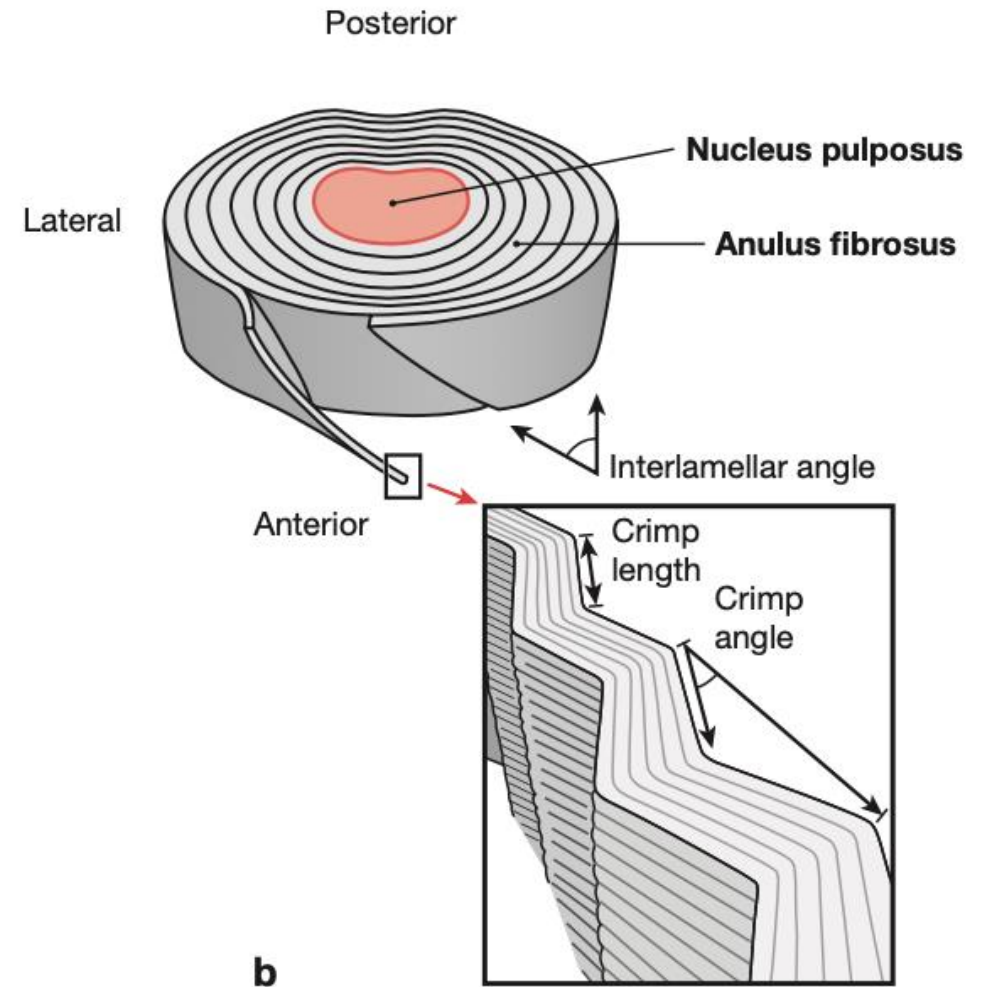
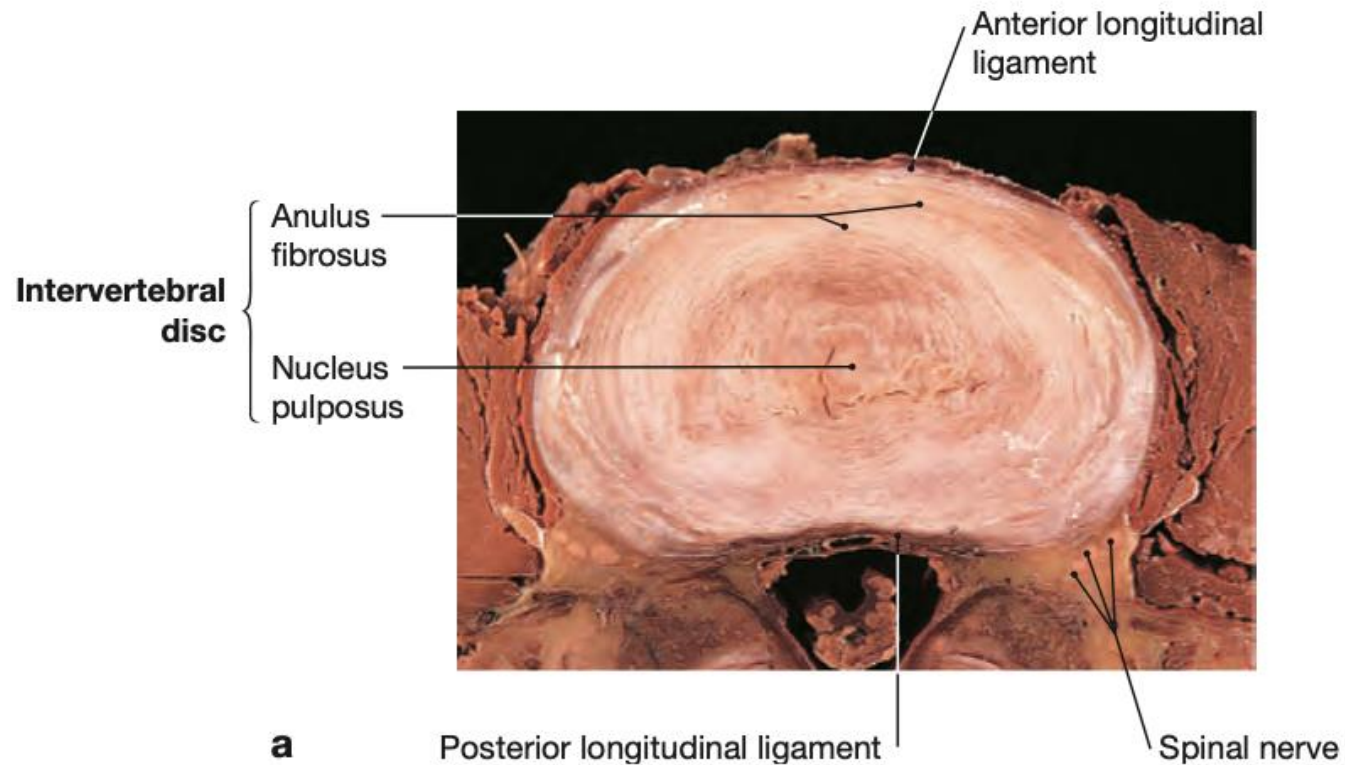


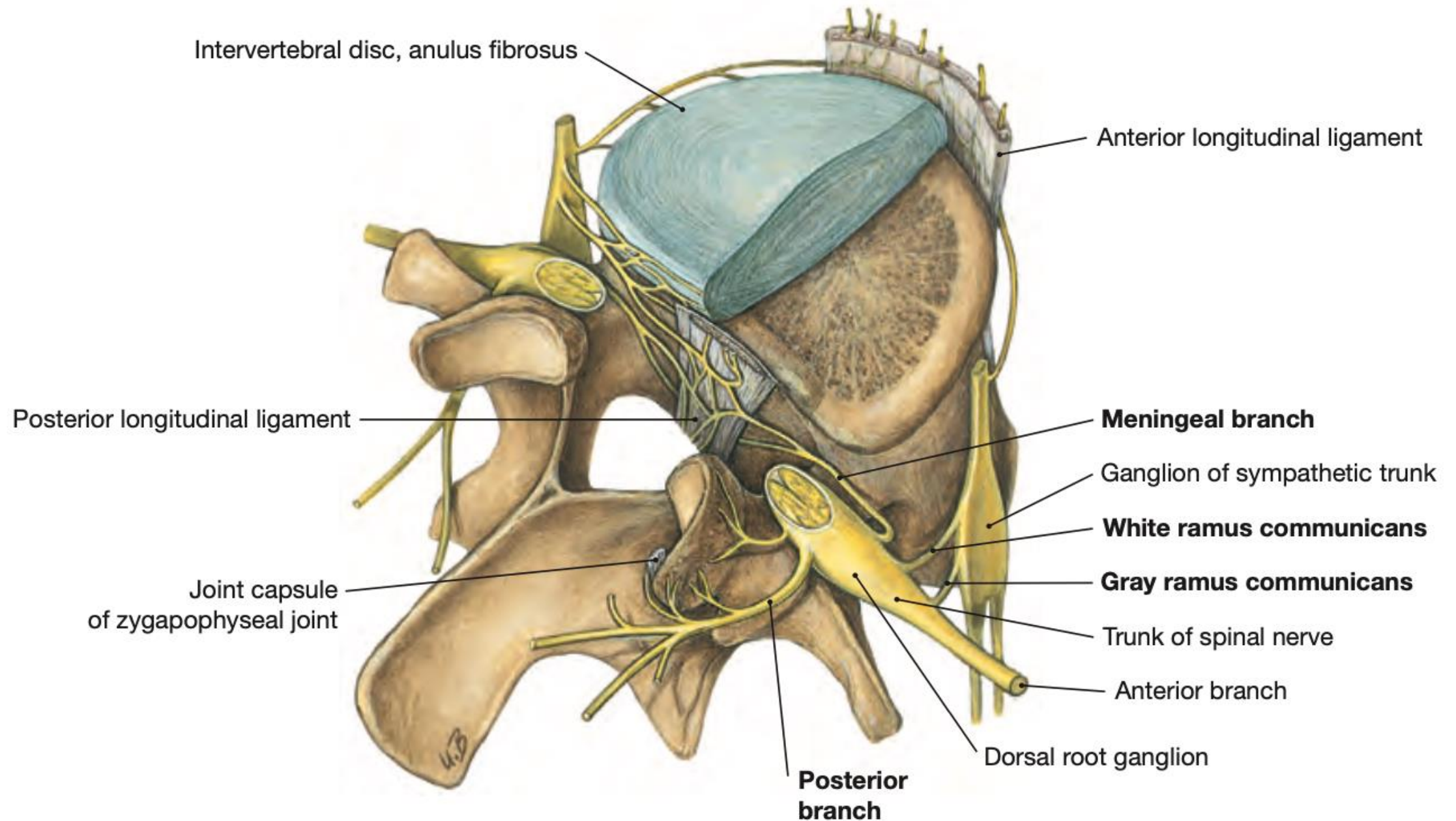
8.378 A dissection of the posterior abdominal wall to show the lumbar plexus and sympathetic trunks. The right psoas major has been removed.



Gray H, Williams, Peter L., Bannister, Lawrence H., Gray's Anatomy: The Anatomical Basis of Medicine and Surgery. Churchill Livingstone; 1999.

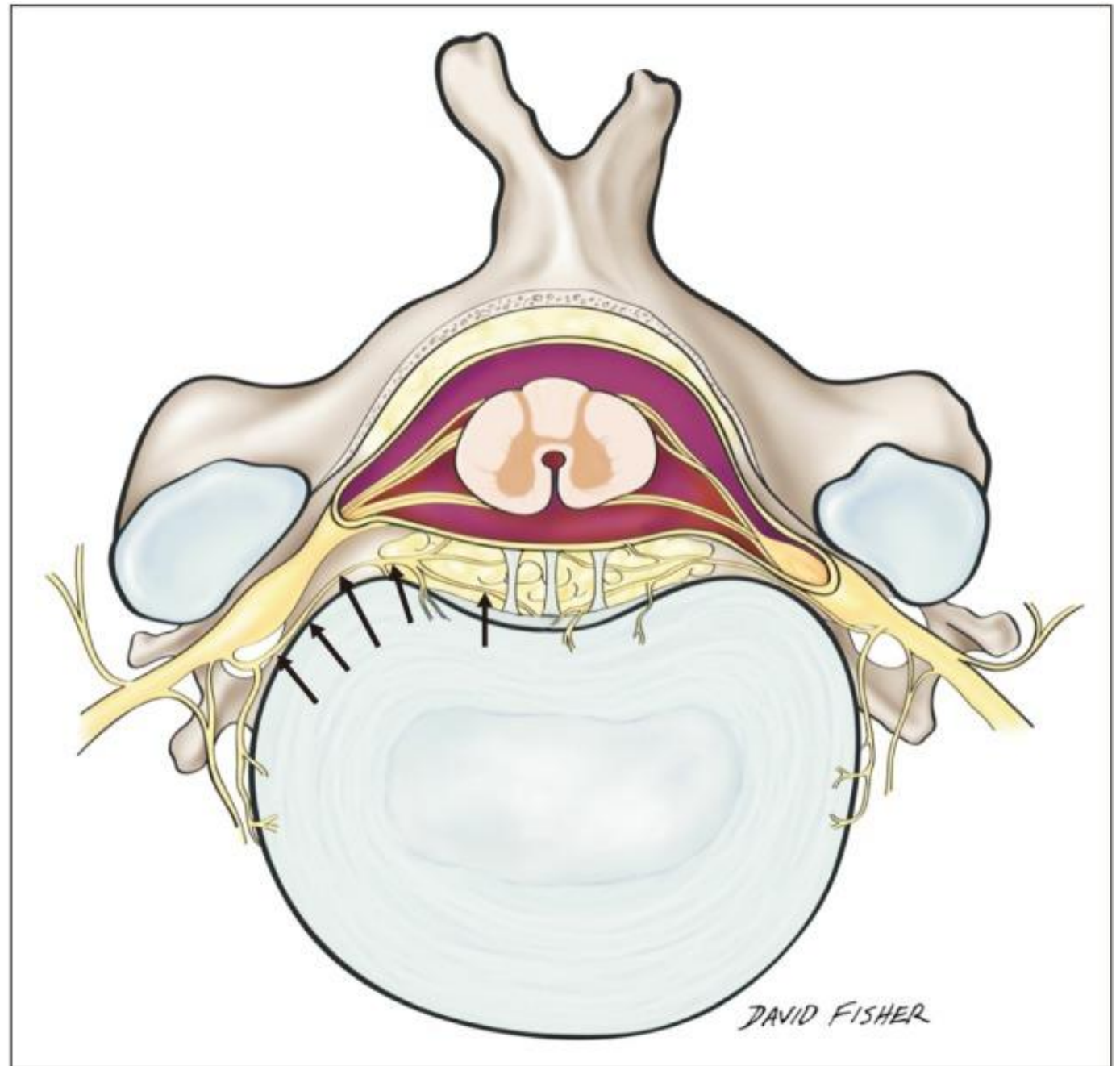
Fisiopatologia del dolore da discopatia



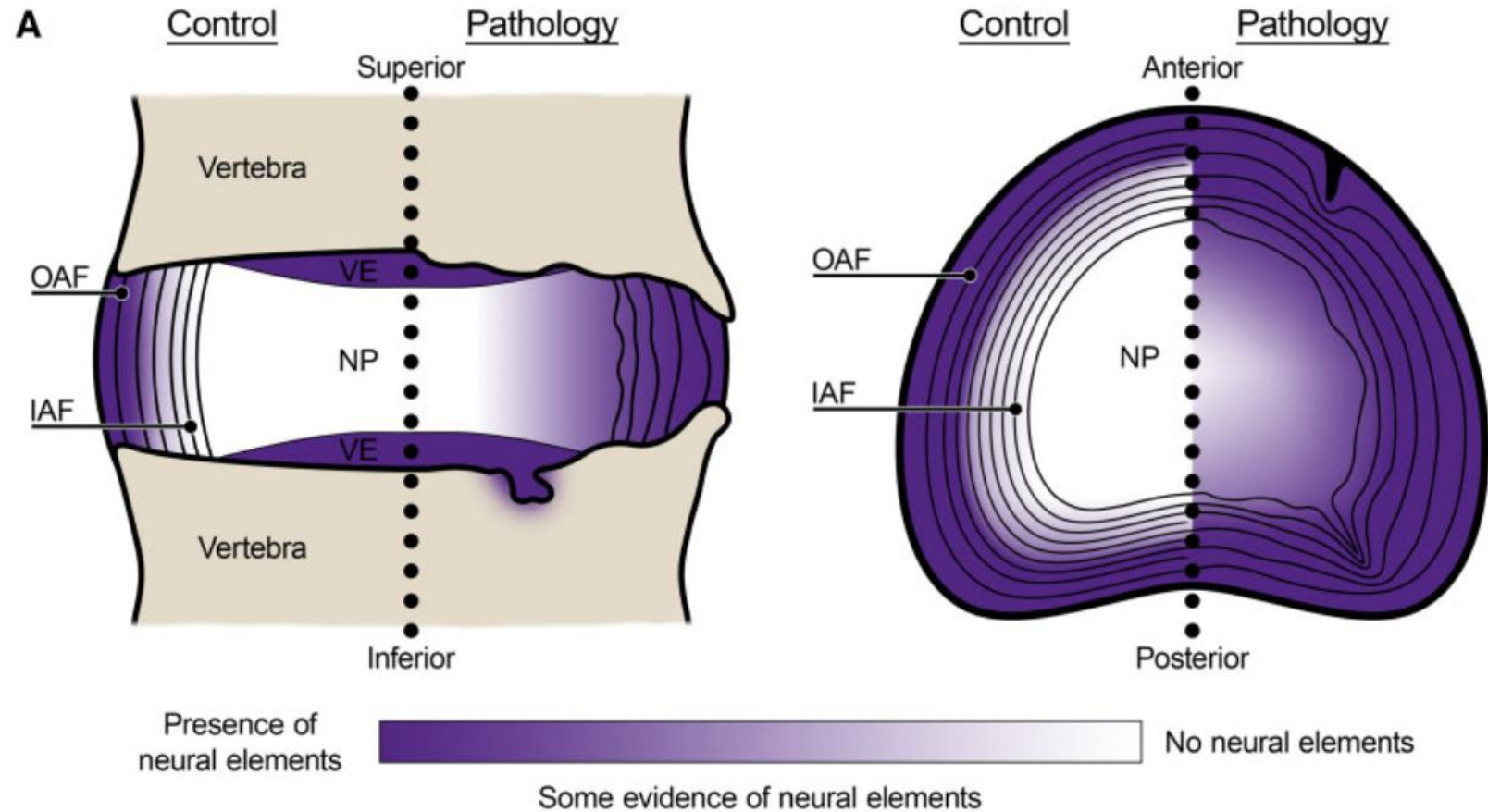


Nervo senovertebrale:

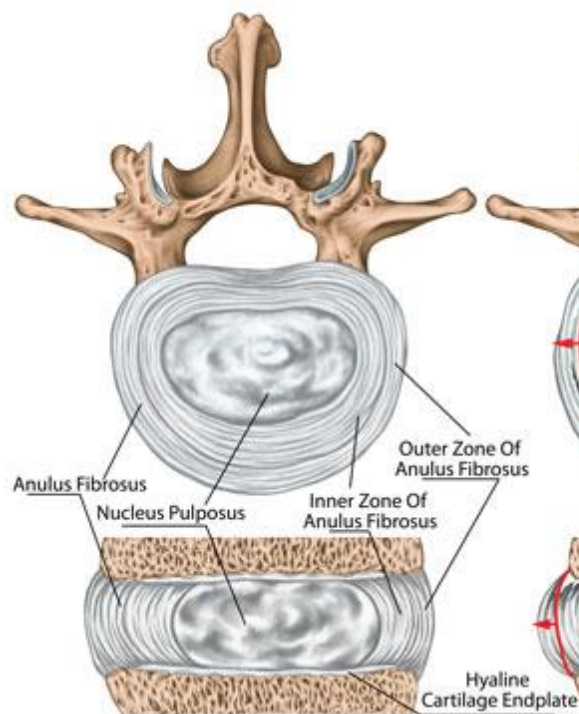
- A ogni livello 2-4 filamenti
- Riceve ≥ 1 ramo da ramo comunicante grigio o ganglio simpatico
- Nervo ricorrente a decorso perivascolare e **multimerico**
- **Innerva dura, vasi, periostio, legamenti, disco intervertebrale nella regione laterodorsale**



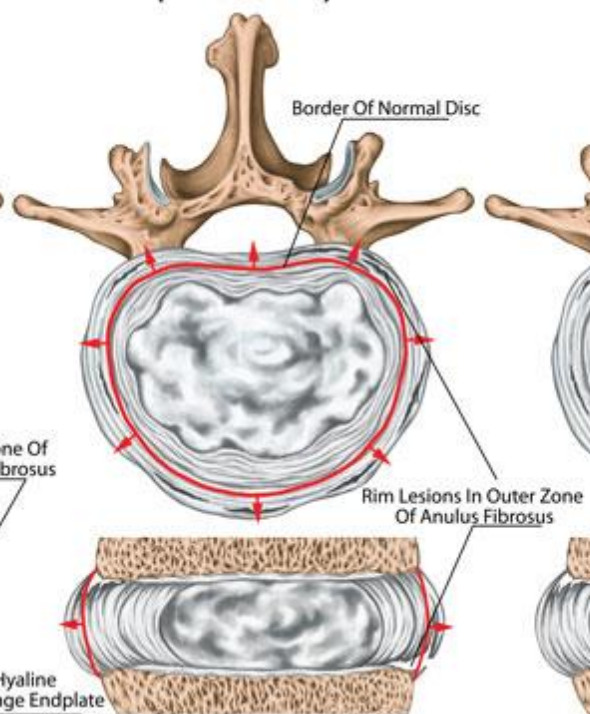
- Fibre nervose nel 1/3 esterno dell'annulus
- Infiltrano 2/3 interni nei pazienti con dolore/ degenerazione discale
- Fibre A δ e C
- Nucleo polposo: se degenerazione terminazioni libere, corpuscoli di Ruffini, fibre A δ e C, perivascolari



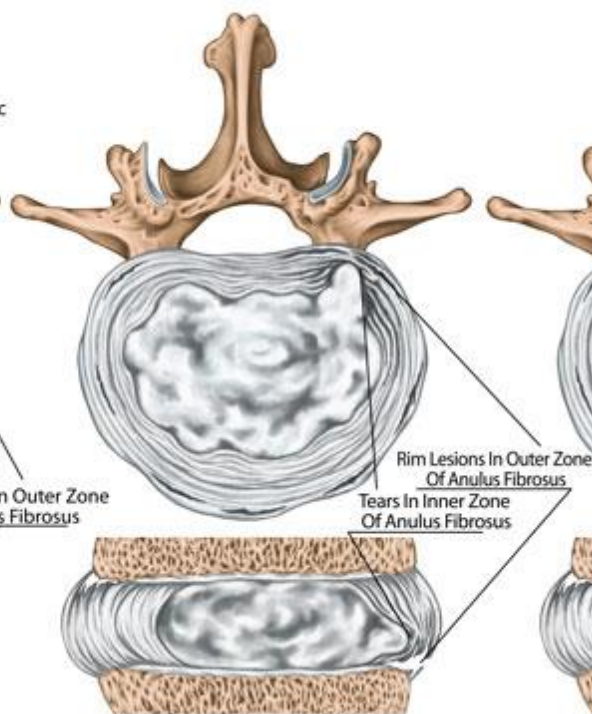
NORMAL DISC



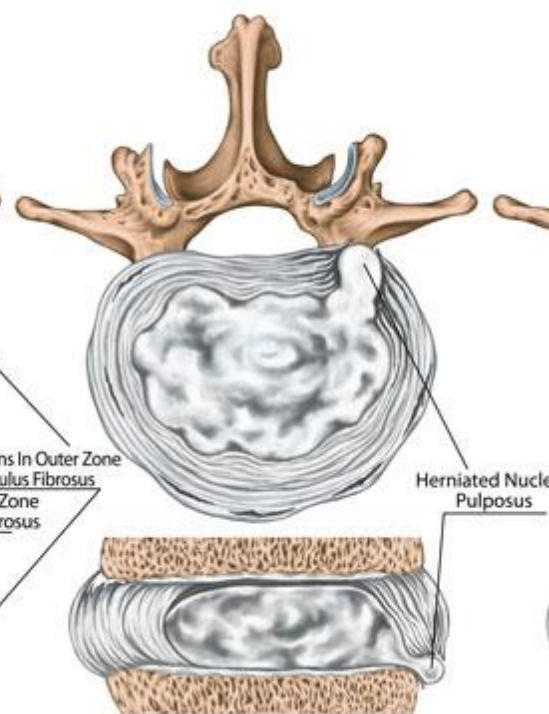
**NUCLEAR HERNIATION
(DISC BULGE)**



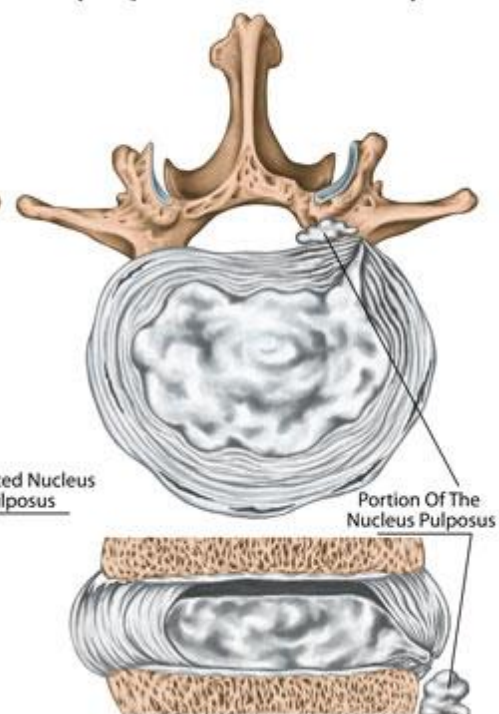
DISC PROTRUSION



DISC EXTRUSION



**SEQUESTRATION
(SEQUESTERED NUCLEUS)**



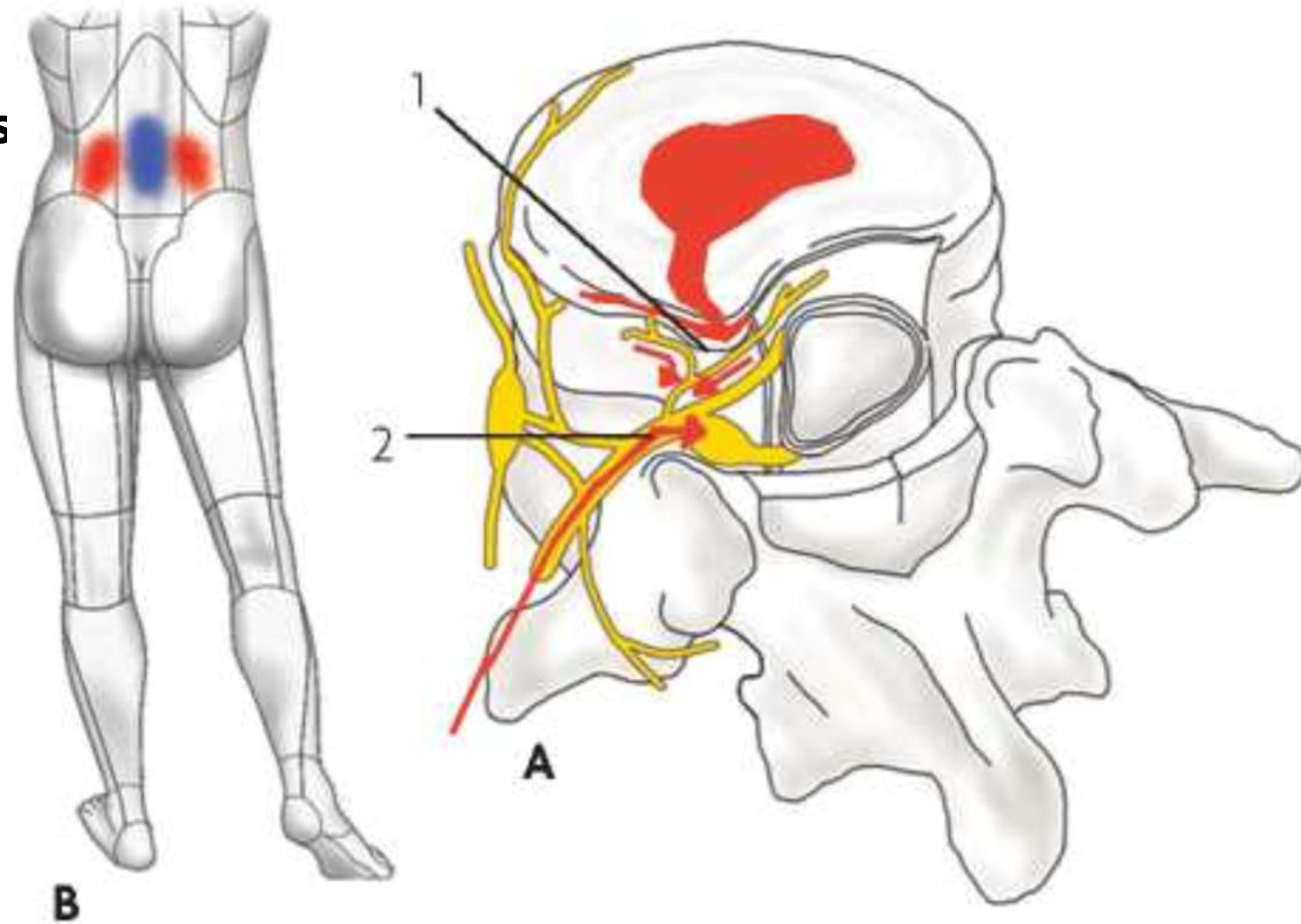
La stimolazione dei nocicettori degli strati superficiali dell'**anulus fibrosus**

→ afferenze **nervo senovertebrale**

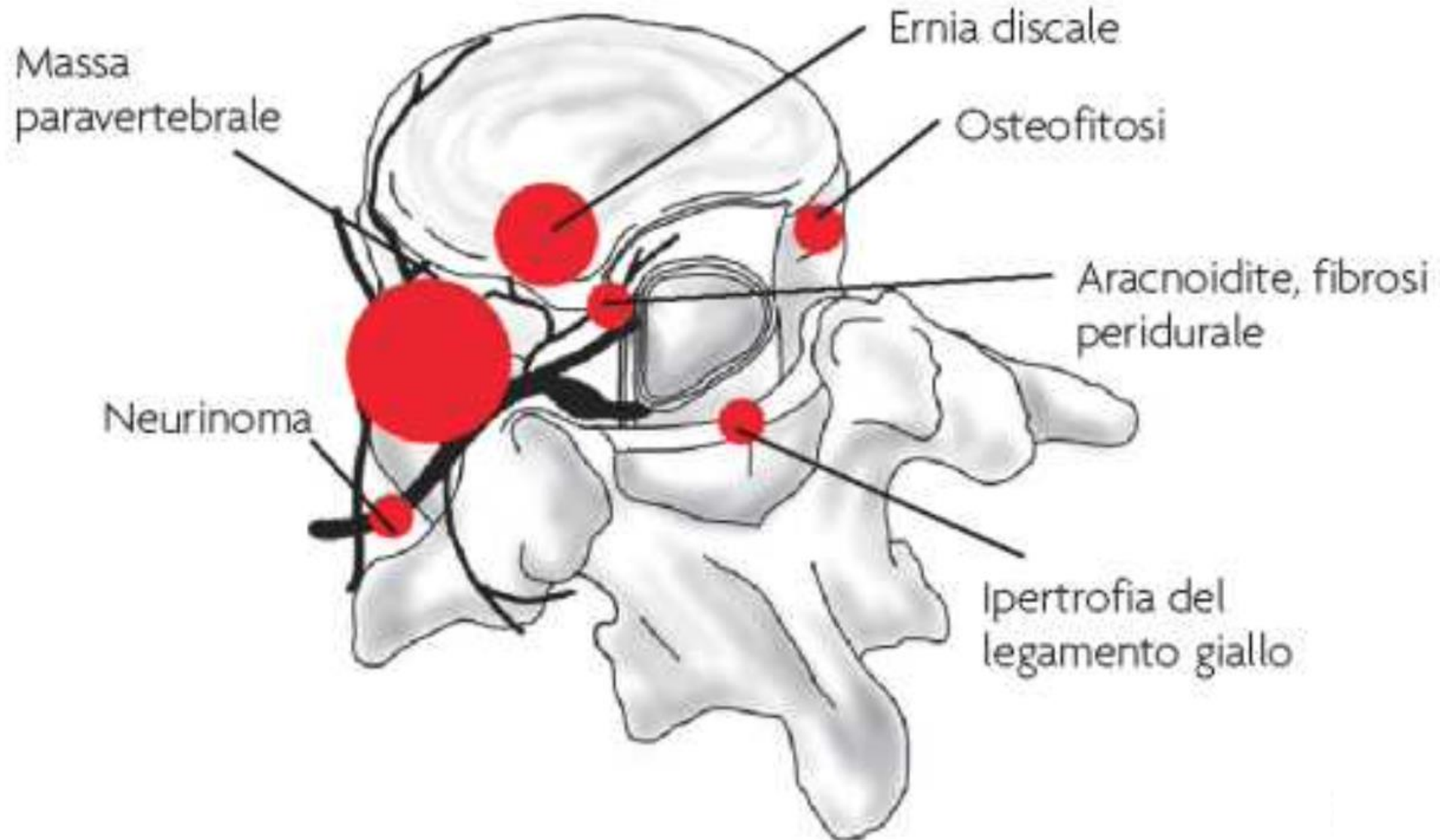
(A1) →

dolore primario nella regione lombare spinale

dolore secondario nella regione lombare paraspinale da spasmo muscolare riflesso (B)



Radicolopatia



Radicolopatia chimica senza ernia discale → contatto del nervo radicolare col materiale nucleare penetrato nello spazio peridurale → nervi nervorum radicolari

Radicolopatia chimica da contatto e/o compressione con ernia discale contatto del nervo radicolare con una franca erniazione del nucleo polposo nello spazio peridurale → nervi nervorum radicolari →

- **nerve trunk pain**
- **dolore neuropatico se se danno delle fibre nervose.**

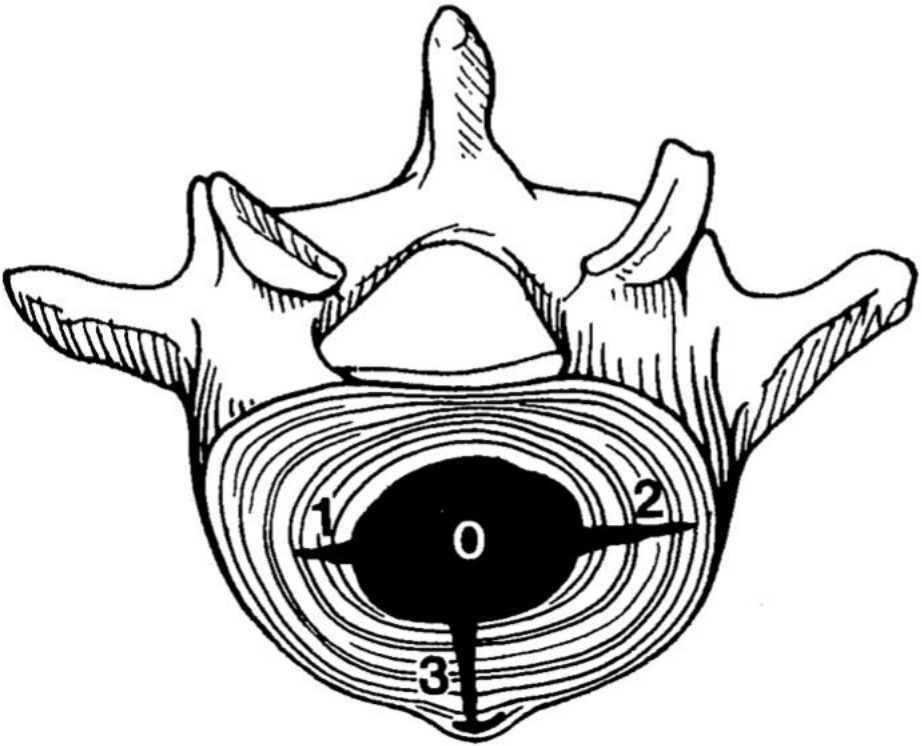
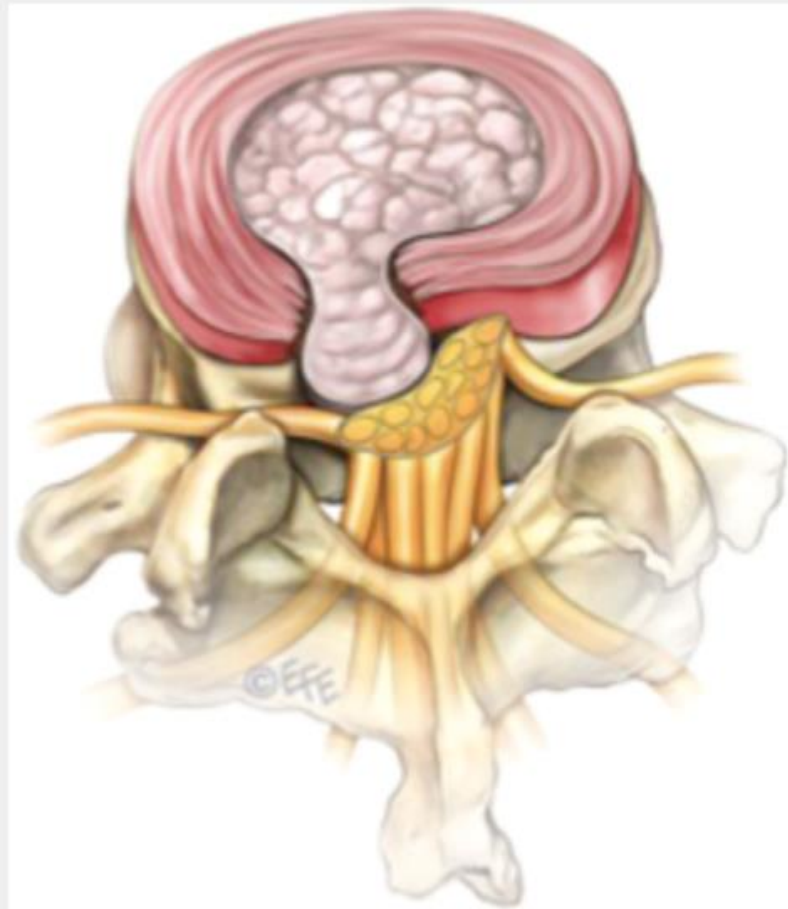
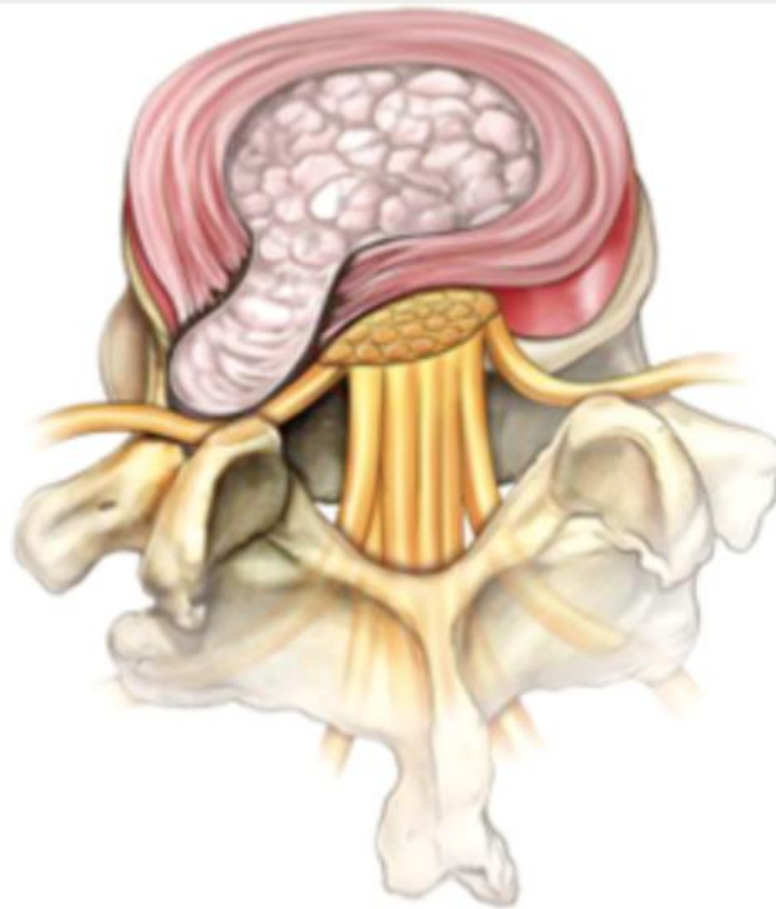


Fig 2. The concentric circumferential areas of the annulus used for grading annular disruption as contrast material progressively moves away from the center of the nuclear injection. Areas 0, 1, 2, and 3 are noted.

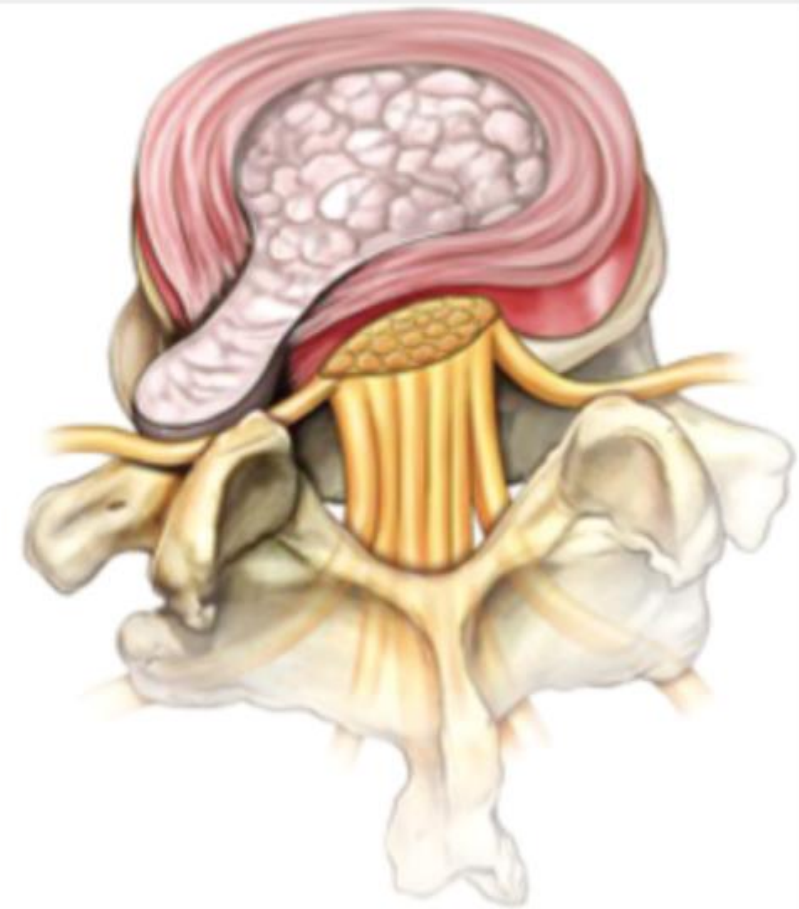
Table 2. Dallas Discogram Description		
Degeneration (annulus)	Annular disruption (contrast extension)	Pain
0—No change	0—None	P—Pressure
1—Local (<10%)	1—Into inner annulus	D—Dissimilar
2—Partial (<50%)	2—Into outer annulus	S—Similar
3—Total (>50%)	3—Beyond outer annulus	R—Exact reproduction



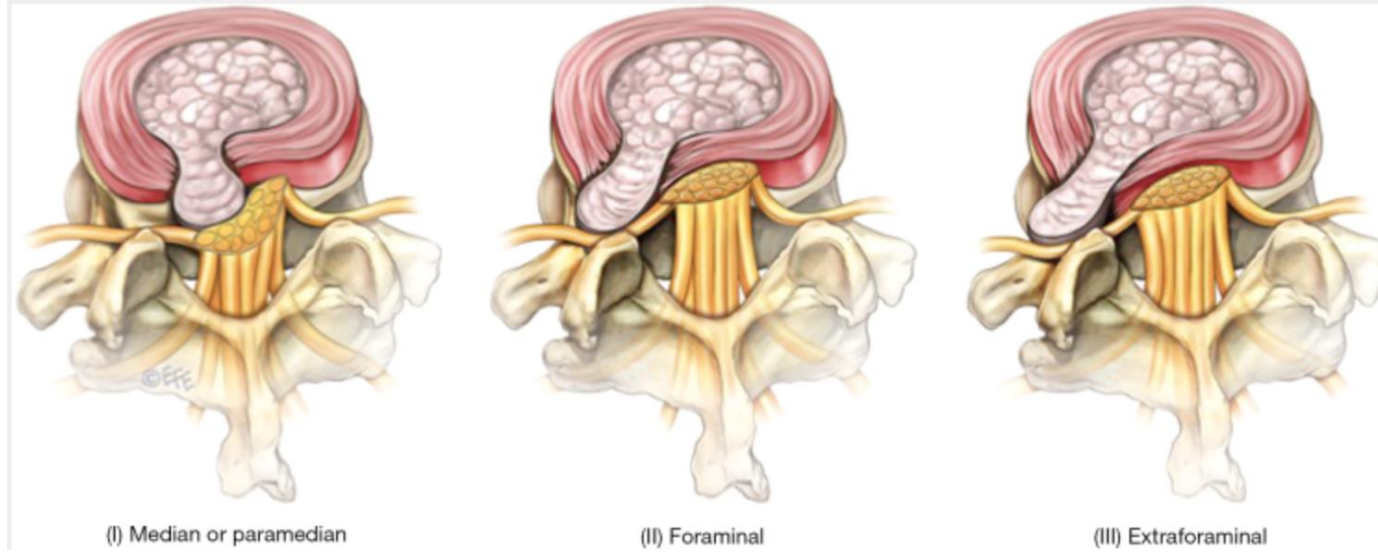
(I) Median or paramedian



(II) Foraminal

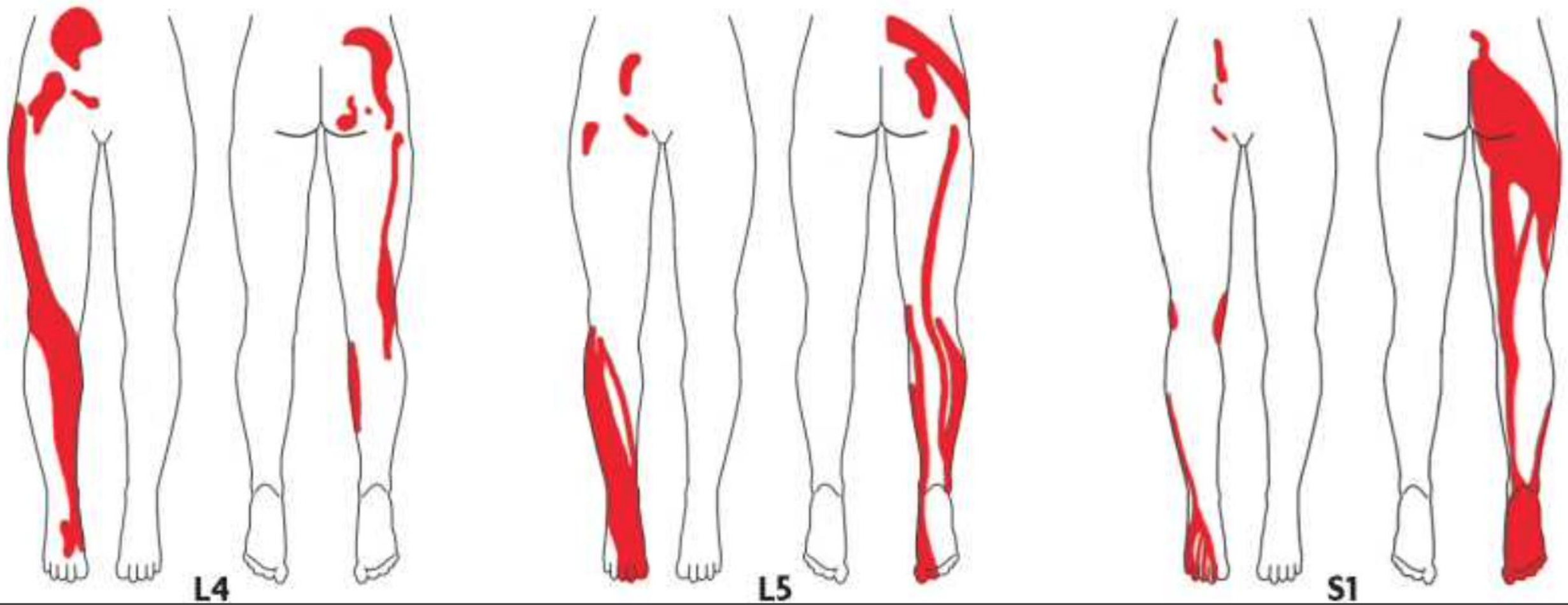


(III) Extraforaminal



ernia **posteriore** (mediana o paramediana) → contatto con sacco durale e le radici spinali prossimamente al ganglio → spesso epidurite circoscritta **senza** compressione significativa

ernia **intraforaminale** → complesso ganglio/nervo radicolare compresso contro parete posteriore del forame → flogosi e probabile **danno ischemico** delle fibre nervose



Il dolore nel distretto lombosacrale/arto inferiore con distribuzione quantitativa distrettuale e qualitativa **metamerica** completa →

patologia dei complessi radici-nervi radicolari L4, L5 o S1

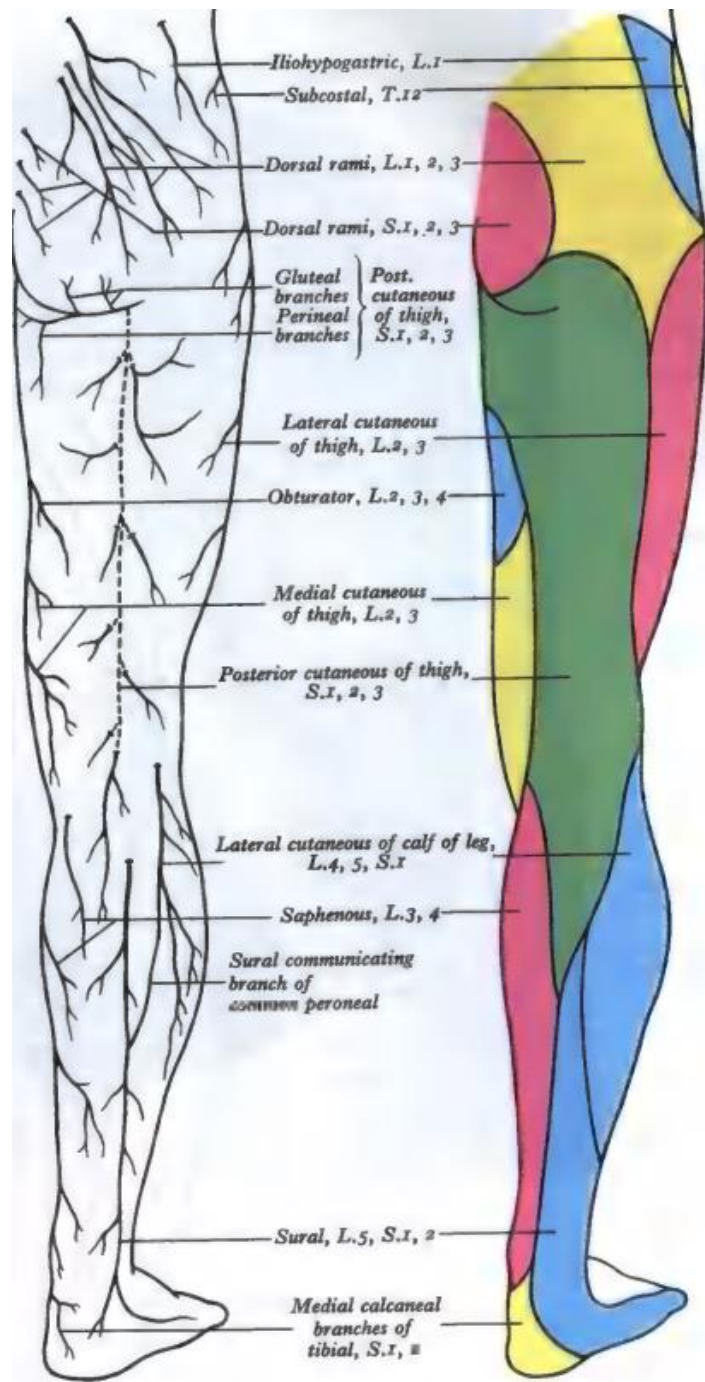
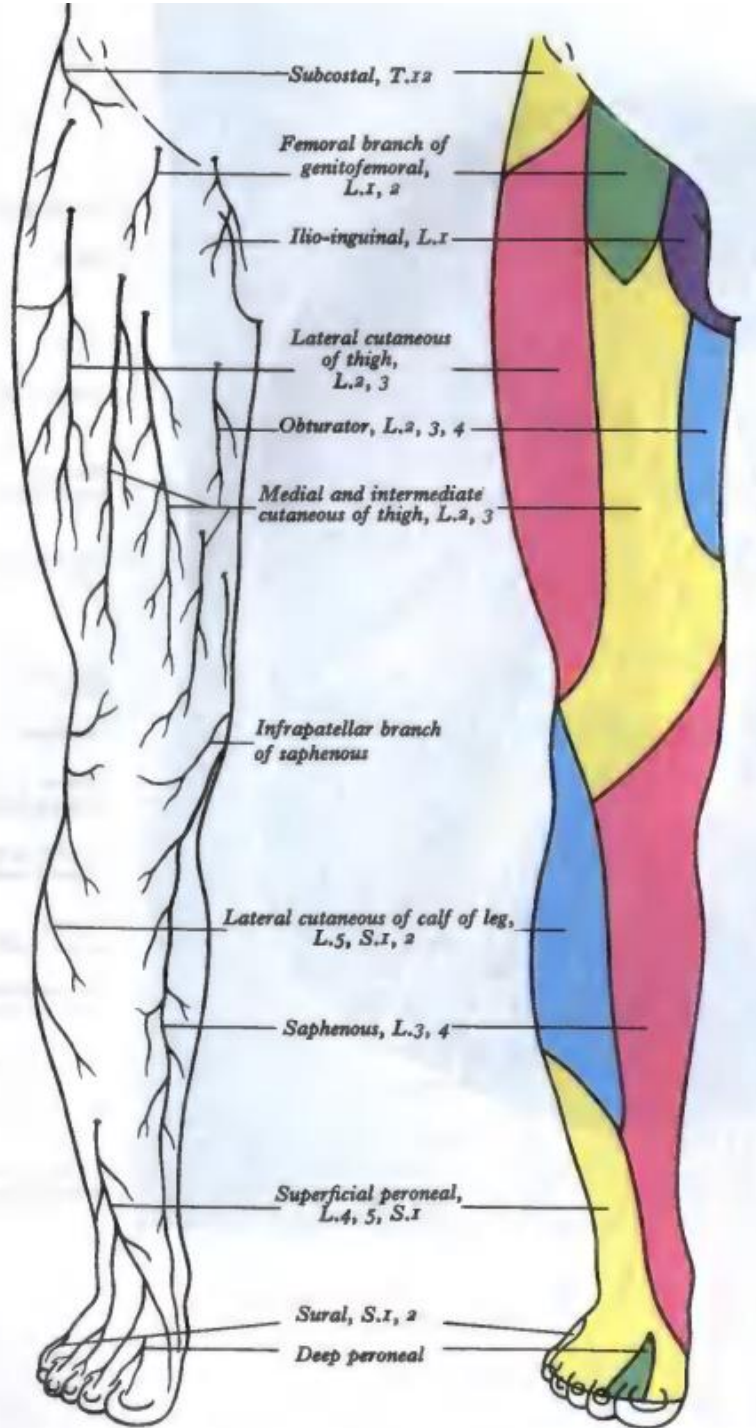
Dolore neuropatico in low back pain

Model parameters for criteria in the final ‘peripheral neuropathic pain’ model.

Criteria	Regression coefficient	SD	95% CI lower	95% CI upper	OR	OR 95% CI lower	OR 95% CI upper
3 History of nerve injury	2.54	0.64	1.29	3.80	12.64	3.59	44.49
9 Dermatomal distribution	3.19	0.69	1.85	4.53	24.29	6.33	93.18
29 Nerve movement tests	2.68	0.49	1.72	3.65	14.64	5.59	38.37

Abbreviations: SD-Standard deviation, 95% CI-95% confidence interval, OR-Odds ratio.

According to the final model, ‘*Pain referred in a dermatomal or cutaneous distribution*’, was the strongest predictor of PNP. Patho-physiologically, dermatomal/radicular pain is thought to arise from ectopic discharges from the dorsal root or its ganglion ([Bogduk, 2009](#)), a mechanism entirely consistent with those thought to underlie PNP ([Costigan et al., 2009](#)).



Gray H, Williams, Peter L., Bannister, Lawrence H., Gray's Anatomy: The Anatomical Basis of Medicine and Surgery. Churchill Livingstone; 1999.

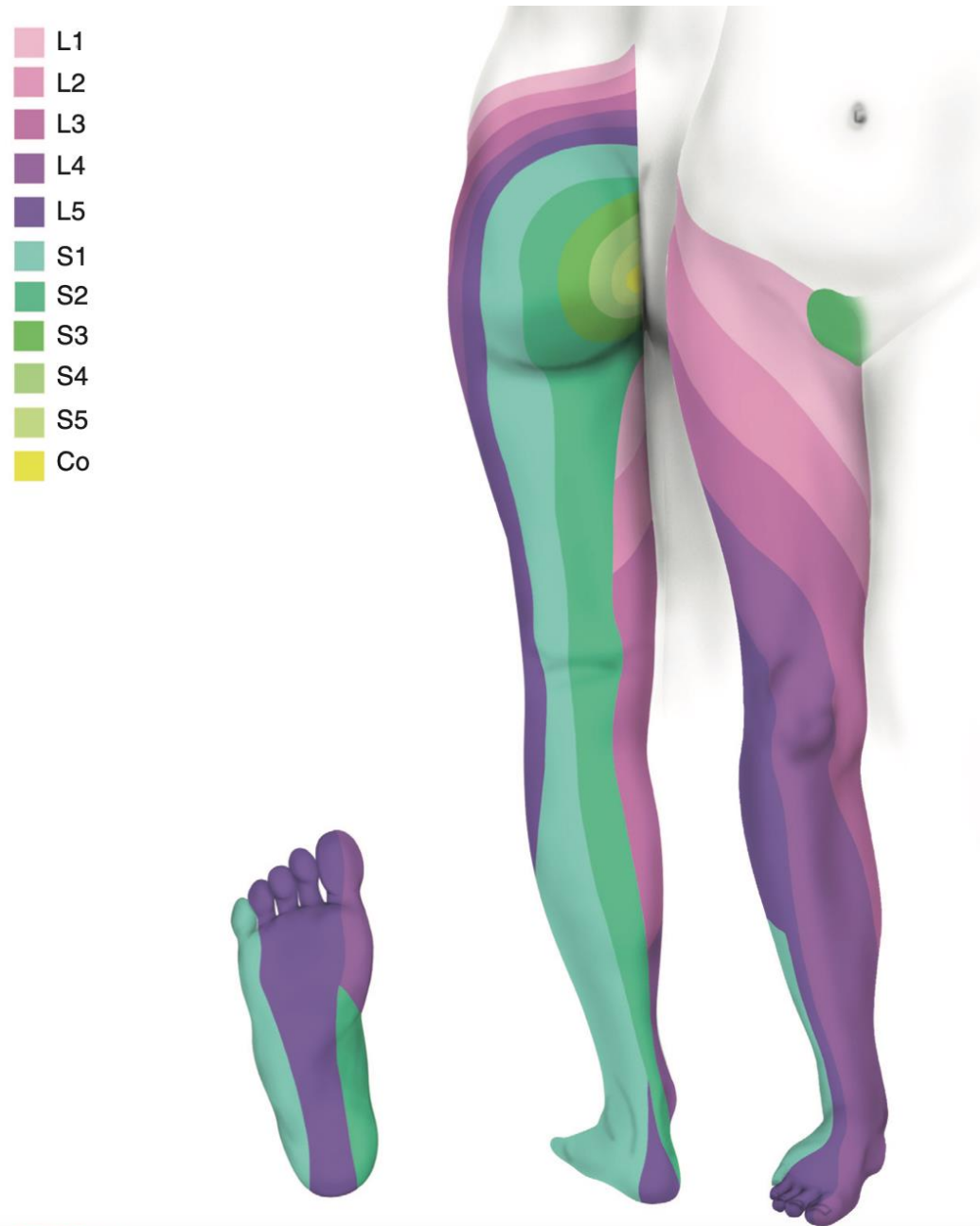


FIGURE 11-9 Dermatomes of the lower limb.

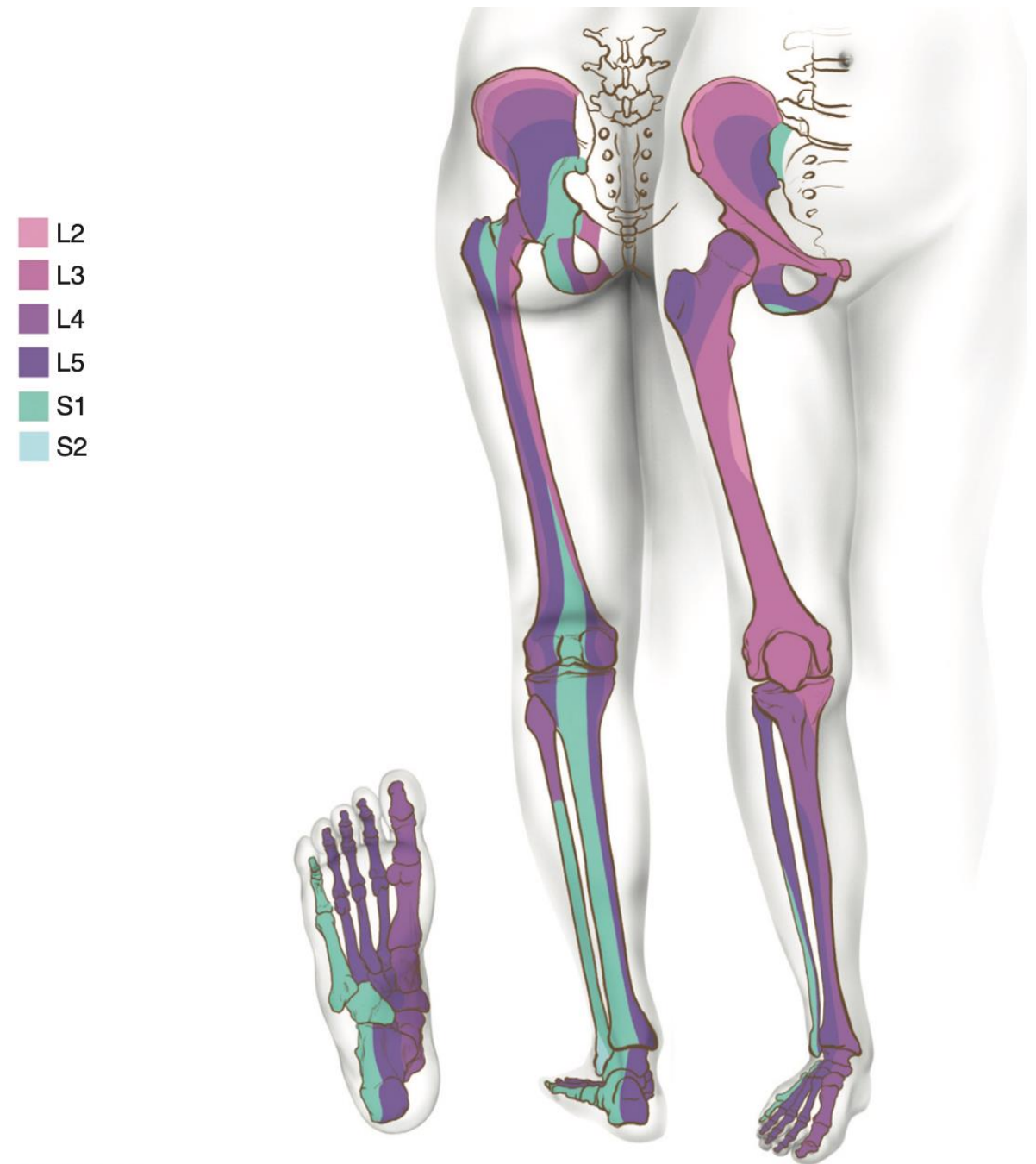


FIGURE 11-8 Osteotomes of the lower limb.

Test di Lasegue



• **Figure 147-1** The Lasegue straight leg raising test: the patient is in the supine position with the unaffected leg flexed to 45 degrees at the knee and the affected leg placed flat against the table.



• **Figure 147-2** The Lasegue straight leg raising test: with the ankle of the affected leg placed at 90 degrees of flexion, the affected leg is slowly raised toward the ceiling while the knee is kept fully extended.

Test di Lasegue in posizione seduta



- **Figure 148-2** Sitting straight leg raising test: with the ankle of the affected leg at 90 degrees of flexion, the leg is slowly raised toward the ceiling while the knee is kept fully extended.

Test di Naffziger



- **Figure 149-1** The Naffziger jugular compression test.

Test di Spurling

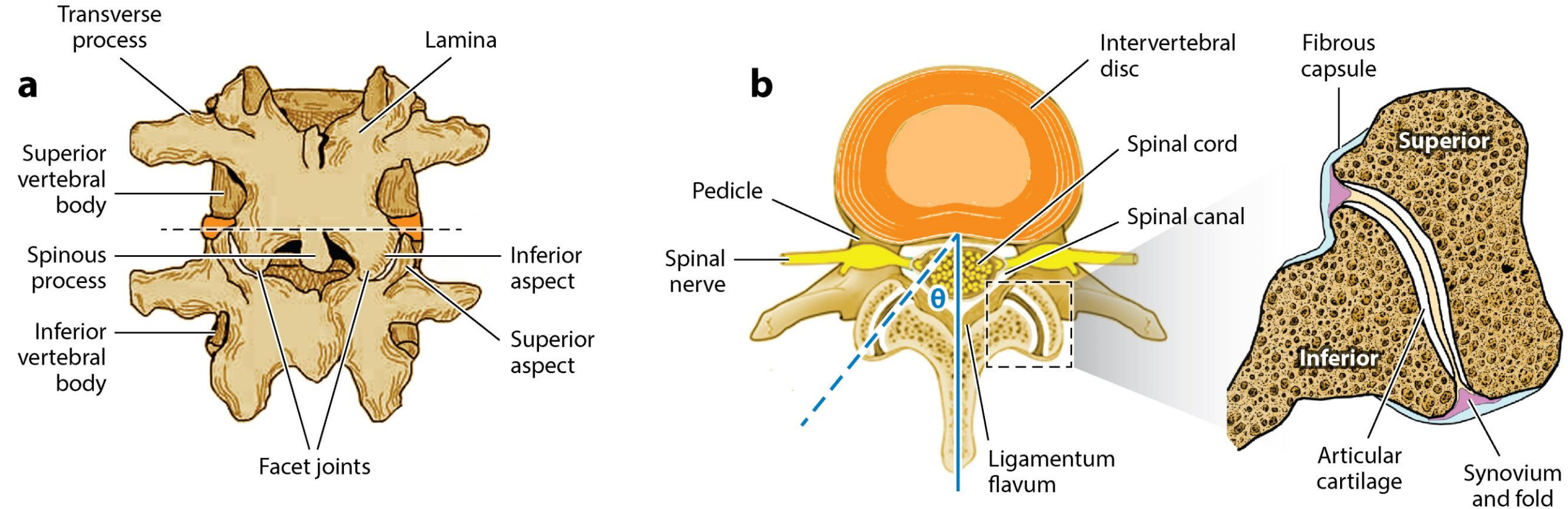


• **Figure 152-1** The Spurling test for lumbar nerve root irritation.

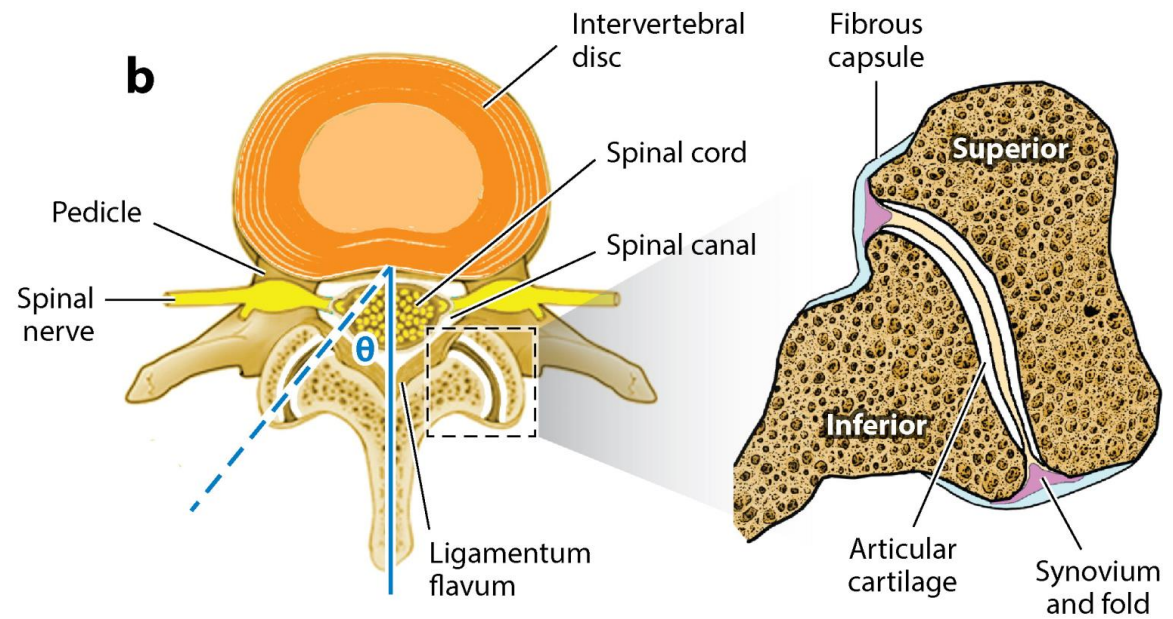
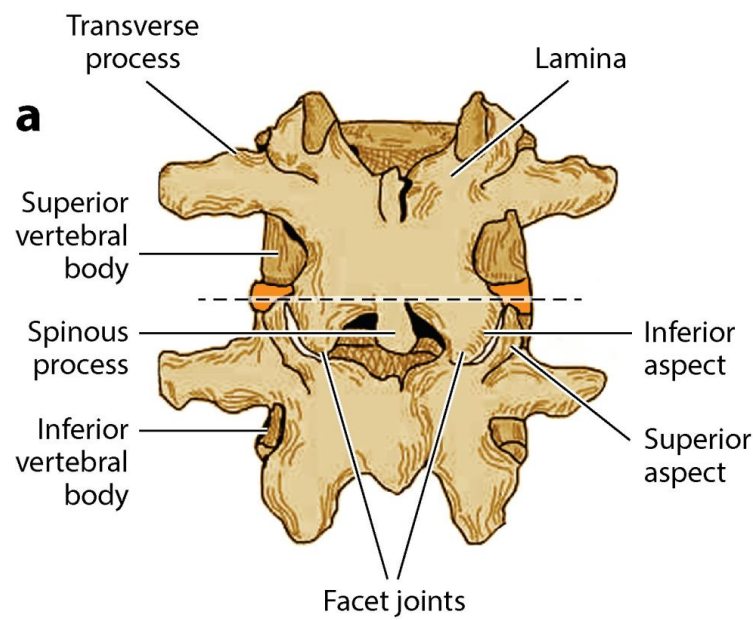


• **Figure 152-2** Sicard test for lumbar nerve root irritation.

Sindrome delle faccette articolari



AR O'Leary SA, et al. 2018.
Annu. Rev. Biomed. Eng. 20:145–70

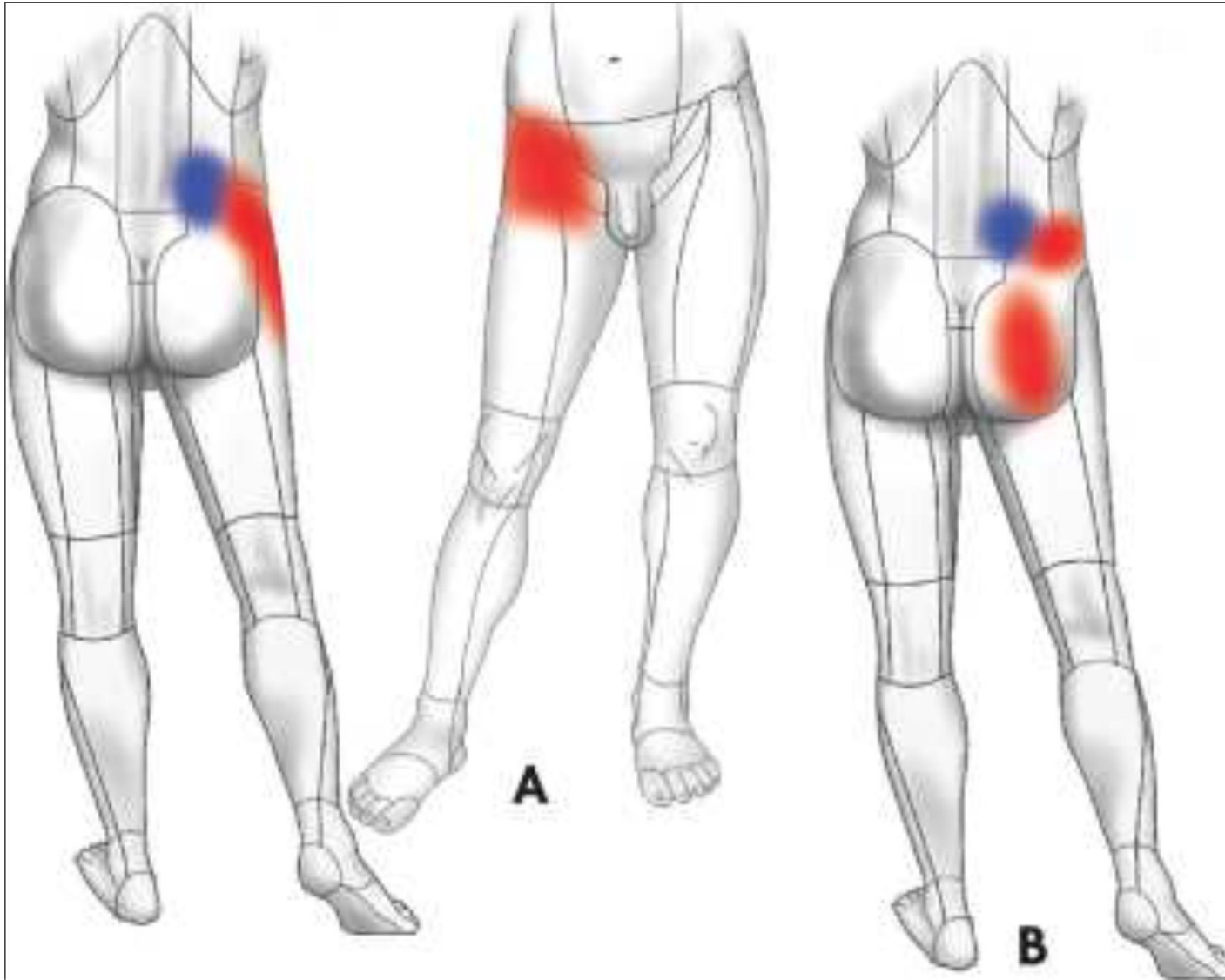


AR O'Leary SA, et al. 2018.
Annu. Rev. Biomed. Eng. 20:145–70

Articolazioni zigoapofisarie

- Articolazioni sinoviali complesse a livello lombare: cuscinetti di grasso subcapsulare e meniscoidi fibroadiposi, su cui si riflette la membrana sinoviale
- Capsula sottile, anteriormente in continuità con il legamento giallo a livello lombare
- Densa innervazione dai rami mediali dei rami dorsali primari

- Capsule articolari sono limite posteriore dei forami intervertebrali
- Posteriormente e lateralmente in rapporto con i muscoli profondi del dorso, alcuni fasci muscolari si inseriscono sulla capsula
- 1/5 popolazione faccette asimmetriche, reperto non sicuramente associato a degenerazione



A = **dolore primario** in sede lombare paraspinale, approssimativamente sopra le faccette articolari lombari e **dolore riferito** (in rosso) all'**inguine** ed alla parte prossimale della **coscia**;

B = **dolore riferito** alla **natica** e/o alla cresta iliaca (più raro).

Dolore è **aggravato**

- estensione del tronco
- rotazione controlaterale al lato affetto
- prolungato ortostatismo
- dalla posizione seduta

Dolore è **migliorato**

- dal riposo a letto
- in ortostatismo, dalla flessione del tronco

Test di Kemp



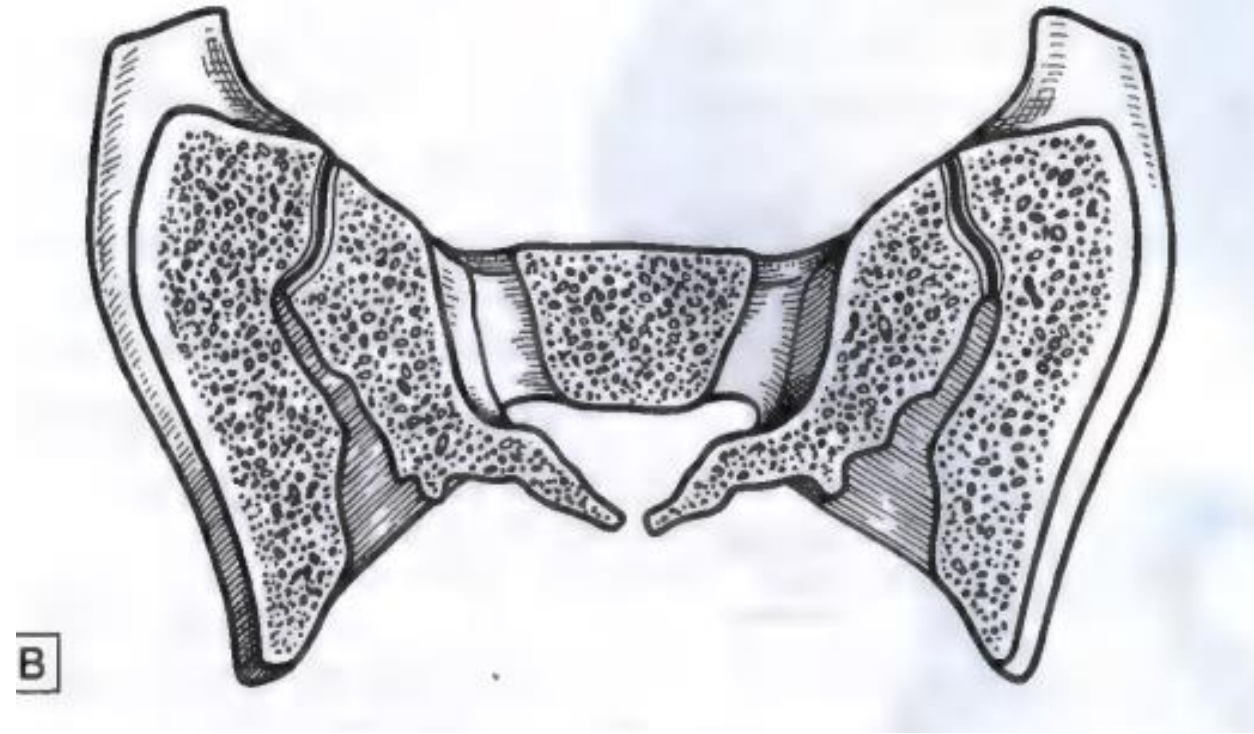
- **Figure 142-1** With the patient in the standing position, he or she is asked to extend the lumbar spine.



- **Figure 142-2** The patient is then asked to rotate the shoulder on the less painful side backward while the examiner exerts firm downward pressure on the shoulder.

Sacroiliac Joint Syndrome

- Articolazione sinoviale tra le superfici auricolari di sacro e osso iliaco
- Superfici articolari irregolari nell'adulto
- Cartilagine ialina sul sacro, fine strato di ialina e fibrocartilagine sull'osso iliaco
- Si oblitera prima dei 50 aa
- Innervazione alla capsula e ai legamenti da rami dei primi due nervi spinali sacrali e dal nervo gluteo superiore (L4-L5-S1)
- Articolazione con minima e complessa mobilità <2°



Dolore primario nella parte laterale della regione sacrale e supero-mediale di quella glutea

Dolore riferito con distribuzione metamERICA parziale nella regione posteriore della coscia e del ginocchio



Cause:

1. sindrome da distorsione-sublussazione della sacroiliaca,
2. sacroileite,
3. artrite settica della sacroiliaca
4. artrite reumatoide della sacroiliaca.

Aggravanti

- posizione seduta (il paziente siede sulla natica controlaterale)
- riposo a letto

Test di Stork



- **Figure 166-1** The Stork test: the patient is placed in the standing position with the examiner seated behind the patient. The examiner places one thumb on the patient's posterior superior iliac spine and the other thumb on the base of the sacrum.



- **Figure 166-2** The Stork test: the patient is then asked to flex his or her hip and knee on the nonpainful side to at least 90 degrees while standing on the contralateral leg.

Test di Stork



- **Figure 166-3** The Stork test: if there is no sacroiliac dysfunction, as the patient flexes his or her hip and knee, the thumb on the patient's posterior superior iliac spine of the flexed leg will drop as the ilium rotates in a dorsocaudal direction to brace the pelvis to aid the other leg in receiving the full weight of the upper body.

Test di Gaenslen



- **Figure 167-1** The Gaenslen test: to perform the Gaenslen test to determine if there is dysfunction of the sacroiliac joint, the patient is placed in the supine position with painful hip and leg resting on the edge of the examination table. The patient is then asked to move the leg on the painful side so it can hang partially off the examination table.



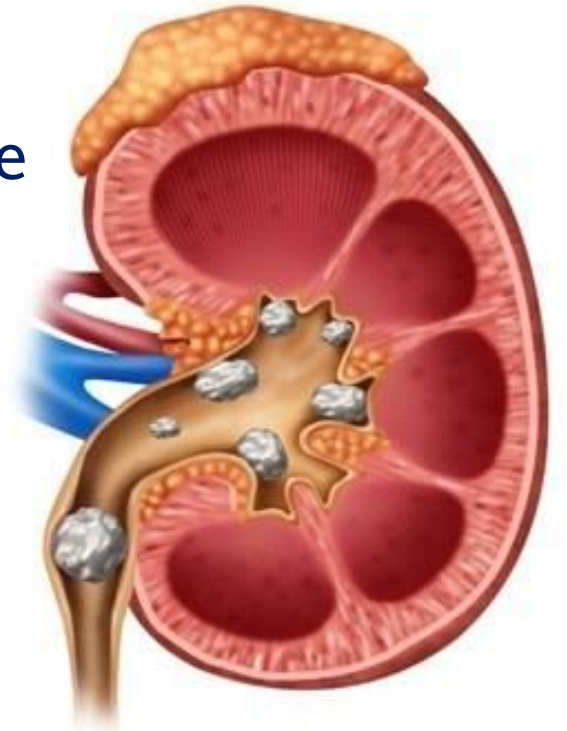
- **Figure 167-2** The Gaenslen test: the patient is then asked to flex his or her hip and knee on the nonpainful side to at least 90 degrees and then hold the leg in that position.

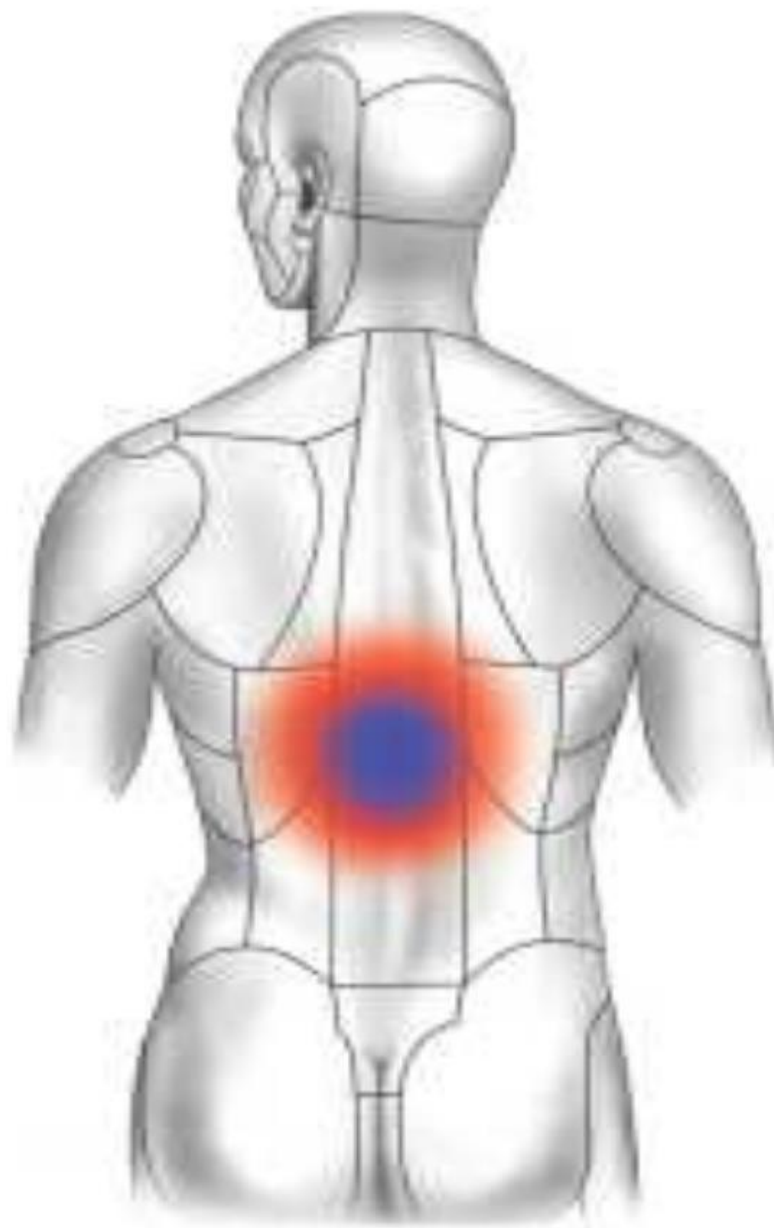
Dolore lombare di origine viscerale



Rene e/o uretere (tumore renale, calcolosi renale, pielonefrite),

- **Dolore primario** regione lombare paraspinale
- **Dolore secondario** all'inguine e nella parte prossimale della regione mediale della coscia
- Tender area nella regione lombare paraspinale (manovra di Giordano).





Pancreas



Aorta addominale

Red Flags

Symptoms	Corresponding pathology
Age under 18 years	Congenital abnormality
Age over 50 years	Fracture, malignancy
Anticoagulant use	Spinal hematoma
Fever	Infection, malignancy
Genitourinary issues such as urinary retention or sexual dysfunction	Cauda equina syndrome
Immunocompromise	Fracture, infection
IV drug abuse	Infection
Recent surgery or epidural injection	Infection, spinal hematoma
Trauma	Fracture, spinal hematoma
Signs	Corresponding pathology
Reduced anal sphincter tone	Cauda equina syndrome
Hyperreflexia	Acute cord compression
Hyporeflexia or areflexia	Cauda equine syndrome
Lower extremity muscle weakness	Acute cord compression or cauda equine syndrome
Saddle anesthesia	Cauda equina syndrome