

Leonardo da Vinci



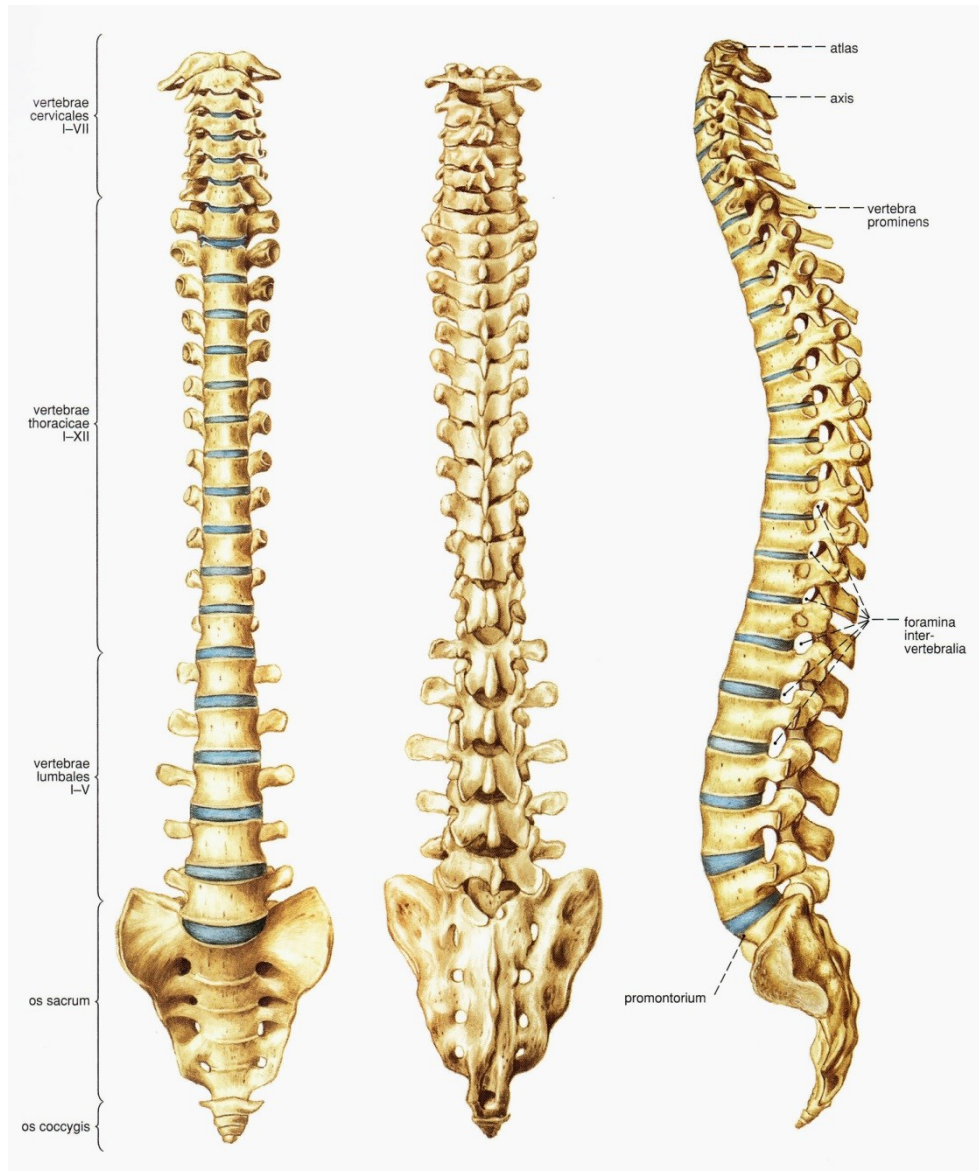
**Wirbel, Wirbelsäule.  
Art. atlantooccipitalis  
und atlantoaxialis mit  
Bewegungen und  
Muskeln.  
Brustkorb: Aufbau,  
Gelenke, Bewegungen.  
Zwerchfell.**

Dr. Emese Pálfi

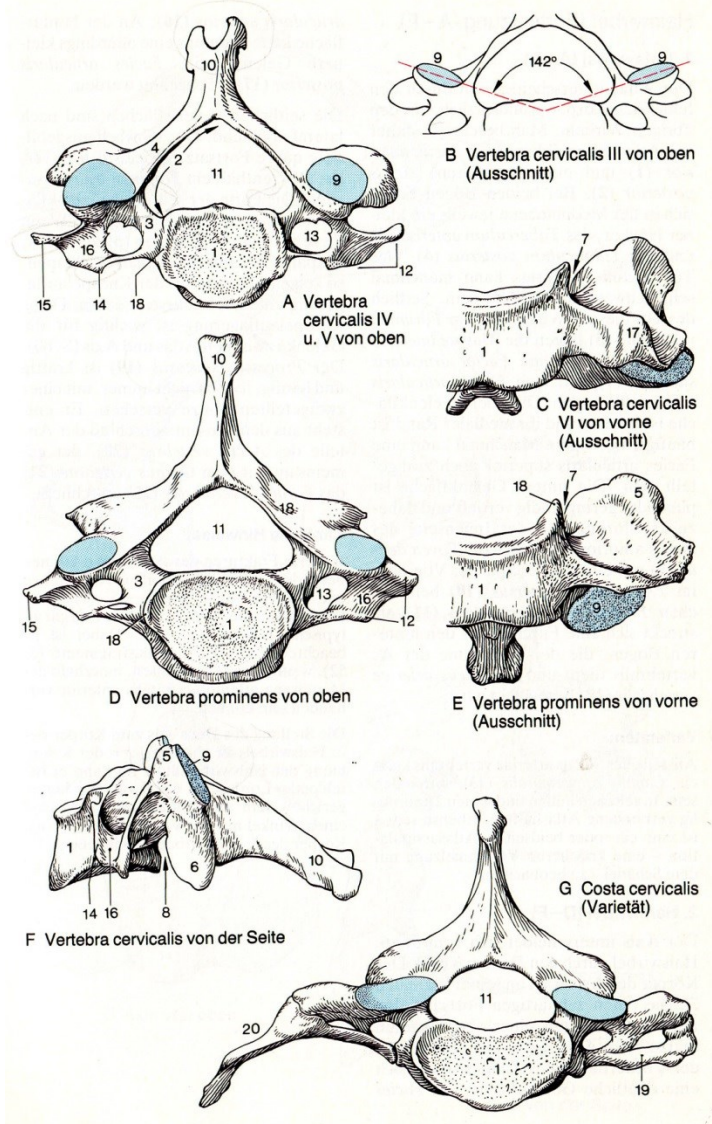
Semmelweis Universität

Anatomisches, Histologisches- und  
Embryologisches Institut

# Vertebrae (Wirbel)

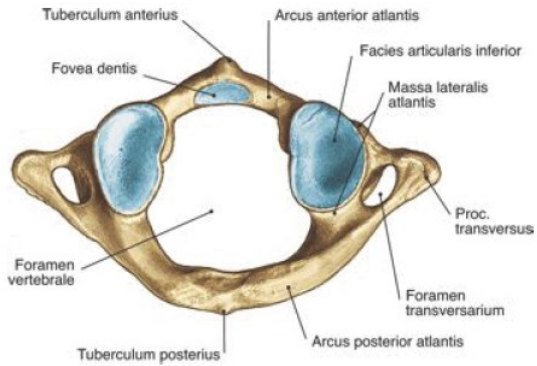
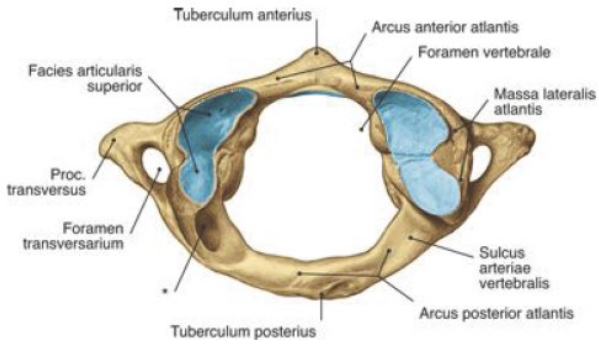


# Vertebrae cervicales (Halswirbel)(7)

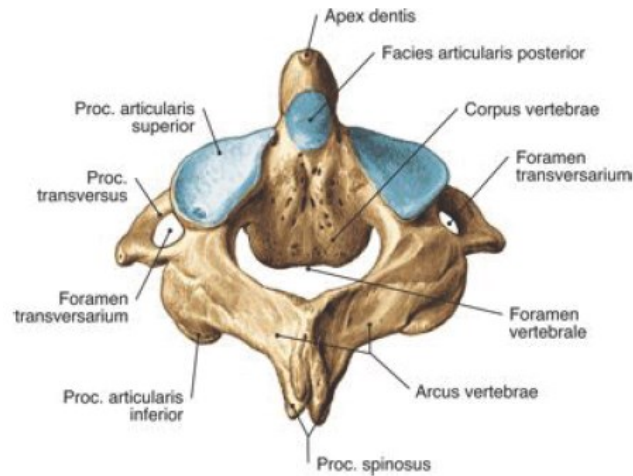
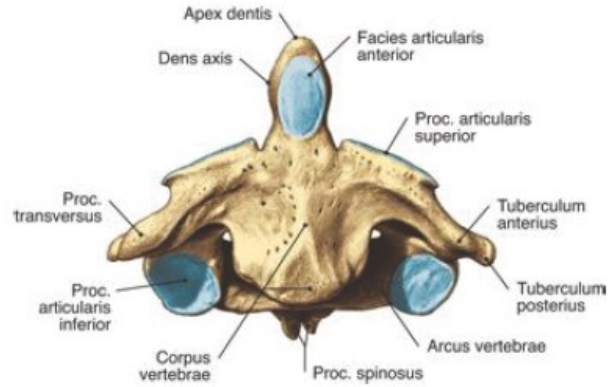


- Ziegelsteinförmiger Körper
- Dreieckiges Wirbelloch
- Zweigeteilter Dornfortsatz
- Zweigeteilter Querfortsatz (Tuberculum anterius: Rudiment der zervikalen Wirbel)
- Foramen transversarium
- ca. waagrecht eingestellte Gelenkfortsätze

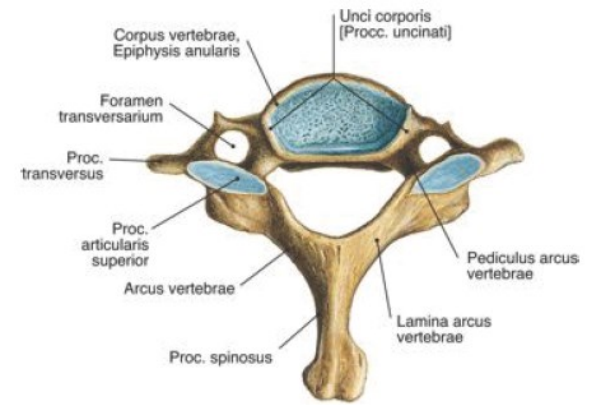
# Atlas



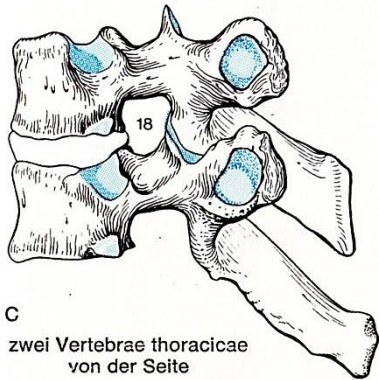
# Axis



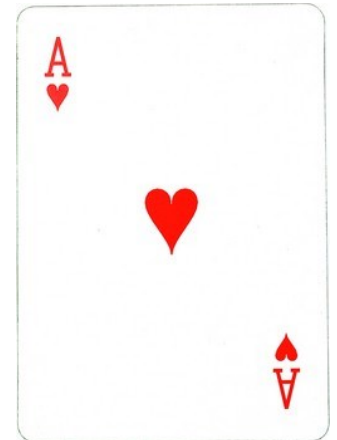
# Vertebra prominens



# Vertebrae thoracales (Brustwirbel)(12)



- „Kartenherzförmiger“ Körper
- Rundes Wirbelloch
- Dornfortsätze immer mehr nach unten zeigend
- Gelenkflächen für die Rippenansätze
- Frontal orientierte Gelenkfortsätze



## Vertebrae lumbales (Lendenwirbel)(5)

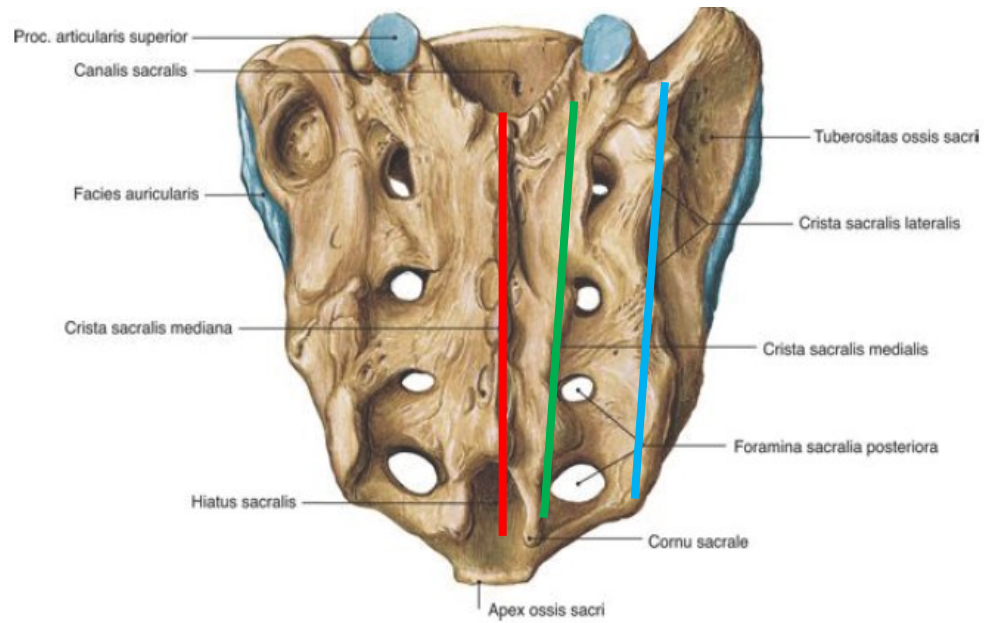
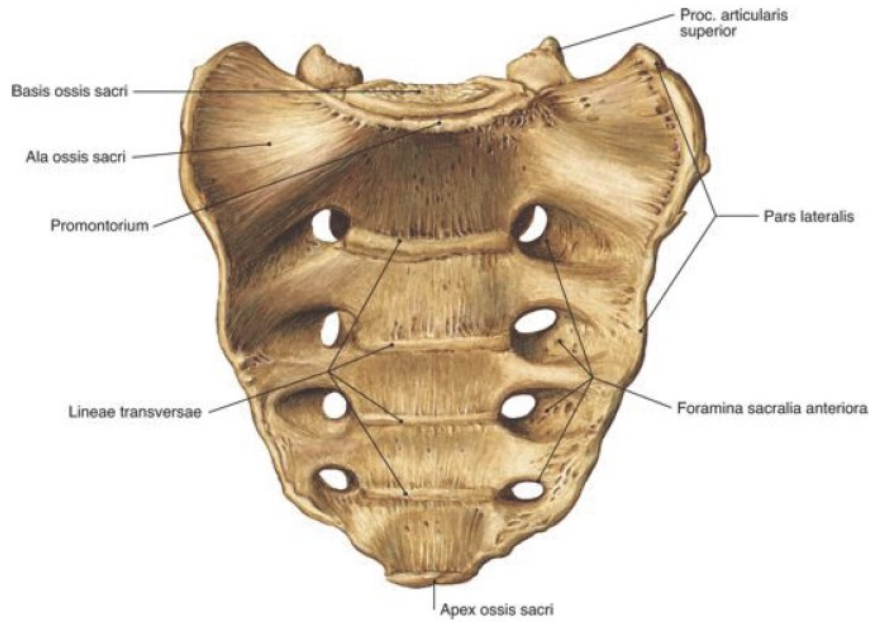


- „Bohnenförmiger“ Körper
- Großer, quadrangulärer Dornfortsatz
- Rundes Wirbelloch

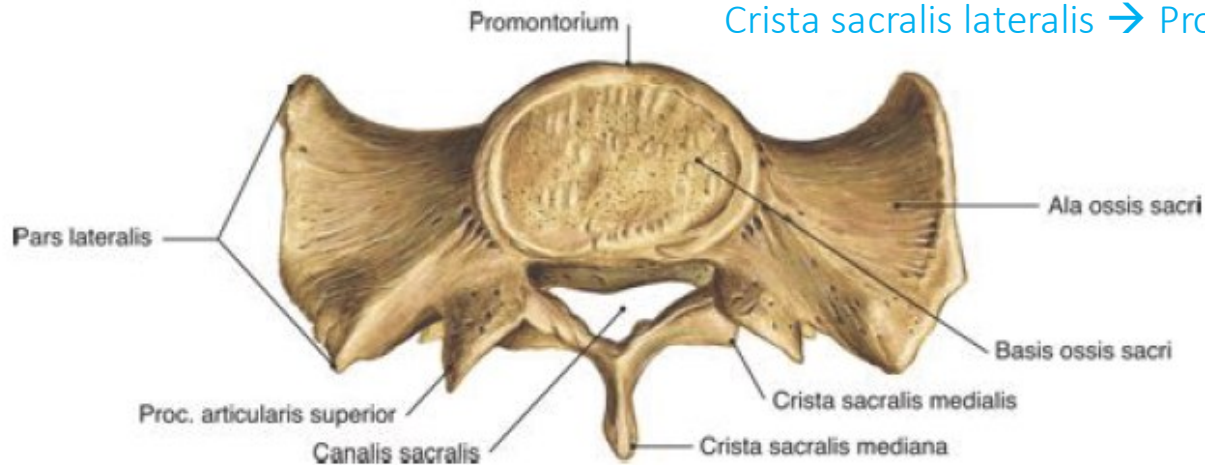


- Querfortsatz kaum entwickelt
- Großer Proc. costarius (Rippenrudiment)
- Proc. mammillare
- Sagittal eingestellte Gelenkfortsätze

# Vertebrae sacrales/Os sacrum (Kreuzwirbel)(5)



Crista sacralis medialis → Proc. spinosus  
 Crista sacralis intermedia → Proc. articularis  
 Crista sacralis lateralis → Processus transversus

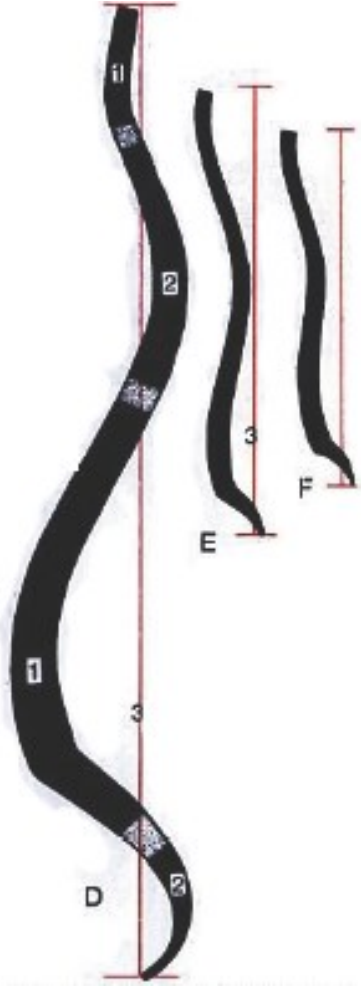


# Vertebrae coccygeales (Steissbein)(4-6)





- Lordose: Krümmung nach vorne (zervikal, lumbal)
- Kyphose: Krümmung nach dorsal (thorakal, sakral)
- Skoliose: seitliche Krümmung (eigentlich mit Drehung)



D 18 Jahre alt  
E 10 Monaten alt  
F 3 Monaten alt



← C3-4

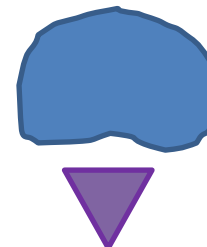
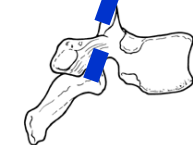
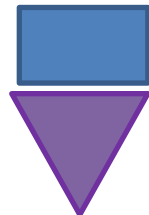
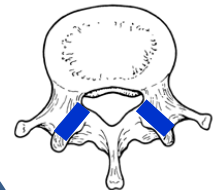
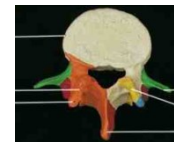
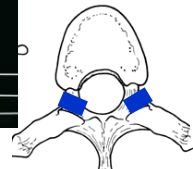
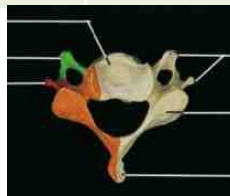
→ Th5-6

← L3-4

← Promontorium



|                        | Zervikal                                     | Thorakal   | Lumbal                              |
|------------------------|--|--|-------------------------------------|
| Anzahl                 | 7  | 12   | 5                                   |
| Wirbelkörper           | quadrangulär                                 | kartenherzförmig                                     | bohnenförmig                        |
| Wirbelloch             | dreieckig                                    | Rund/oval  | Rund/oval                           |
| Gelenkfortsatz         | ca. waagrecht                                | frontal  | sagittal                            |
| Foramen transversarium | +  | -  | -                                   |
| Querfortsatz           | geteilt (Rippe!)                             | Rippe unabhängig                                     | kaum entwickelt (aber Proc. cost.)  |
| Dornfortsatz           | geteilt, waagrecht                           | schräg nach unten                                    | quadrangulär, massenhaft, waagrecht |
| Bewegung               | Rotation, Flexion, Lateralflexion, Extension | Rotation, Flexion, <b>Lateralflexion</b> , Extension | <b>Flexion, Extension</b>           |



Corpus  
Foramen vertebrale  
Processus articularis

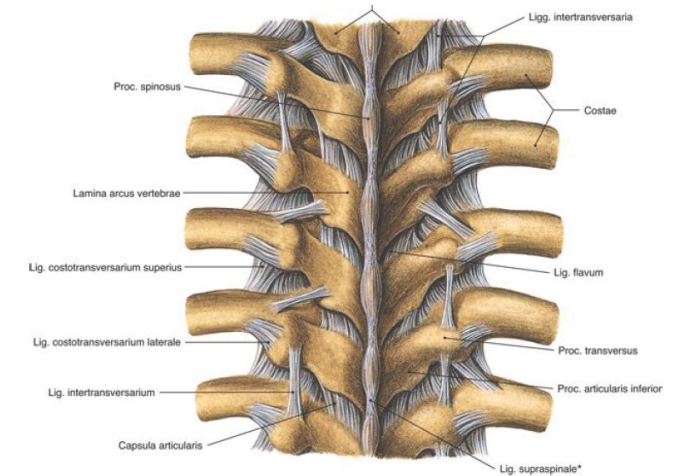
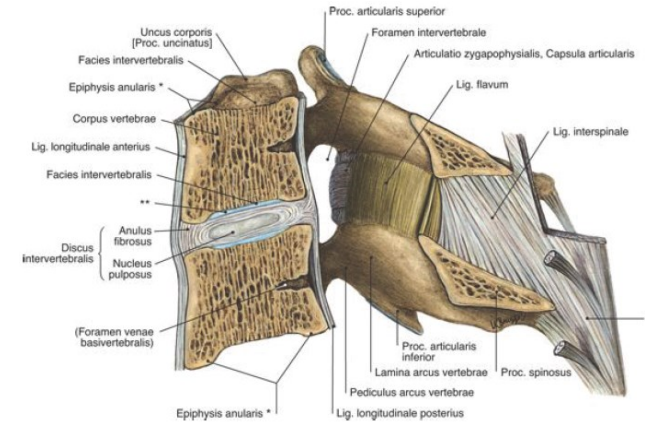
# Synostosis

# Synchondrosis

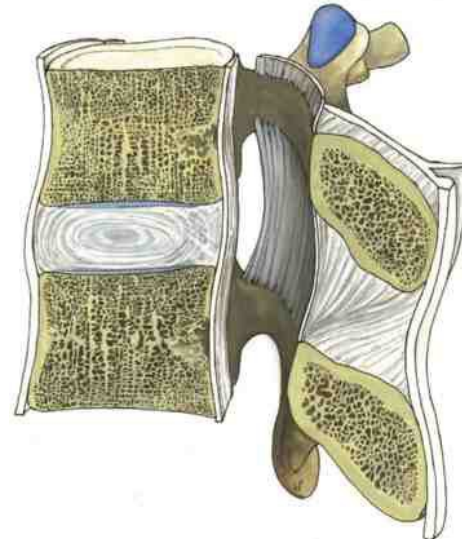
# Syndesmosis

## Zwischenscheiben (Disci intervertebrales)

- 23 Stück



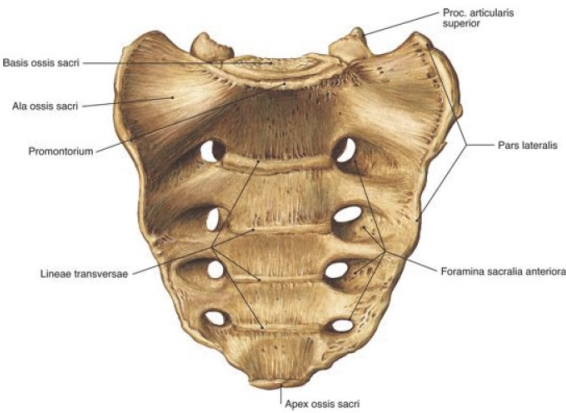
- Lig. longitudinale anterior
- Lig. longitudinale posterior
- Membrana tectoria
- Lig. flavum
- Lig. intertransversarium
- Lig. supraspinale
- Lig. nuchae



## Os sacrum



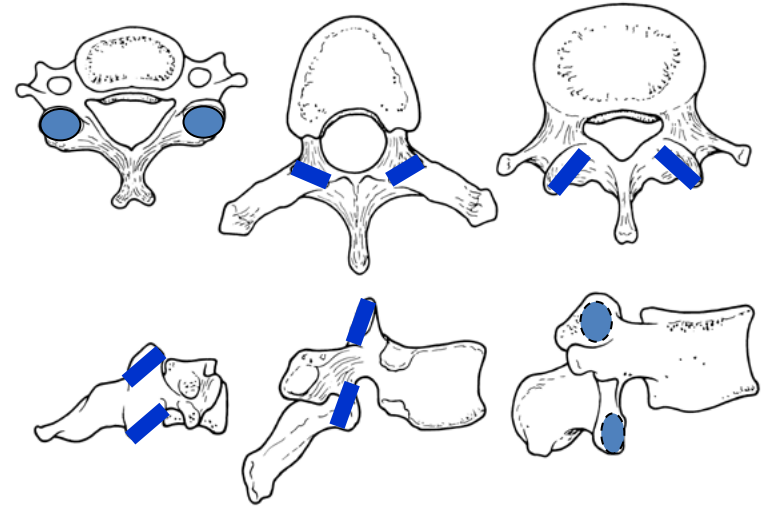
## Os coccygis



# Articulatio intervertebralis

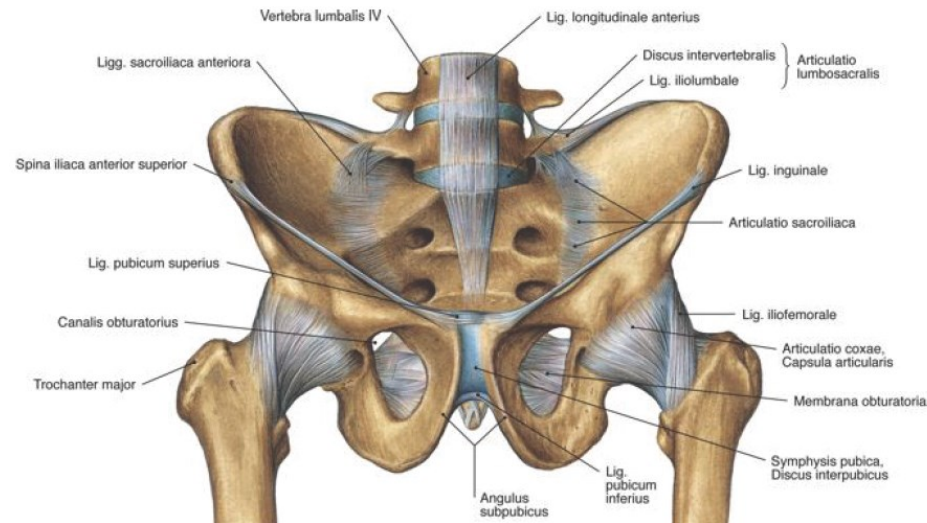
## Articulatio zygapophysialis

- processus aticulares
- Straffe Gelenke
- Schlaffes Kapsel, in caudale Richtung wird straffer sein



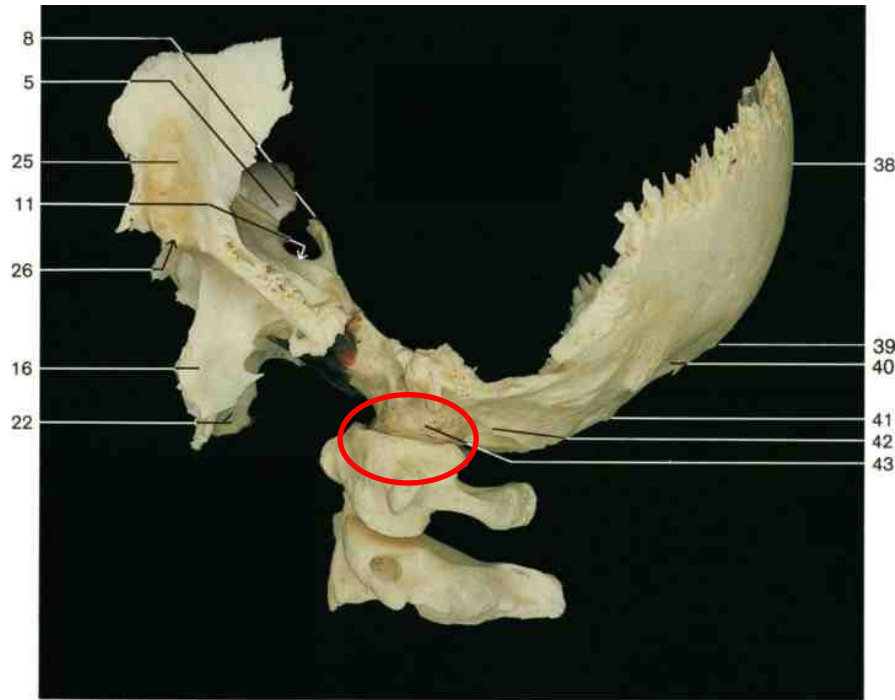
# Articulatio lumbosacralis

## Articulatio sacrococcygea



# Articulatio atlantooccipitalis

Facies art. sup. atlantis  
Condylus occipitalis



Art. elipsoidea:

- Horizontale Achse: Vor- und rückwärtsbewegungen
- Sagittale Achse: seitwärtsneigungen



# Articulationes atlantoaxiales

Articualtio atlantoaxialis mediana

Fac. art. ant. dentis

Fovea dentis

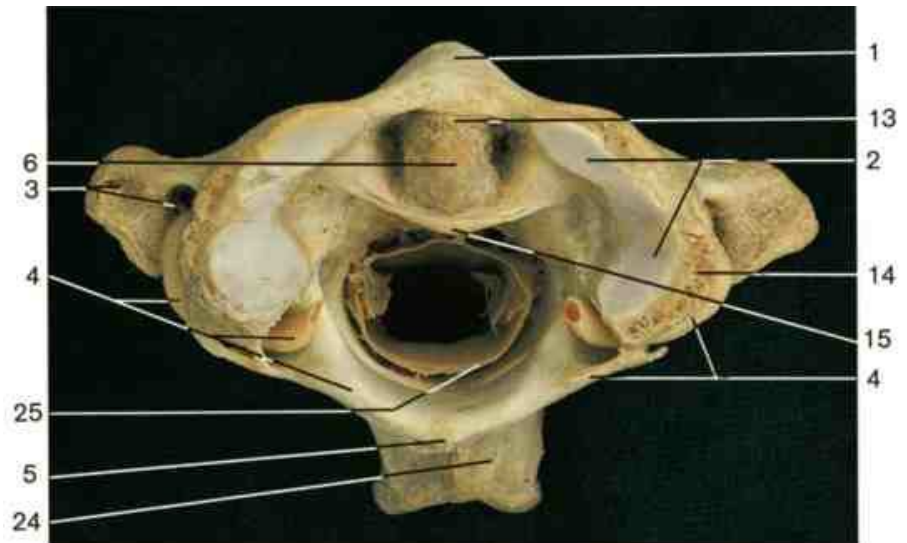
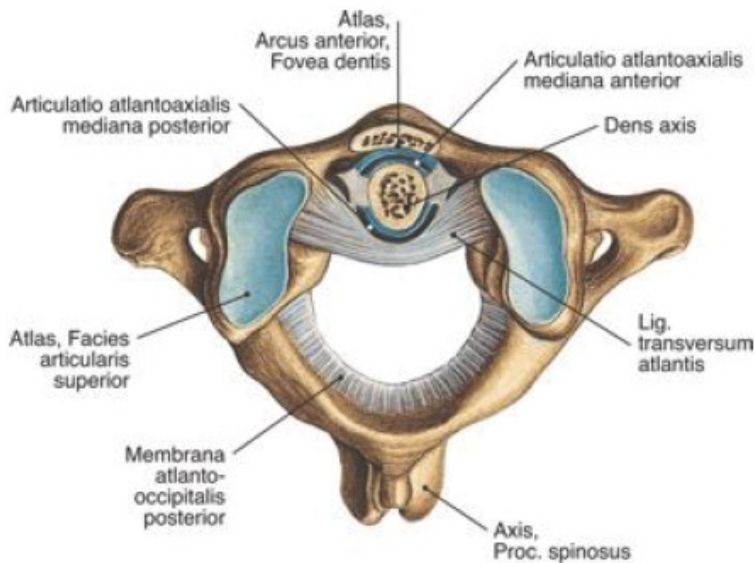
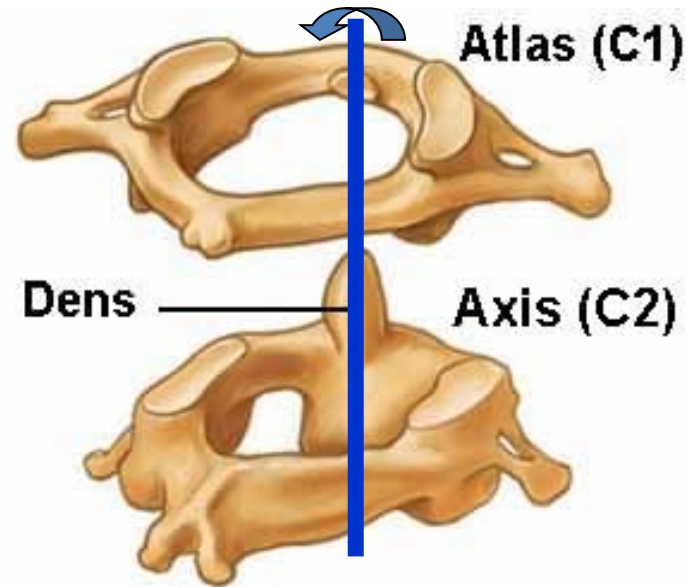
Articulationes atlanroaxiales laterales

Fac. art. inf atlantis

Fac. art. sup. axis

Art. trochoidea:

- 26 Grad Drehung nach jede Seite

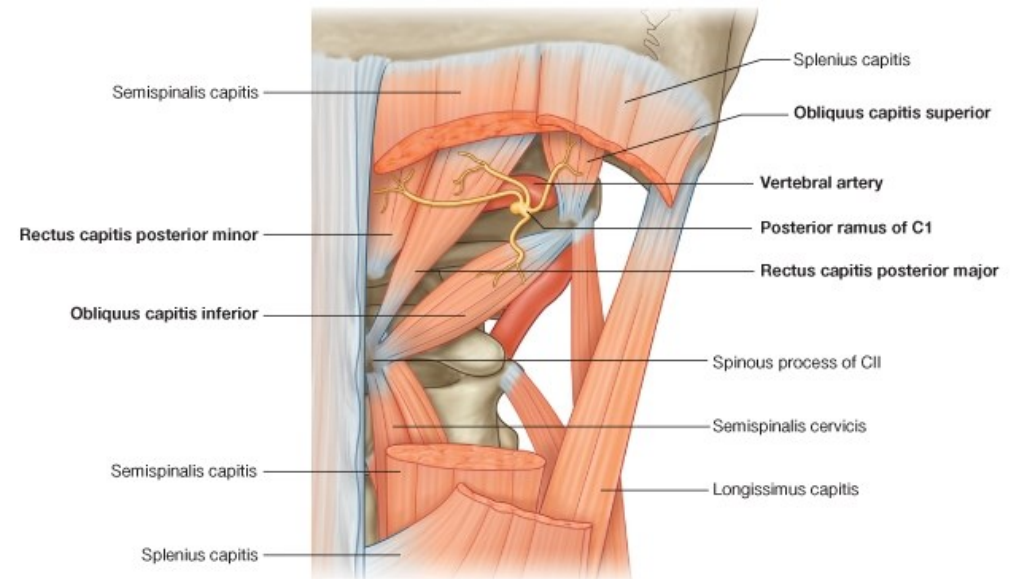


## Ventrale Muskeln

M. rectus capitis lateralis

M. rectus capitis anterior

M. longus capitis



© Elsevier. Drake et al: Gray's Anatomy for Students - [www.studentconsult.com](http://www.studentconsult.com)

## Dorsale Muskeln

M. trapezius

M. splenius capitis

M. longissimus capitis

M. semispinalis capitis

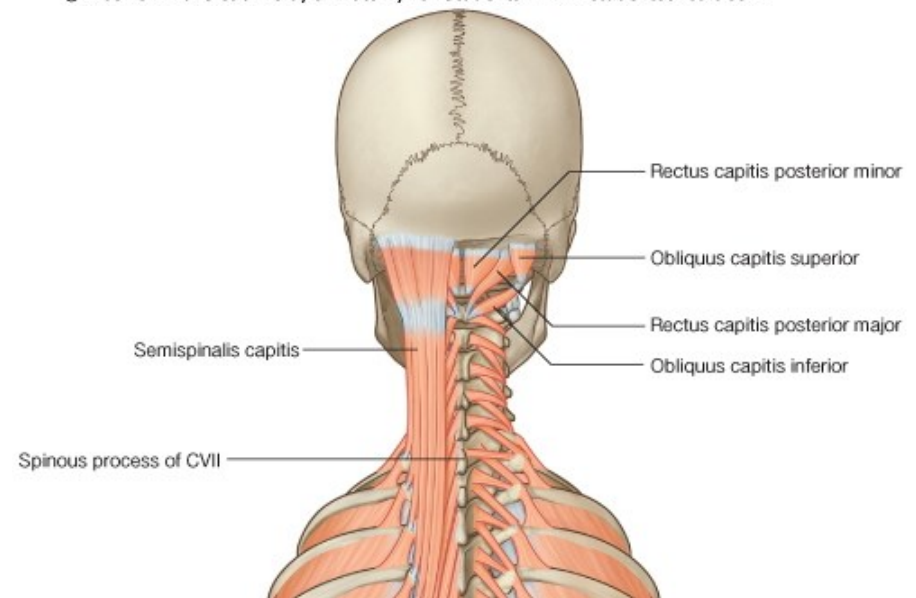
## Kurze Nackenmuskeln:

M. rectus capitis posterior major

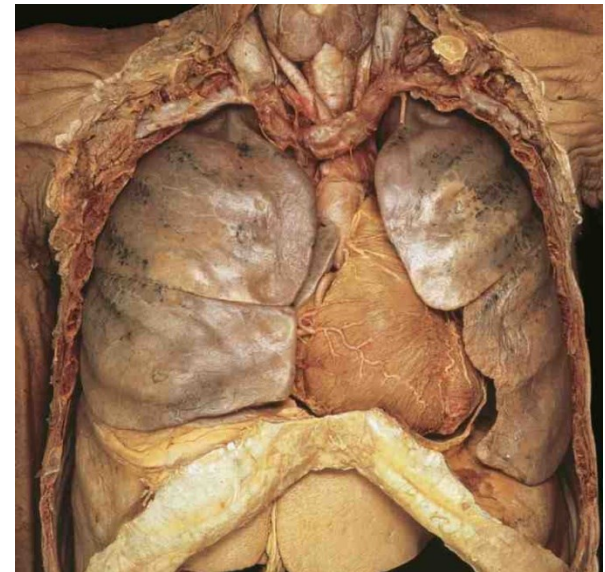
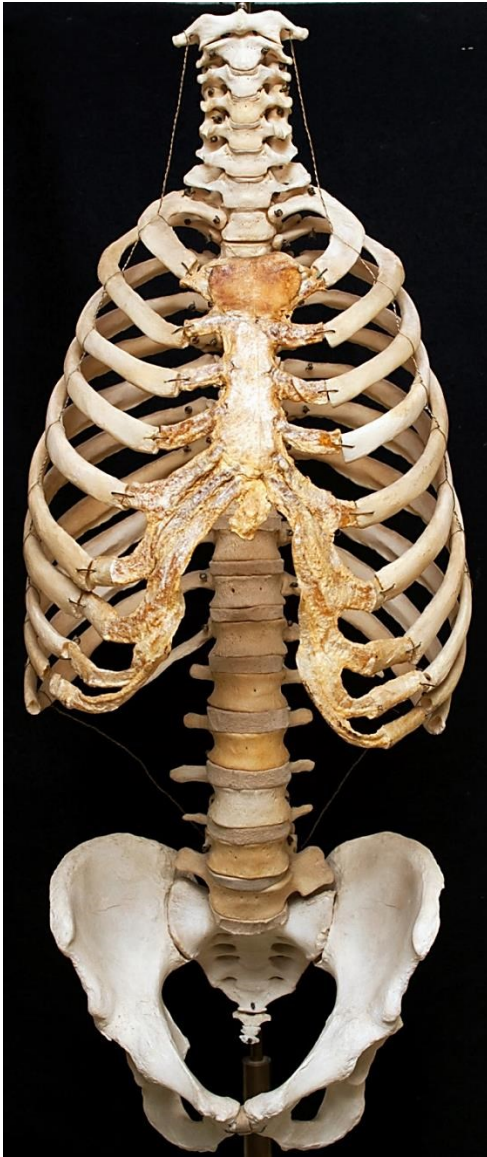
M. rectus capitis posterior minor

M. obliquus capitis superior

M. obliquus capitis inferior



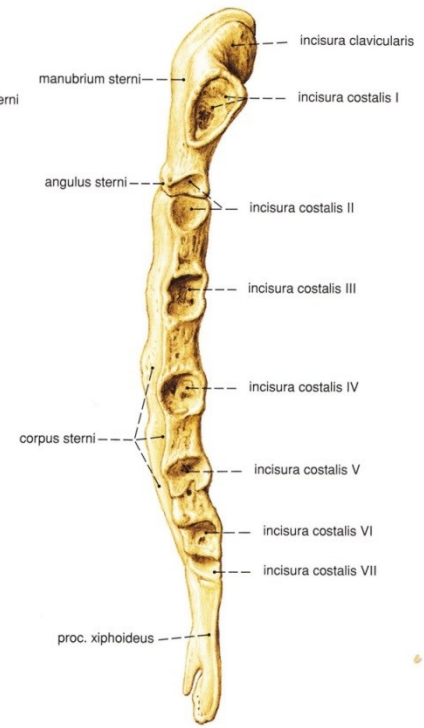
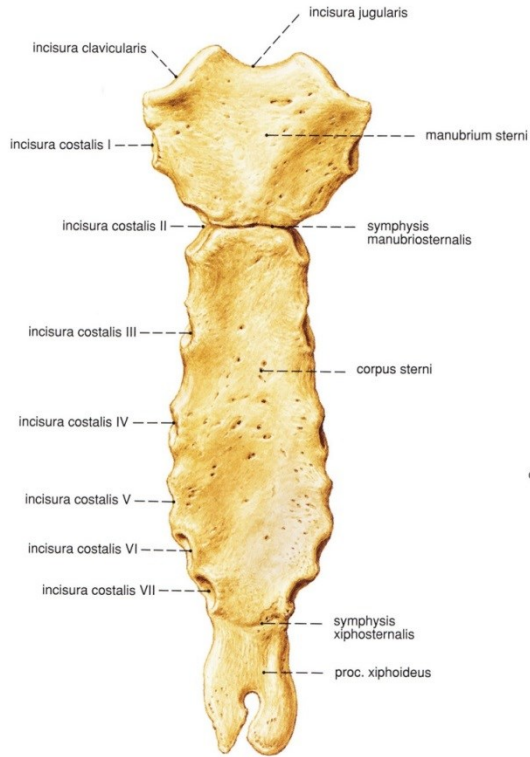
# Brustkorb



knöcherner Brustkorb: Sternum, 12 Paar Rippen, Wirbelsäule (12 Brustwirbel)



# Sternum (Brustbein)



Griff (Manubrium)  
 Körper (Corpus)  
 Schwertfortsatz (Proc. xiphoideus)



Sternumpunktion!!!  
 Pectus carinatum  
 Pectus excavatum

# Costae (Rippen)

## Wahre Rippen (I – VII.):

setzen mit dem eigenen Knorpel  
einzeln am Sternum an

*Costae verae*

## Falsche Rippen (VIII - XII.):

*Costae spuriae*

...nicht, wie die obigen

entweder mit gemeinsamen Knorpel (VIII – X.)

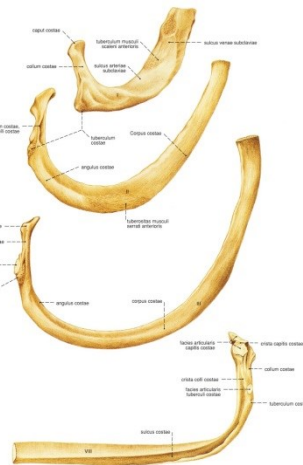
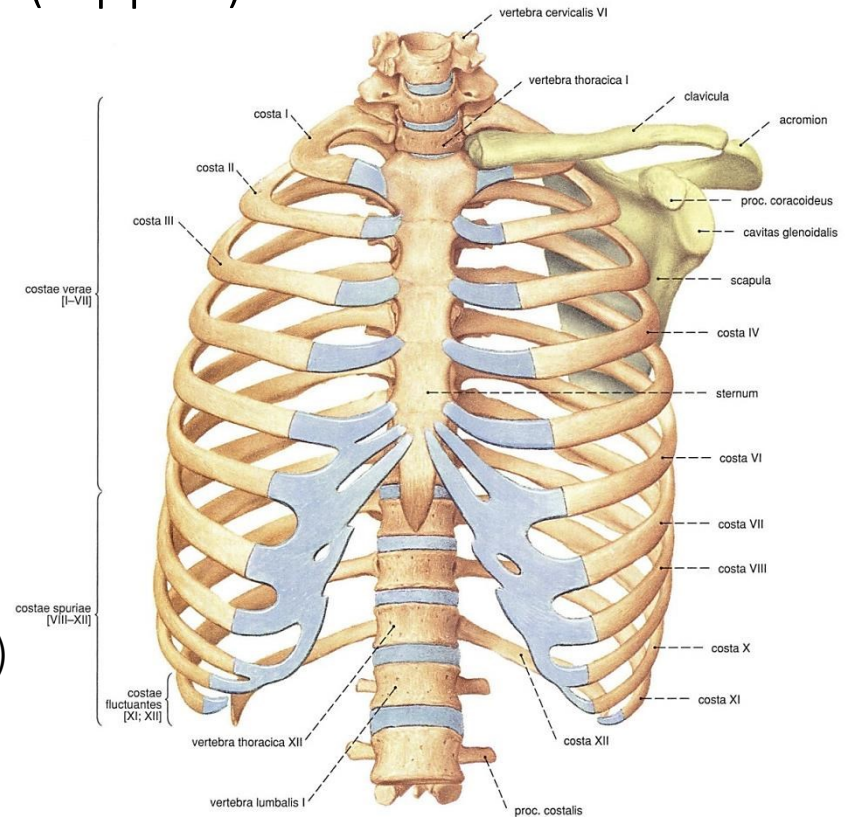
oder kein Ansatz am Sternum (XI., XII.):

Fliehende Rippen/ Fleischrippen

*Costae fluitantes*

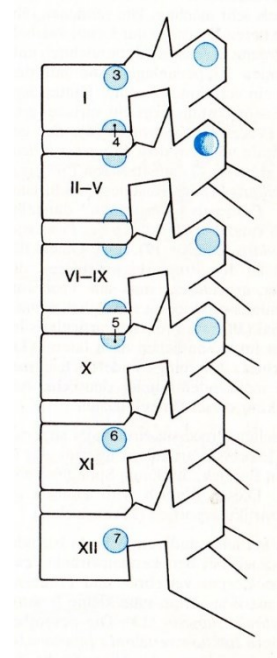
Krümmungen:

1. Kantenkrümmung
2. Flächenkrümmung
3. Torsion



Jede Rippe artikuliert mit dem eigenen und dem eins darüber liegenden Wirbel insgesamt an drei Stellen.

Ausnahme: I., XI. und XII. Rippe



### Articulatio capitis costae:

Caput costae + die zwei nagbarige Fovea costalis

Faserknorpel

Schlaffes Kapsel

(Lig. capitis costae intraarticulare et radiatum)

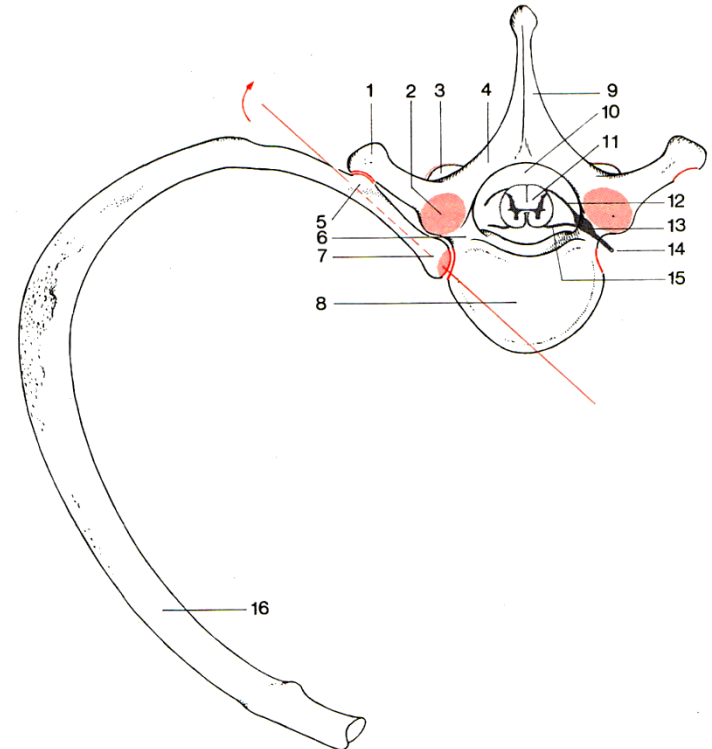
### Articulatio costotransversalis:

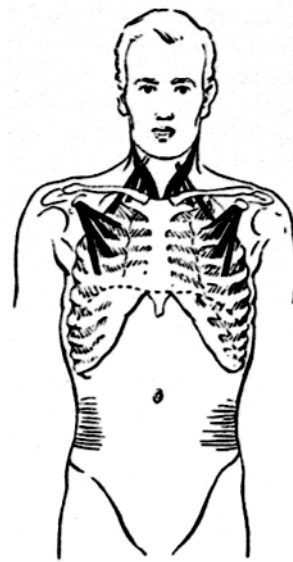
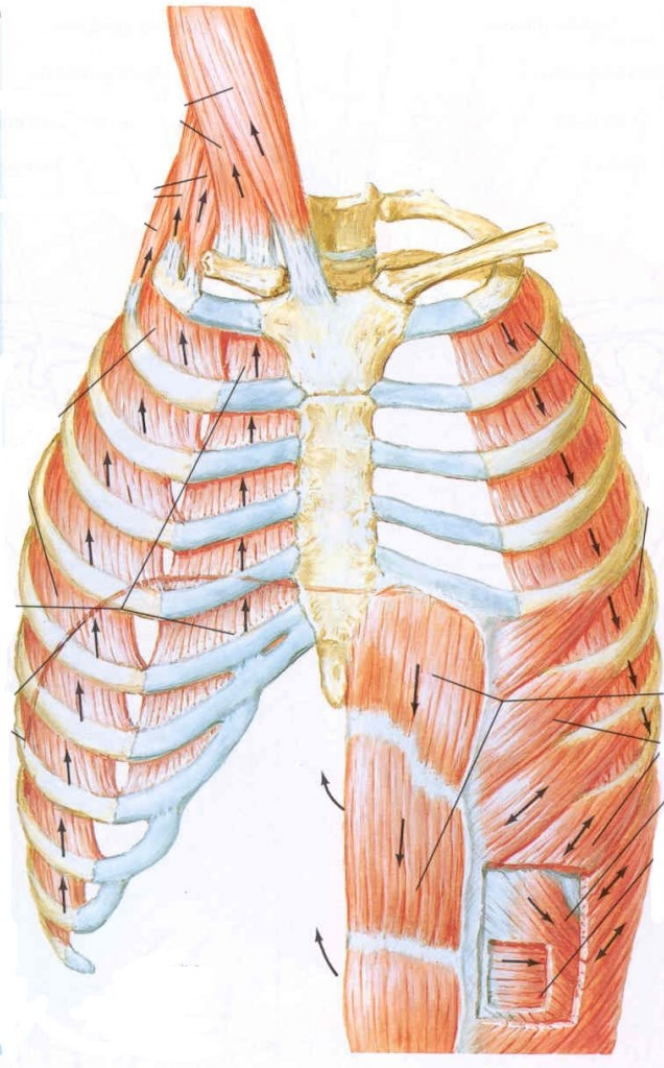
Tuberculum costae + Fovea costalis am Processus transversus

Hyalinknorpel

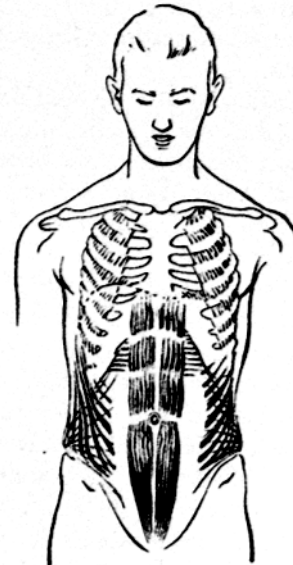
Schlaffes Kapsel

(Lig. costotransversarium, ~ lat. et sup.)





*Einatmung  
(inspiratio)*



*Ausatmung  
(expiratio)*

**Einatmung:**

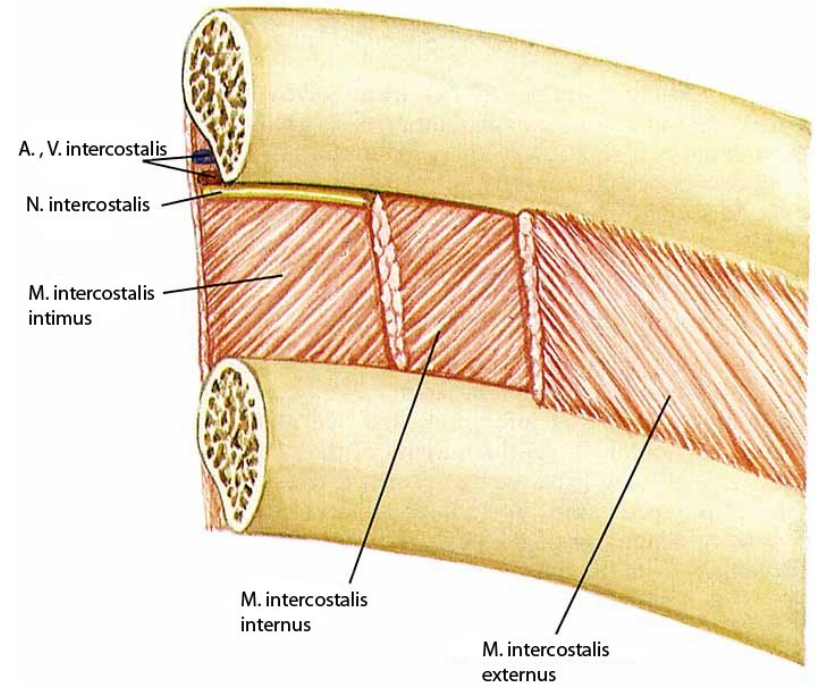
- Hebung der Rippen

Mm. levatores costarum  
**Mm. intercostales externi**  
 Mm. scaleni  
 Mm. pectoralis minor  
 M. serratus posterior sup.  
 M. serratus anterior

**Ausatmung:**

- Depression der Rippen

**Mm. intercostales interni**  
 M. serratus posterior inf.  
 M. transversus thoracis  
 Mm. subcostales  
 Bauchmuskeln...



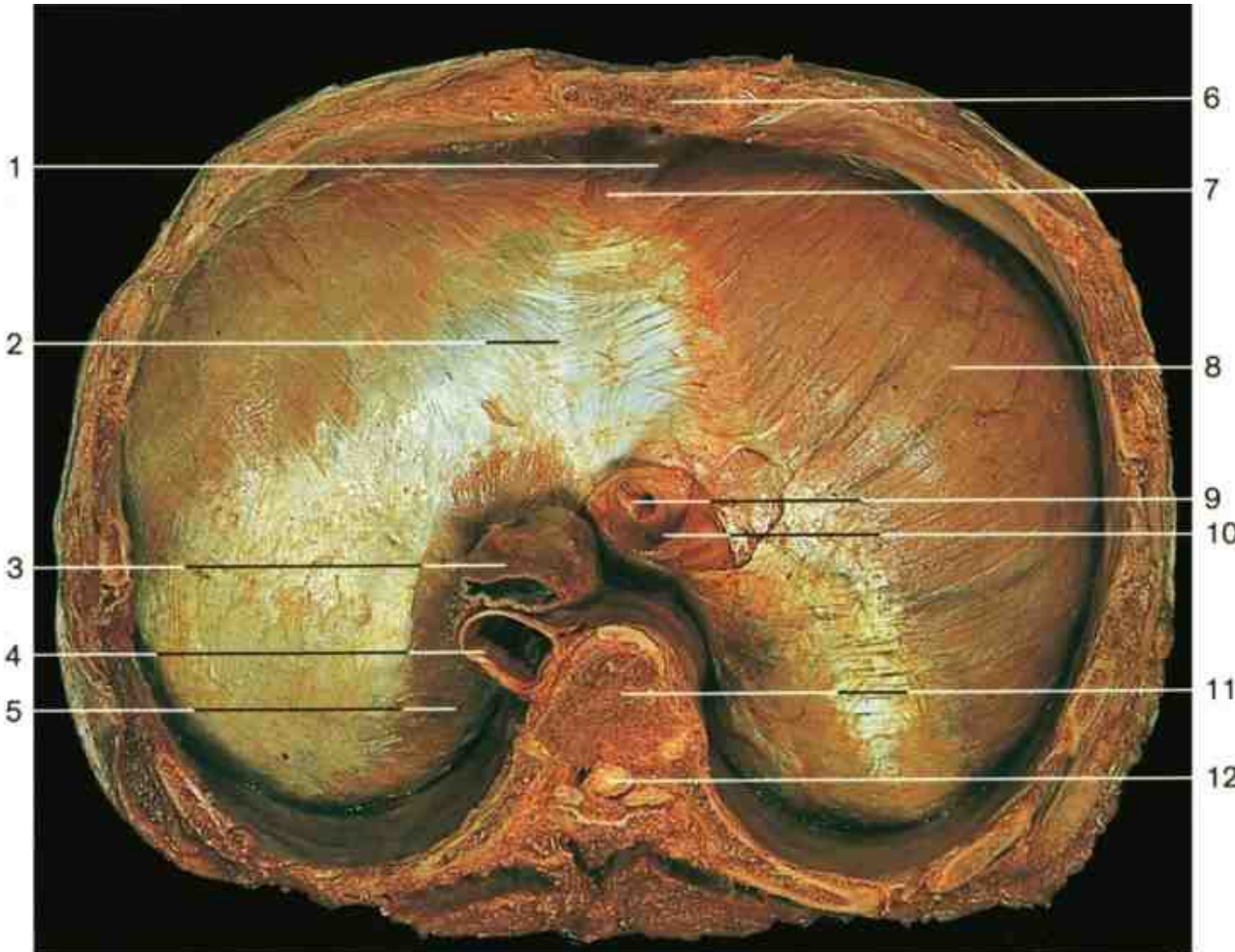
# Zwerchfell

Centrum tendineum

Pars sternalis

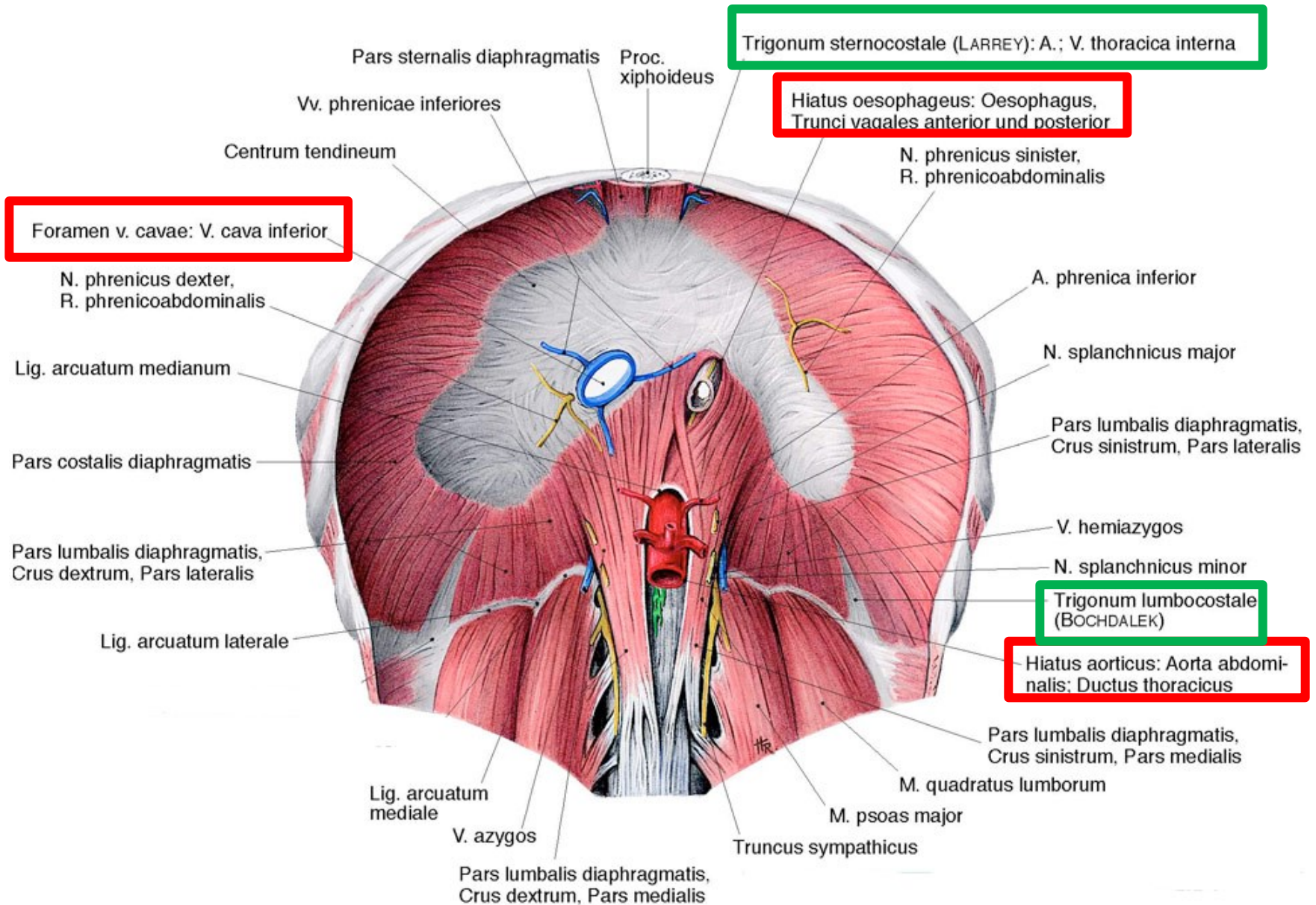
Pars costalis

Pars lumbalis (rechts L4, links L3)

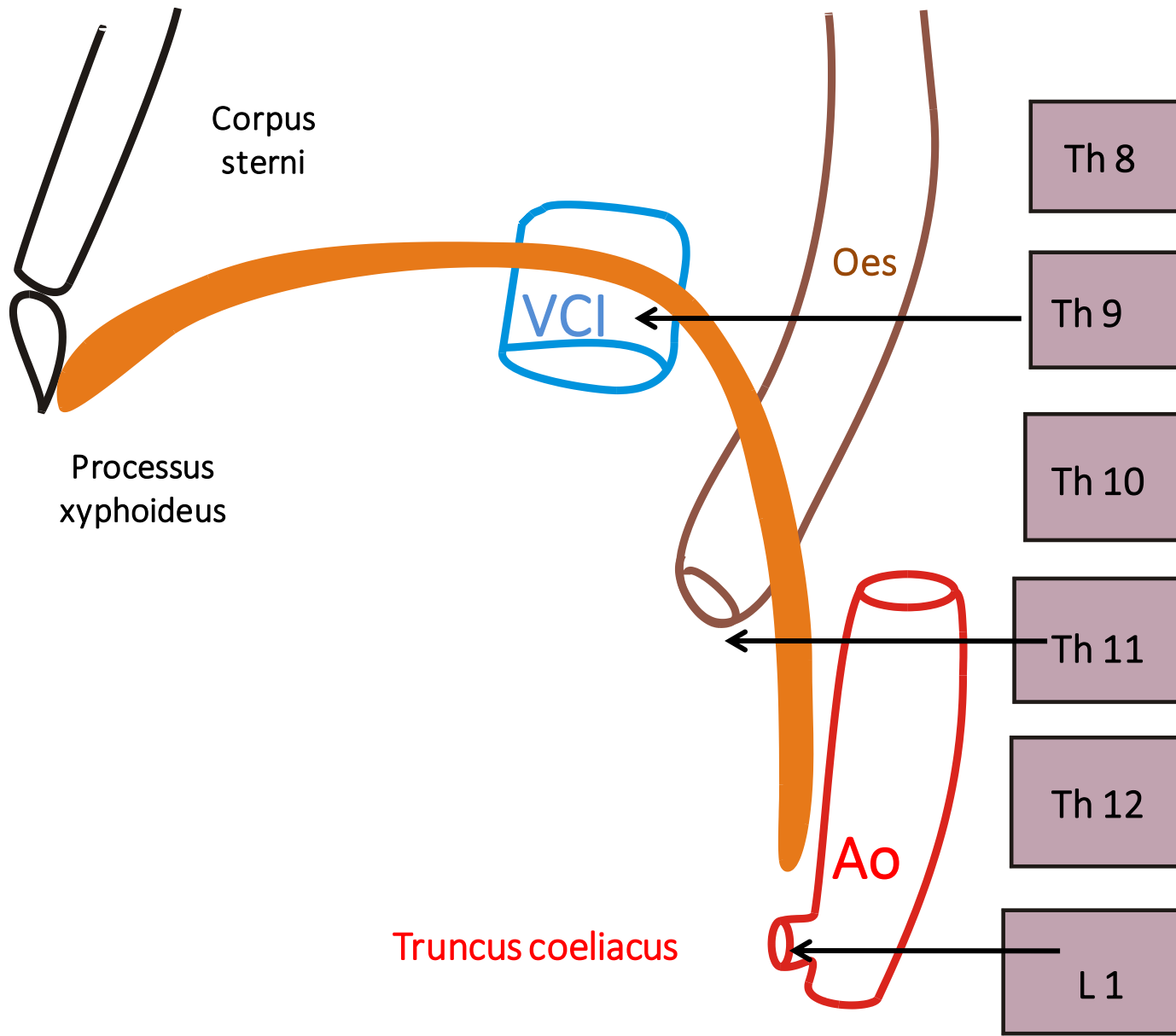


- 1 Trig. sternocostale
- 2 Centrum tendineum
- 3 Oesophagus
- 4 Aorta
- 5 Pars lumbalis
- 6 Sternum
- 7 Pars sternalis
- 8 Pars costalis
- 9 Vv. hepaticae
- 10 VCI
- 11 IX. vertebra thoracica
- 12 Medulla spinalis

# Durchtrittsstellen



# Topographie von Durchtrittsstellen



Dr. Gábor Baksa: Die knöchernen Aufbauelemente des Brustkorbes

Dr. Orsolya Kántor: Rekesz

Dr. Márk Kozsurek: Gerinc, fejízületek

Yokochi Rohen: Color atlas of anatomy (Schattauer, 2011.)

Pernkopf Anatomie 1. Band (Brust und obere Extremität)  
(Urban & Schwarzenberg 1991.)

Platzer W: Taschenatlas der Anatomie – Bewegungsapparat (Thieme 1991.)

Sobotta: Az ember anatómiájának atlasza (Alliter 2004.)

[www.gyorplusz.hu](http://www.gyorplusz.hu)

[www.pectusexcavatum.atw.hu](http://www.pectusexcavatum.atw.hu)

[www.patikamagazin.hu](http://www.patikamagazin.hu)