

BIOMECHANIKA KRĘGOSŁUPA



Marek Matyjewski





Biomechanika

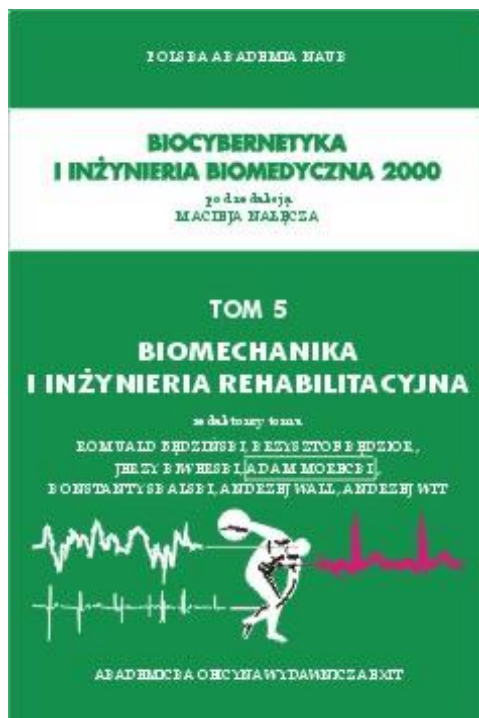
Biomechanika jest nauką o ruchu oraz związanych z nim obciążeniach i ich skutkach, mechanizmach ruch ten wywołujących, ze szczególnym uwzględnieniem człowieka i zwierząt.

Nauka ta opiera swoje podstawy na mechanice z jednej, biologii i medycynie natomiast - z drugiej strony.





Literatura





Biomechanika i inżynieria rehabilitacyjna Tom 5

- ◆ Biomechanika Ogólna
- ◆ Biomechanika Medyczna
- ◆ Biomechanika Sportu
- ◆ Biomechanika Pracy, Układy Człowiek-Maszyna
- ◆ Biomechanika Inżynierska, Ortopedyczna i Rehabilitacyjna



Dolegliwości powodujące absencję chorobową

Choroba	Liczba dni absencji chorobowej w 2015 roku (tys.)	Liczba dni absencji chorobowej w 2016 roku (tys.)
Opieka położnicza z powodu stanów związanych głównie z ciążą	31 906,3	34 732,0
Zaburzenia korzeni rdzeniowych i splotów nerwowych	13 953,5	14 503,2
Ostre zakażenie górnych dróg oddechowych o umiejscowieniu mnogim lub nieokreślonym	8 754,9	9 035,5
Inne choroby krążka międzykręgowego	5 377,9	5 702,2
Reakcja na ciężki stres i zaburzenia adaptacyjne	4 985,6	5 427,3
Bóle grzbietu	4 904,6	5 780,8
Zmiany zwyrodnieniowe kręgosłupa	4 821,0	4 970,7
Krwawienie we wczesnym okresie ciąży	4 820,4	5 047,1
Ostre zapalenie nosa i gardła (przeziębienie)	3 989,2	4 337,9



Funkcje kręgosłupa



Płaszczyzny anatomiczne

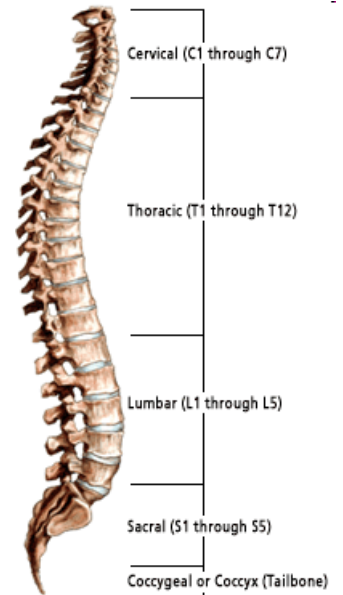


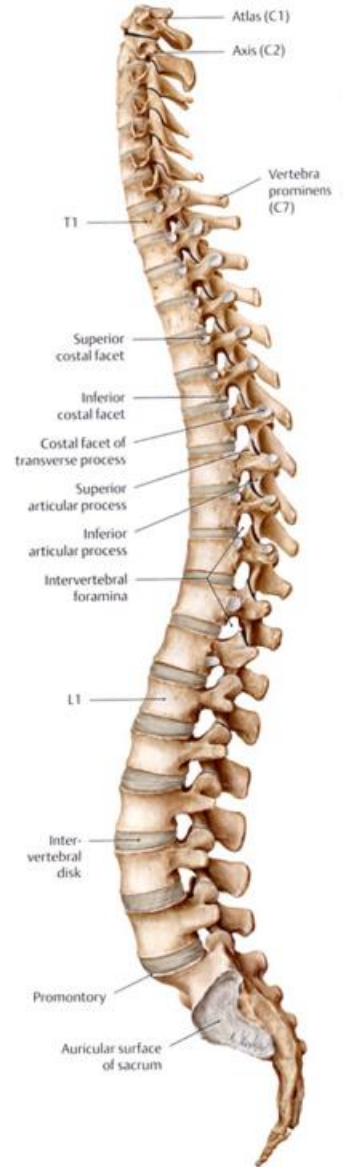
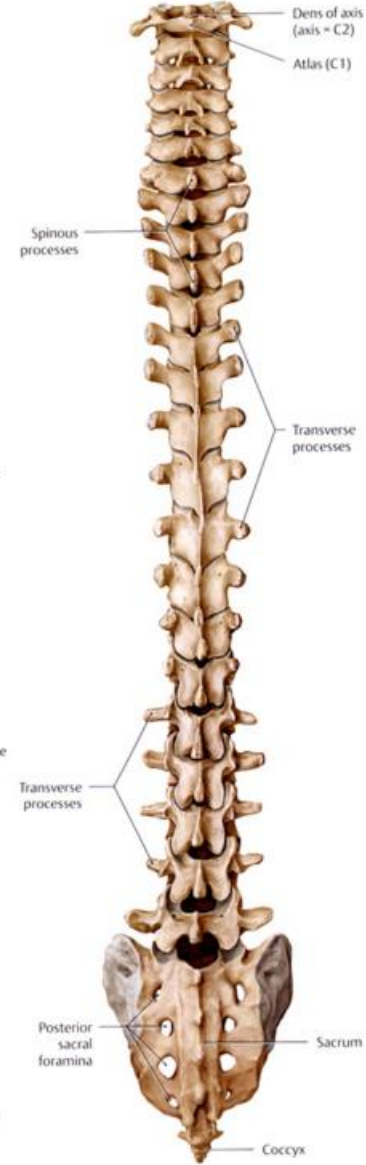
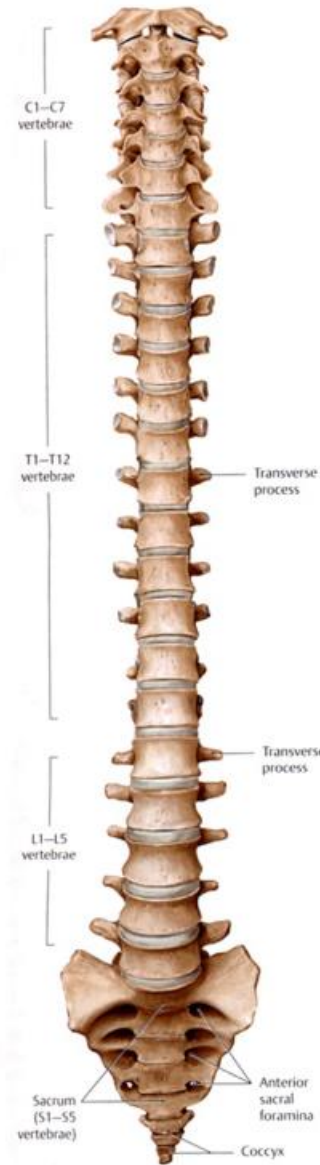
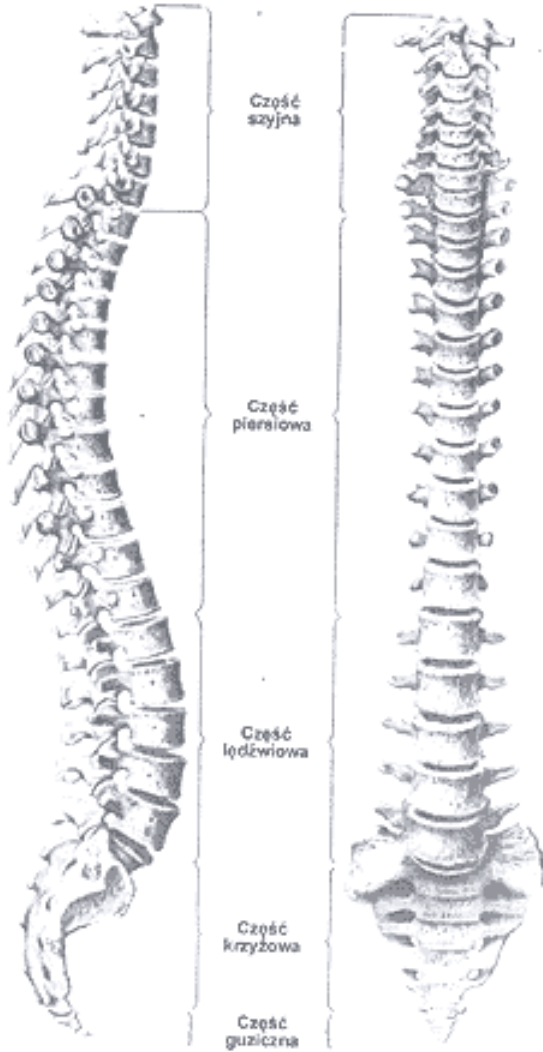
Coronal Plane
pł. czołowa



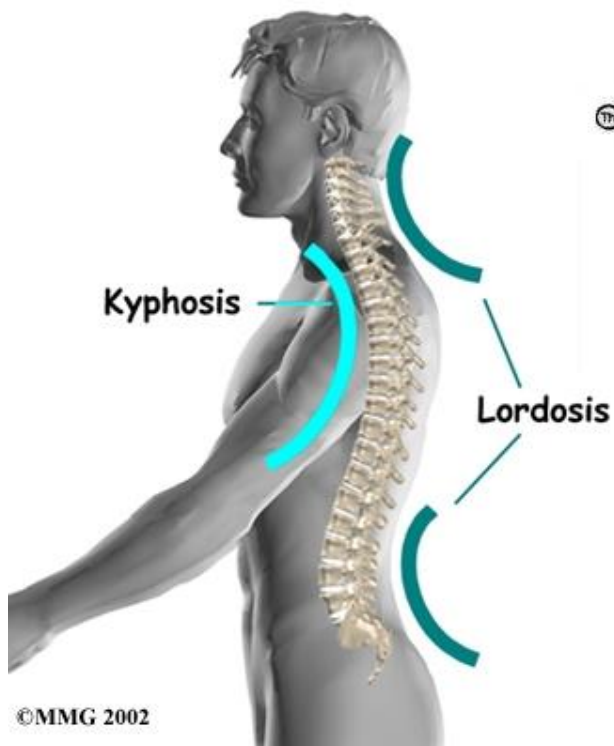
Sagittal Plane
pł. strzałkowa

Axial Plane
pł. pozioma
(poprzeczna)

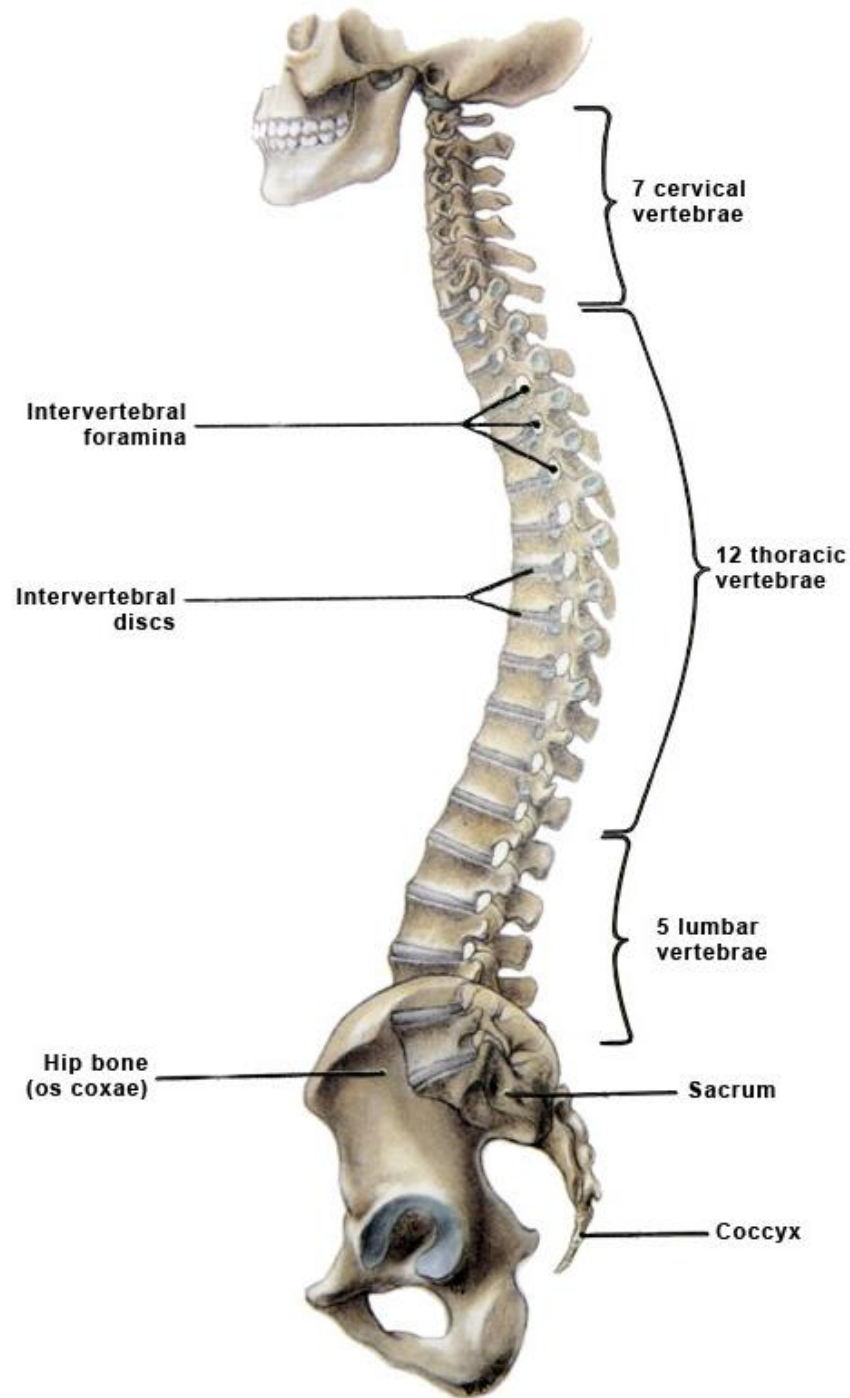
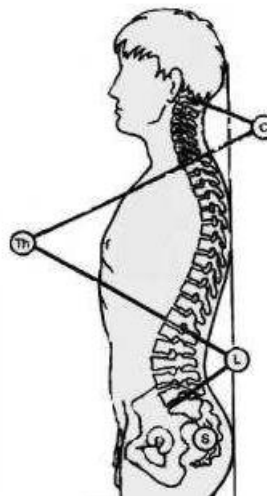




Krzywizny kręgosłupa

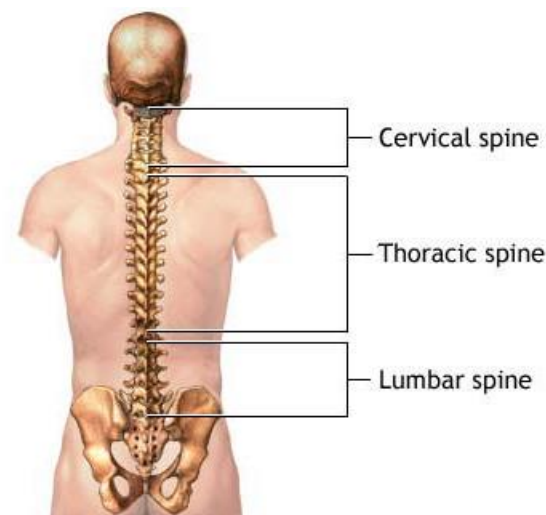
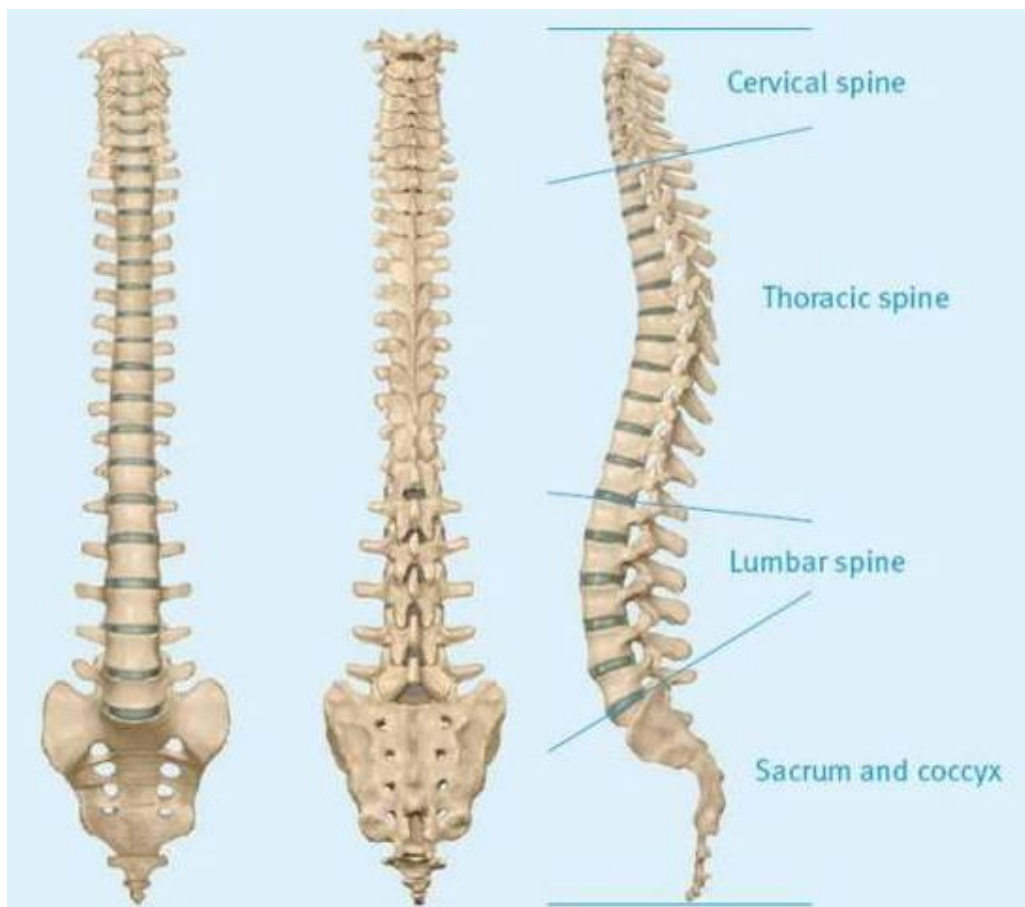


©MMG 2002



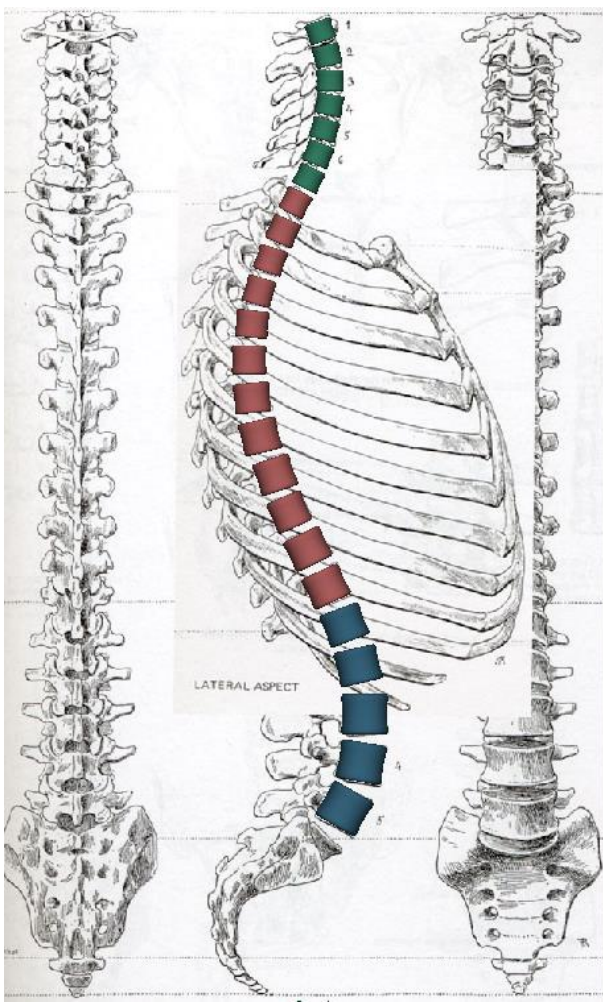


Cztery odcinki kręgosłupa





Liczba kręgów



7 kręgów szyjnych

C1 ÷ C7

12 kręgów piersiowych

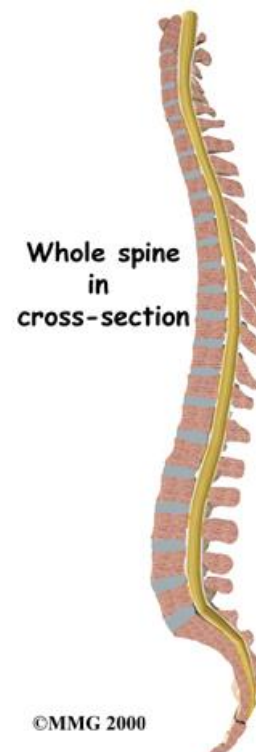
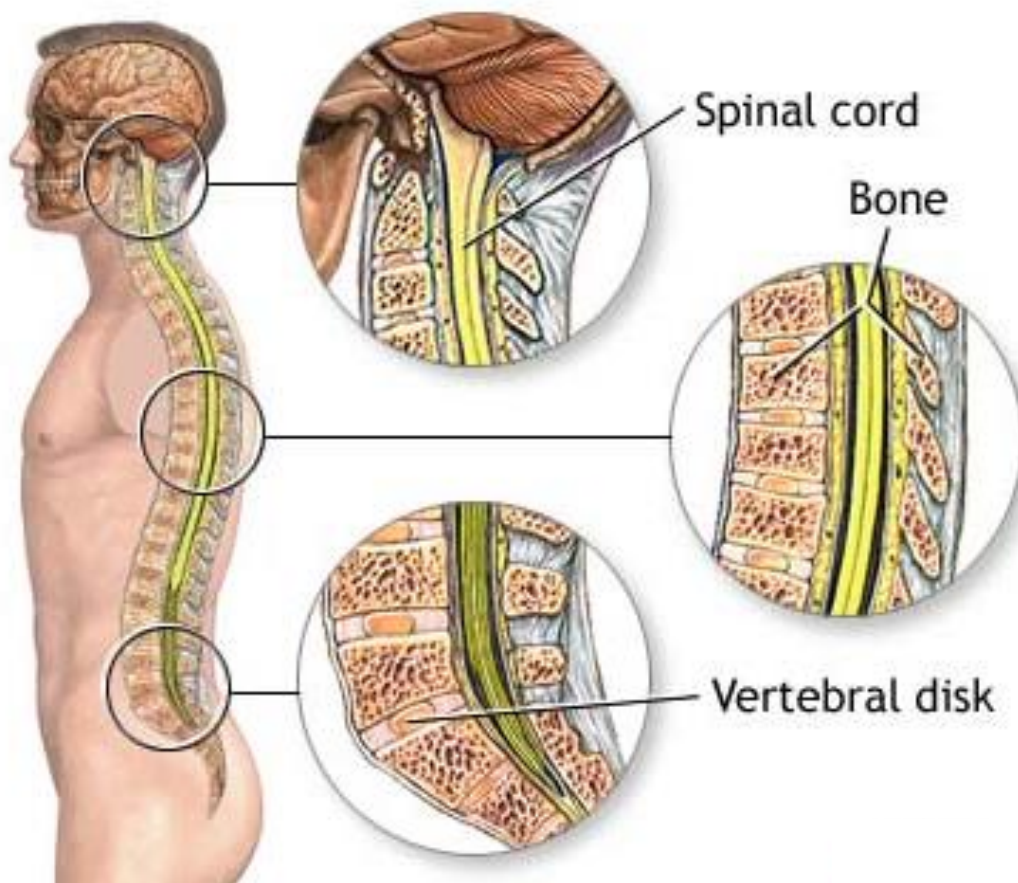
Th1 ÷ Th12

5 kręgów lędźwiowych

L1 ÷ L5

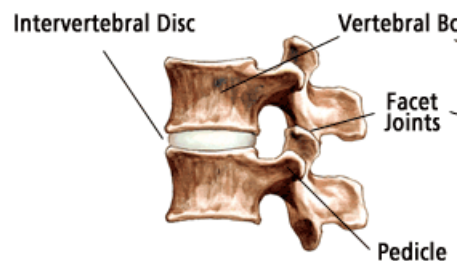
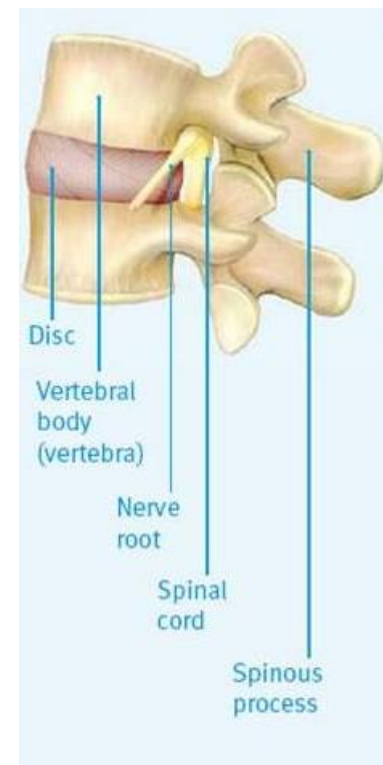
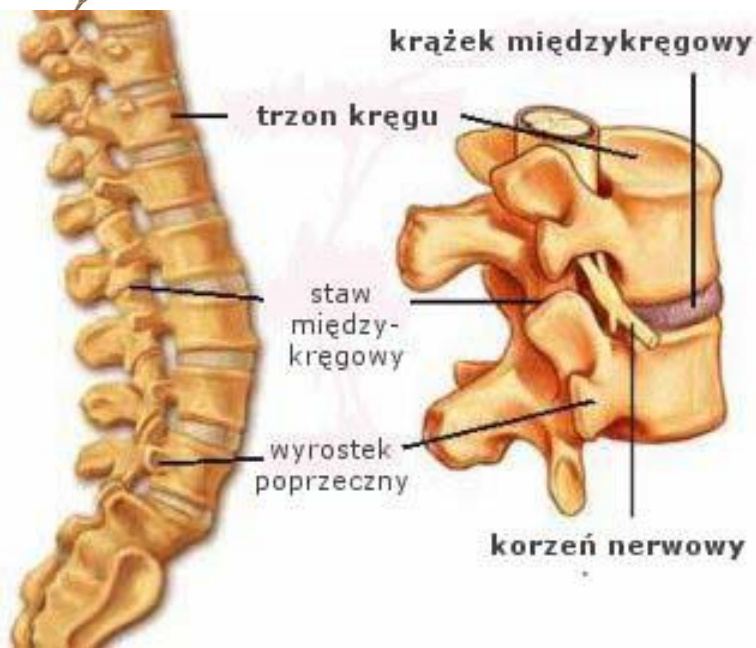


Przekrój w płaszczyźnie strzałkowej



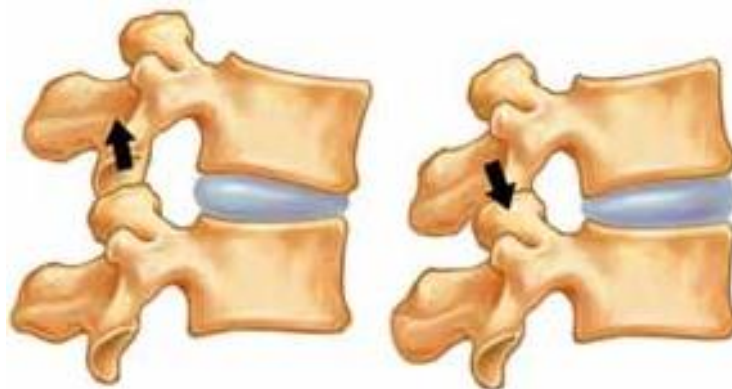
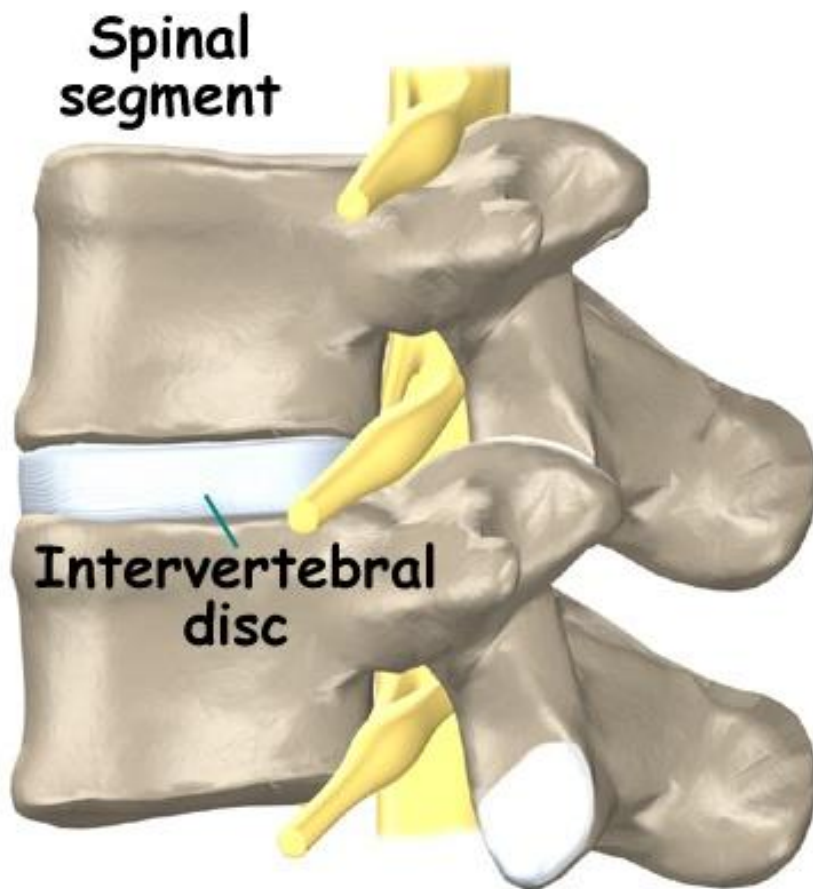


Segment ruchowy kręgosłupa



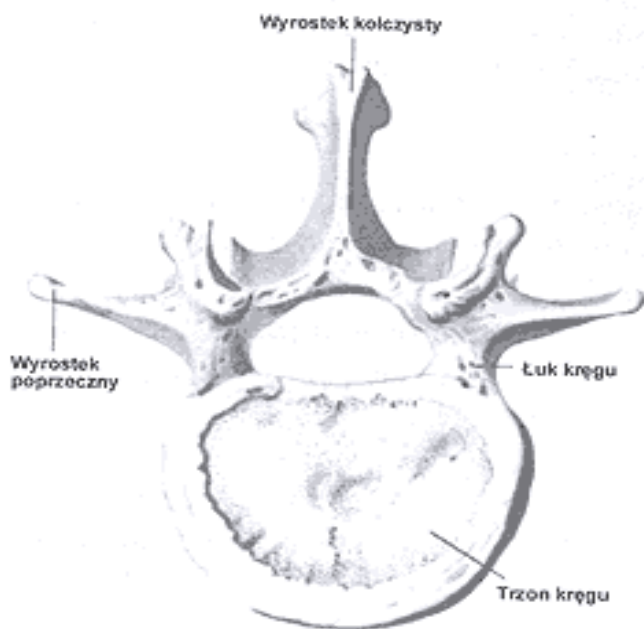
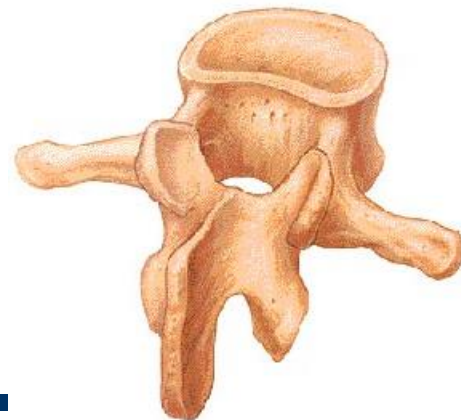


Segment ruchowy kręgosłupa

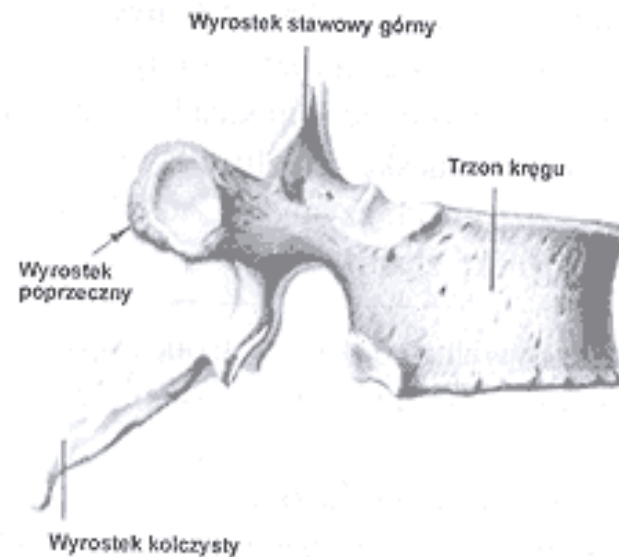




Budowa kręgu



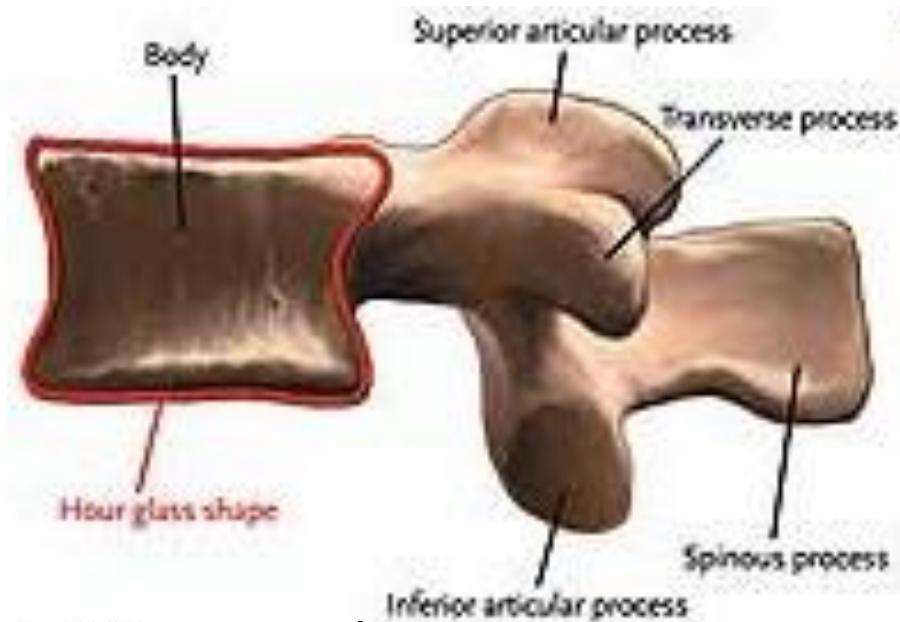
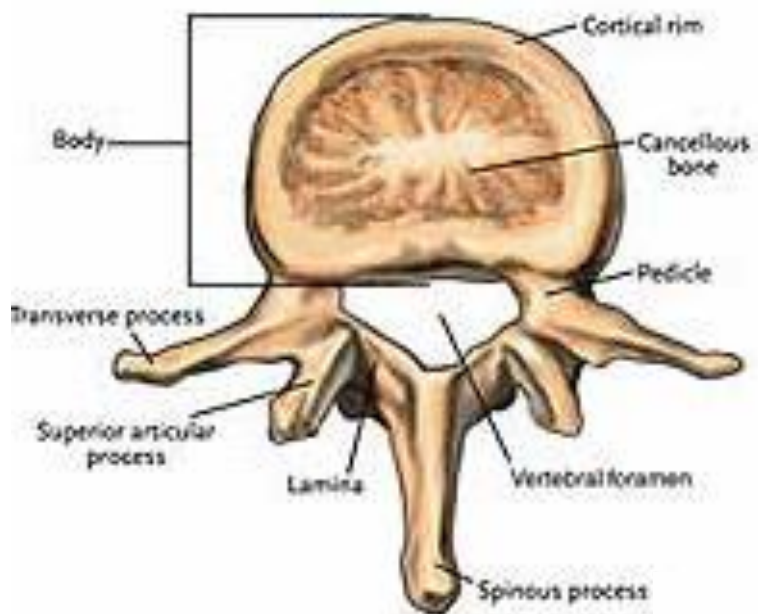
Widok kręgu z góry



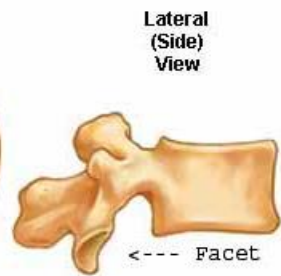
Widok kręgu z boku



Budowa kręgu



Lumbar Vertebrae

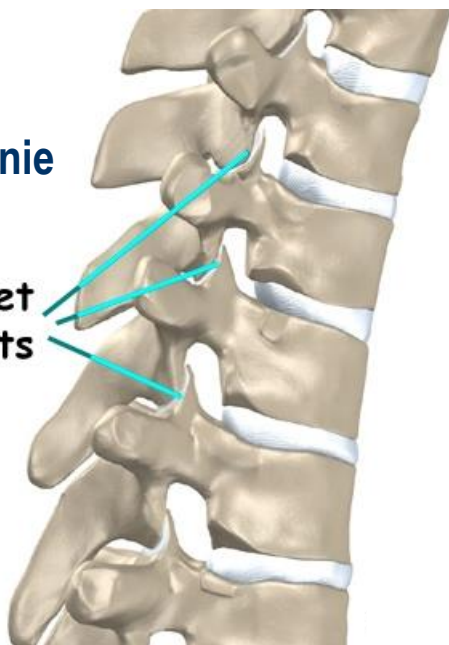




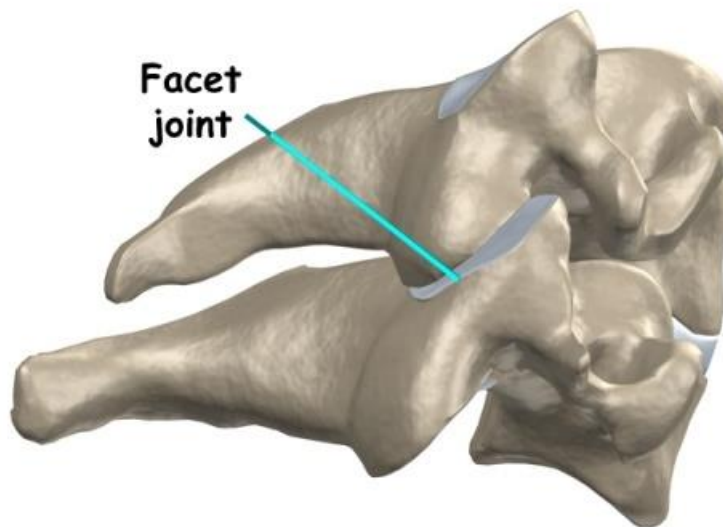
Stawy międzykręgowe

Powierzchnie
stawowe

Facet
joints

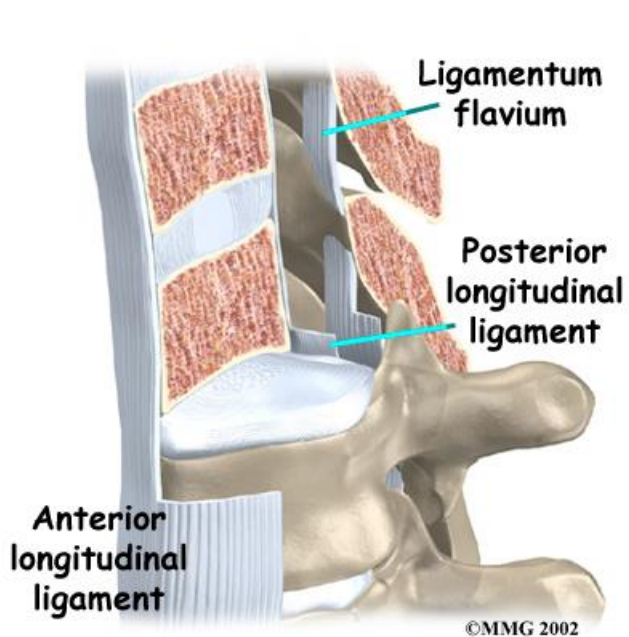


Facet
joint





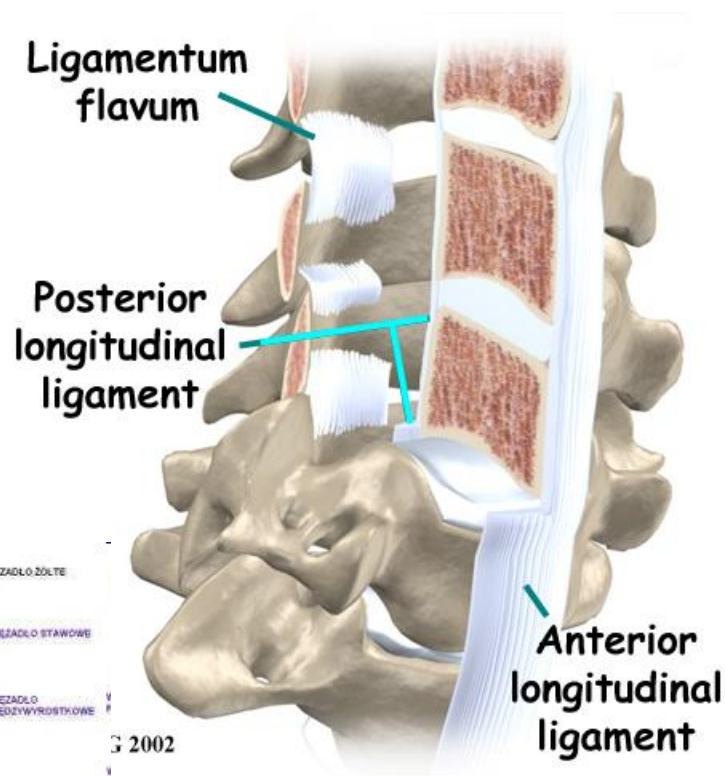
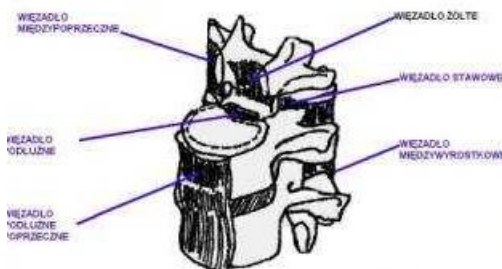
Więzadła



Więzadło
żółte

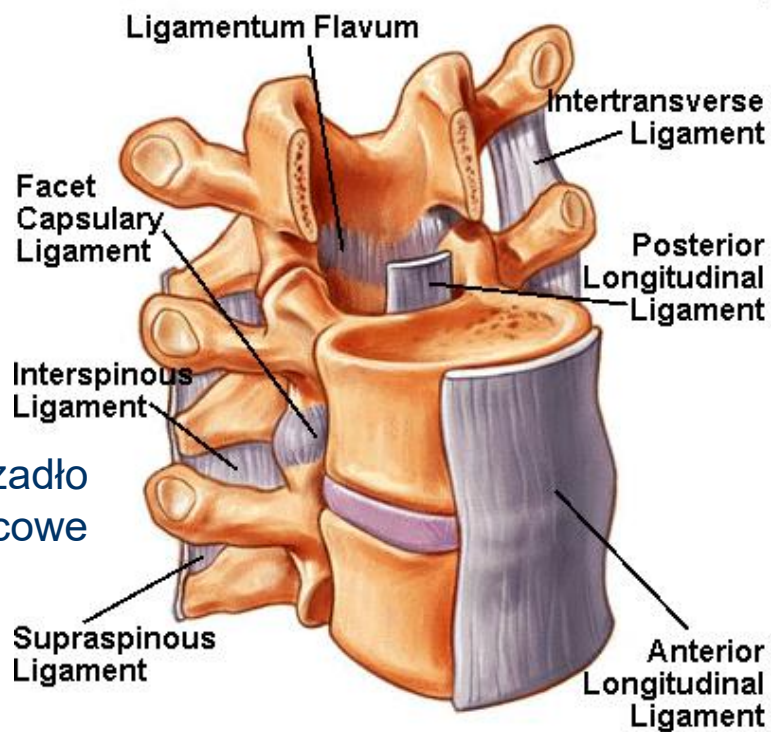
Więzadło
podłużne
tylne

Więzadło
podłużne
przednie

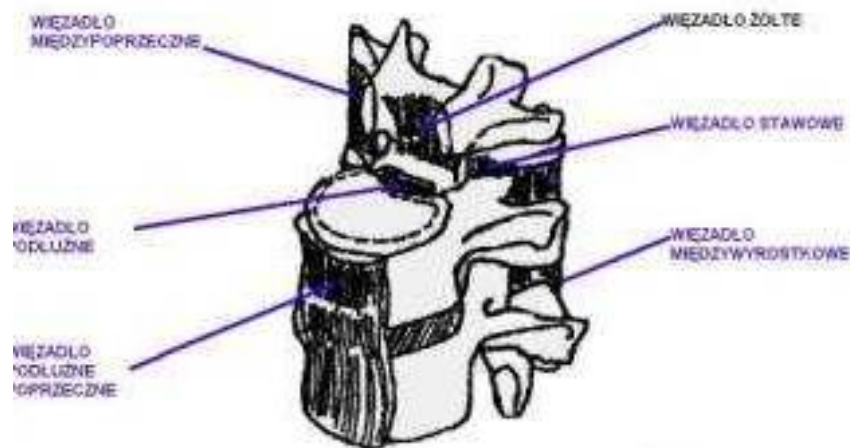




Więzadła

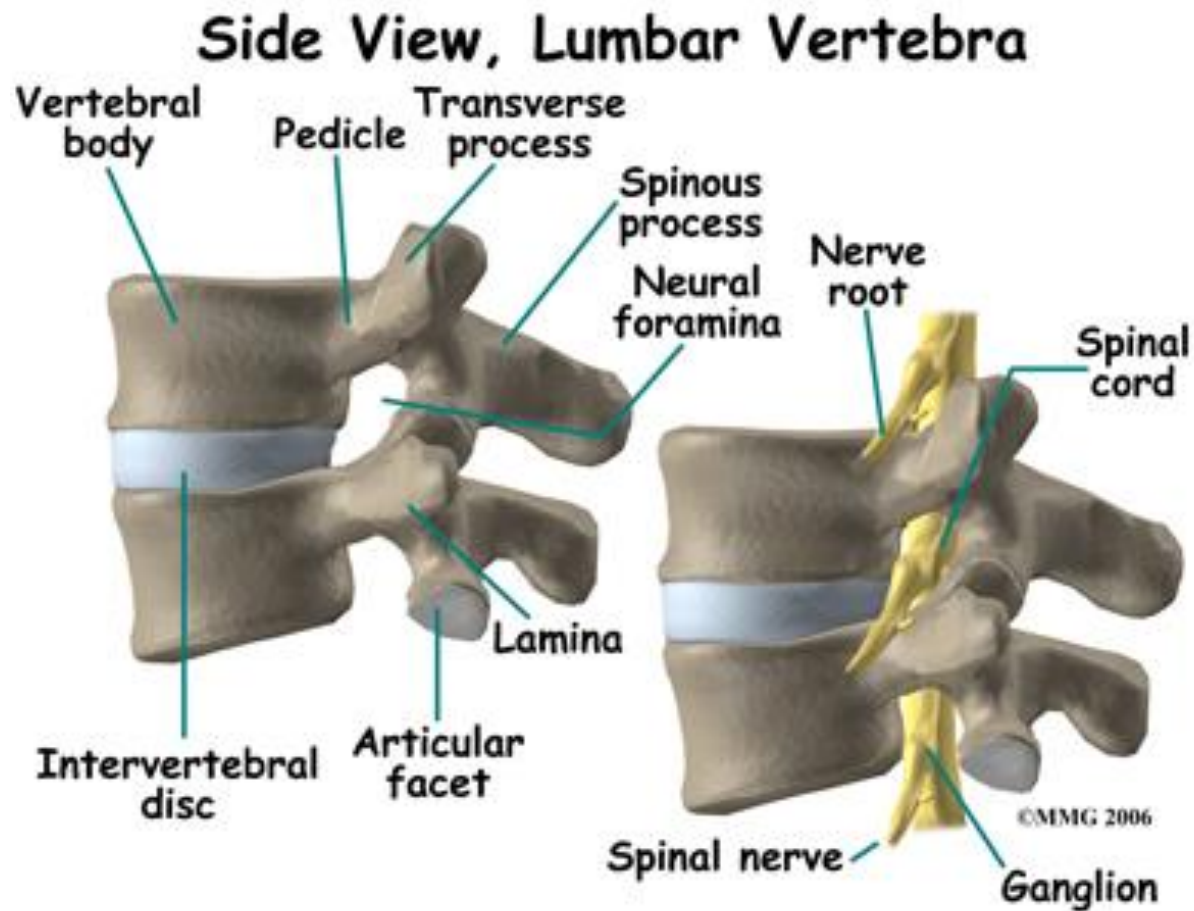


Więzadło nadkolcowe





Wyrostki stawowe





Różnice w budowie kręgów

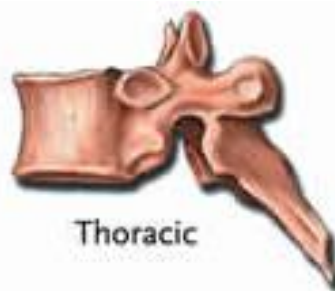
szyjny

piersiowy

lędźwiowy



Cervical



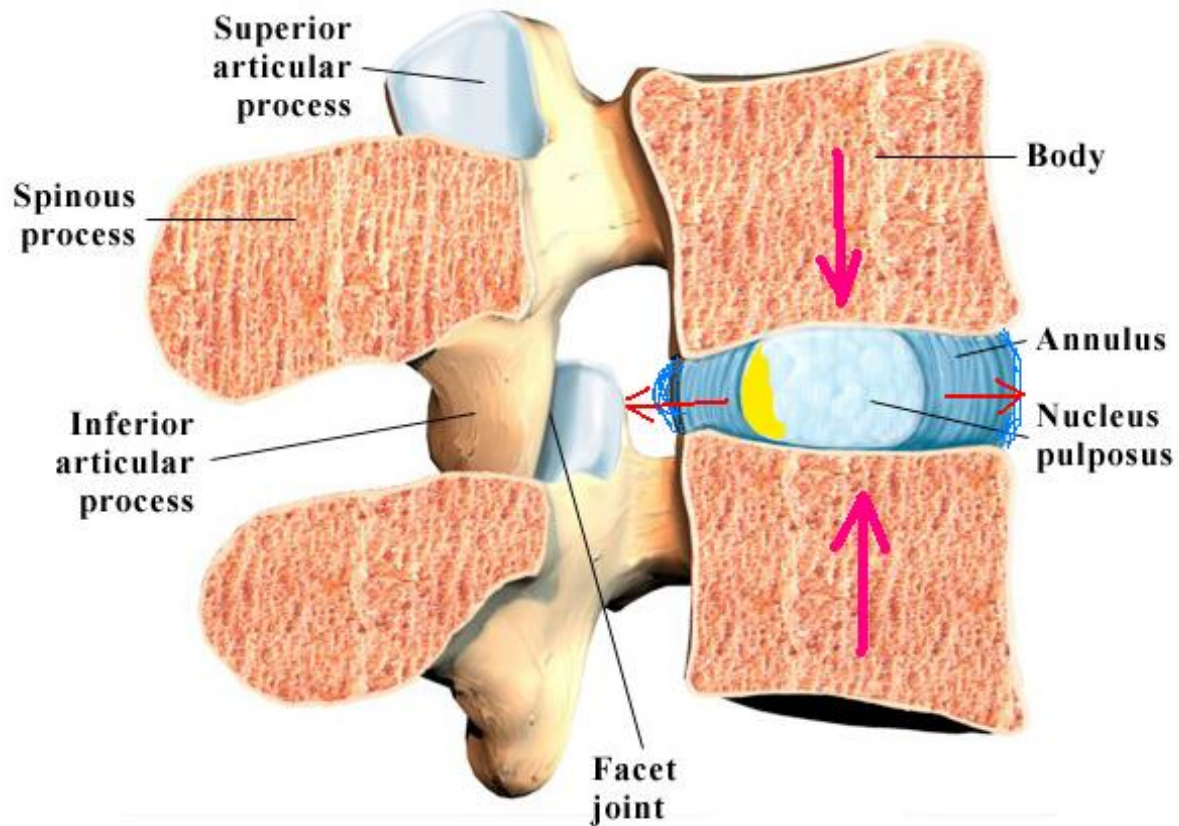
Thoracic



Lumbar



Krążek międzykręgowy





Krążek międzykręgowy

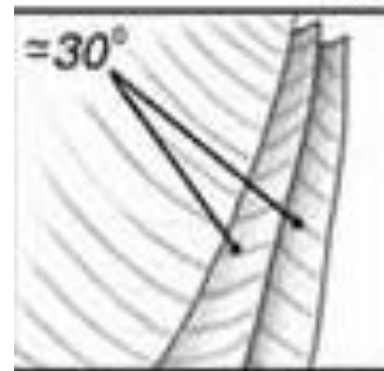
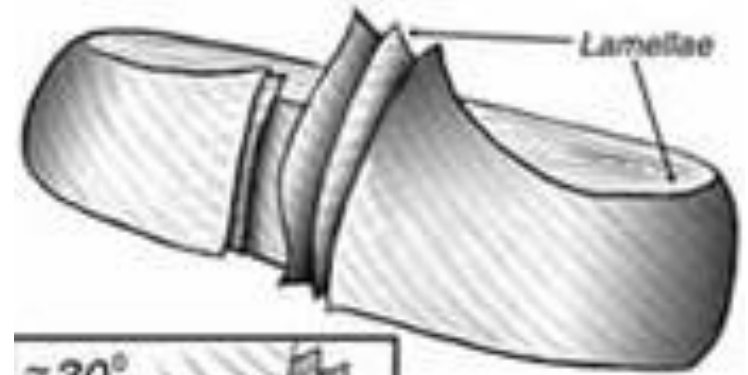
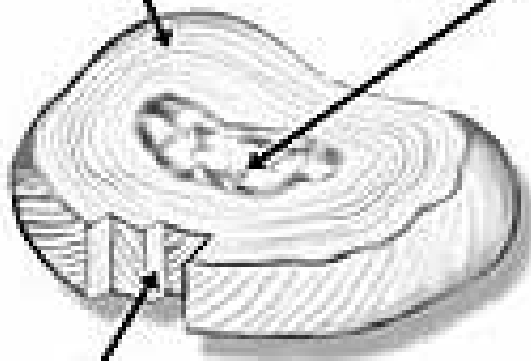
Pierścień włóknisty

Annulus Fibrosus

Jądro miazdżyste

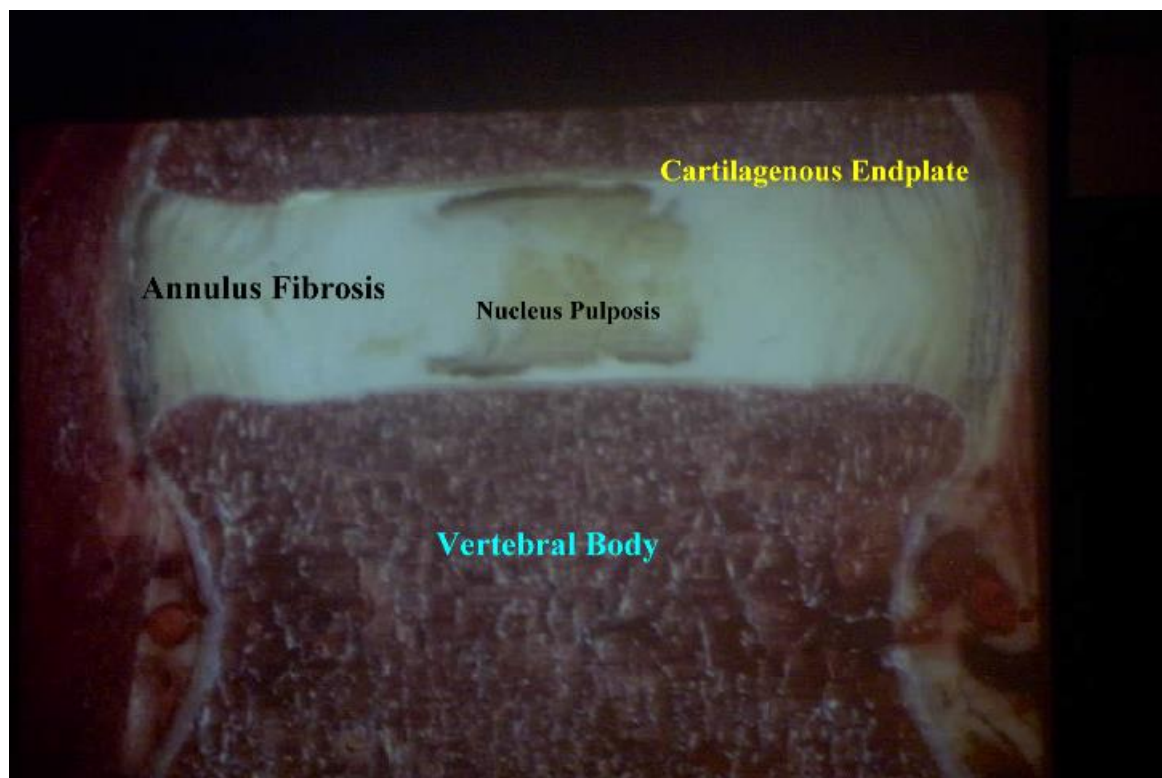
Nucleus Pulposus

Lamellae



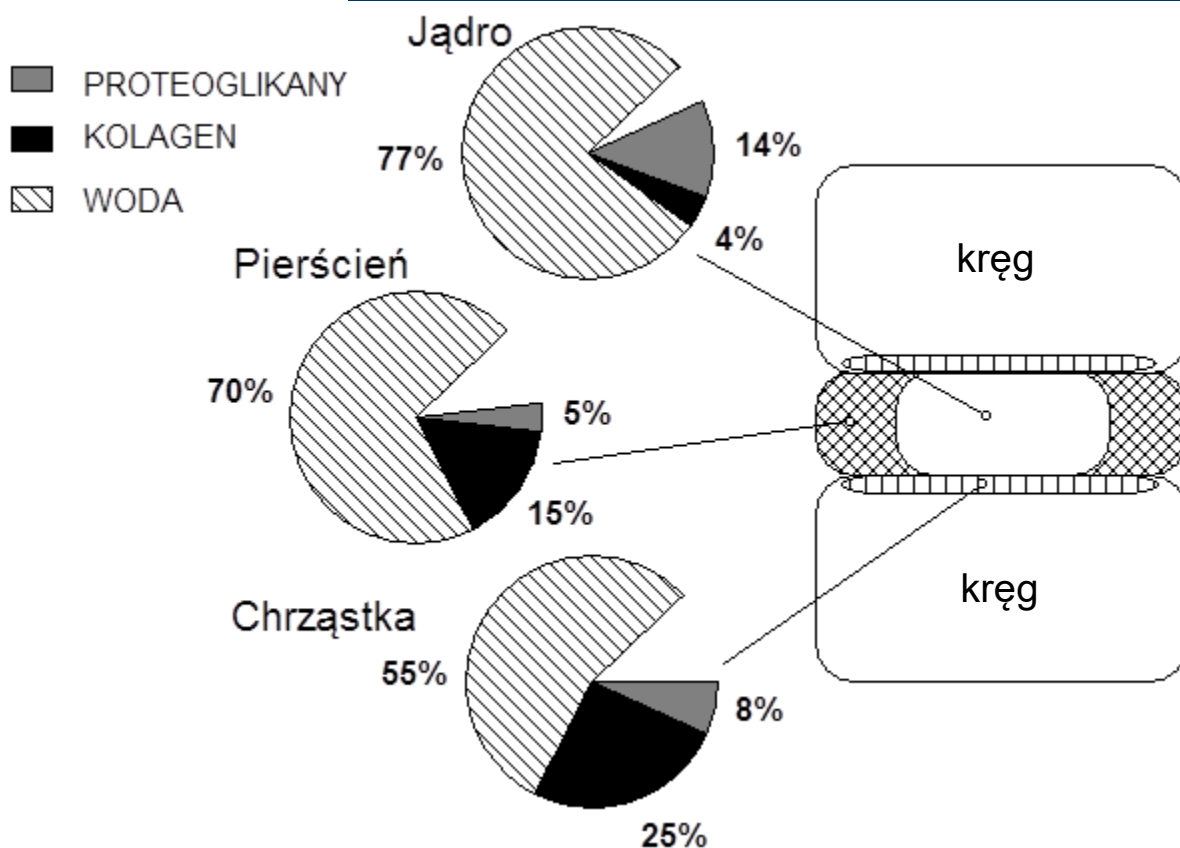


Krążek międzykręgowy





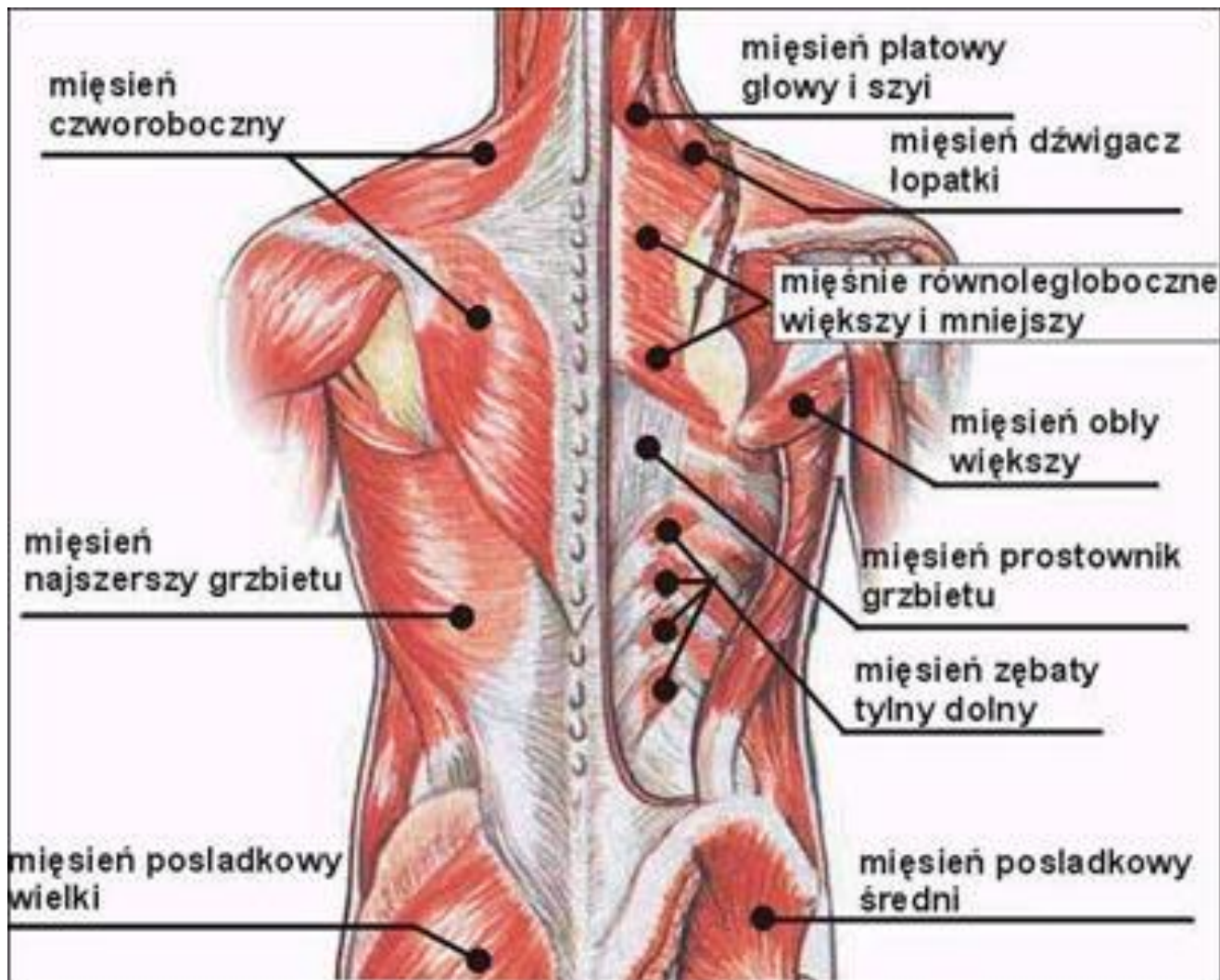
Skład krążka międzykręgowego



Względna zawartość trzech głównych składników w: jądrze miazdżystym, pierścieniu włóknistym oraz płytce chrzęstnej końcowej

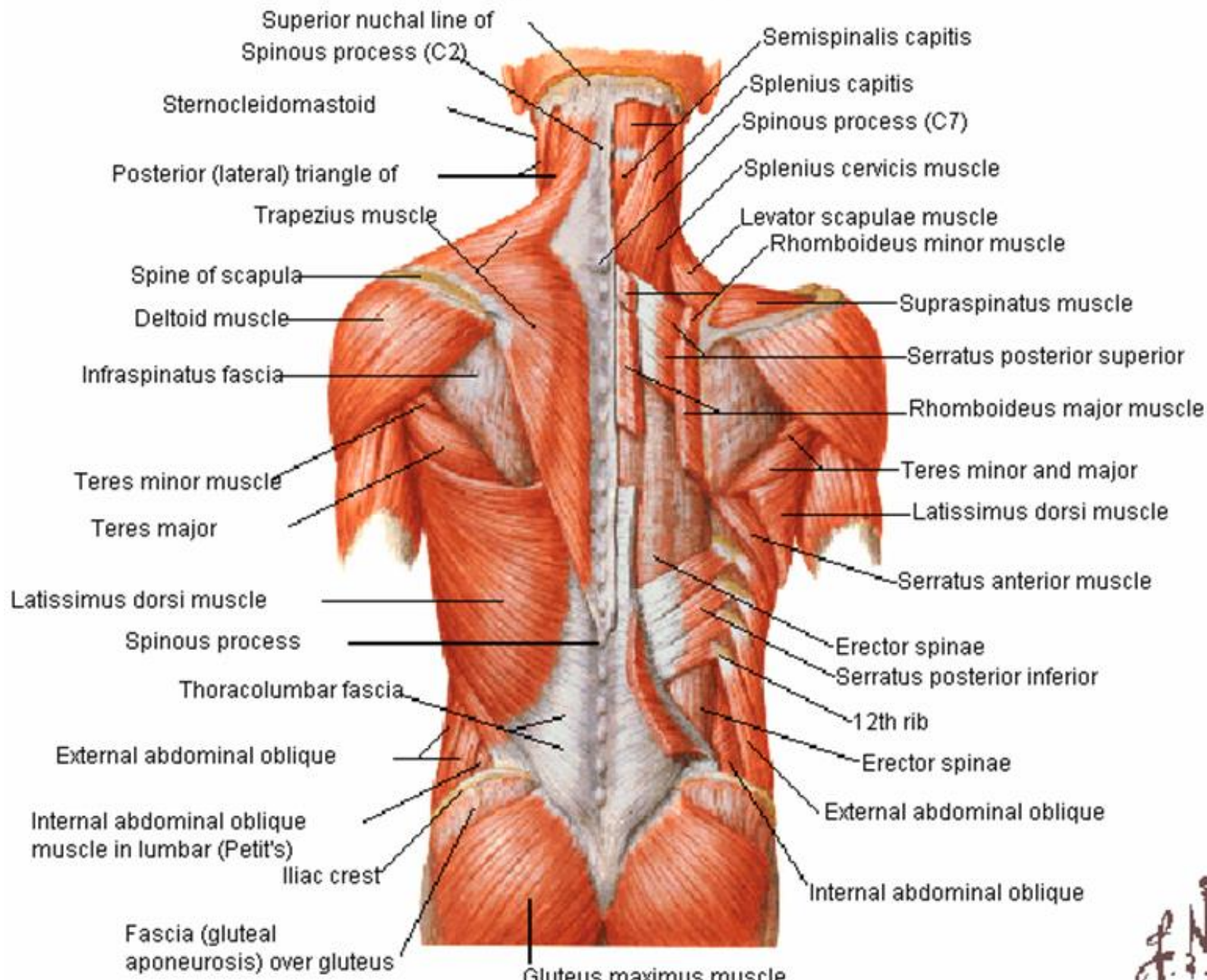


Mięśnie pleców

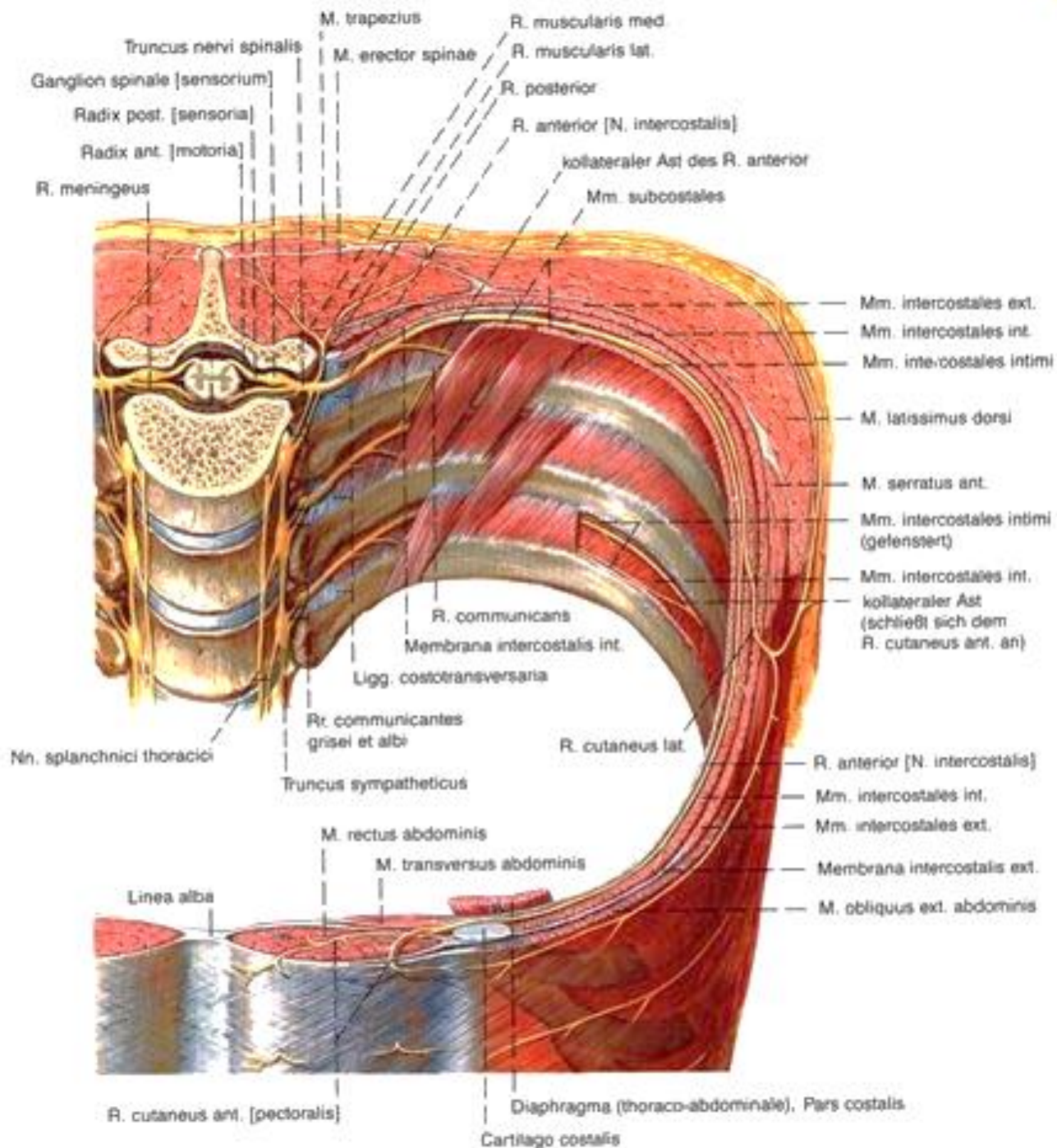


Muscles of Back

Superficial Layers

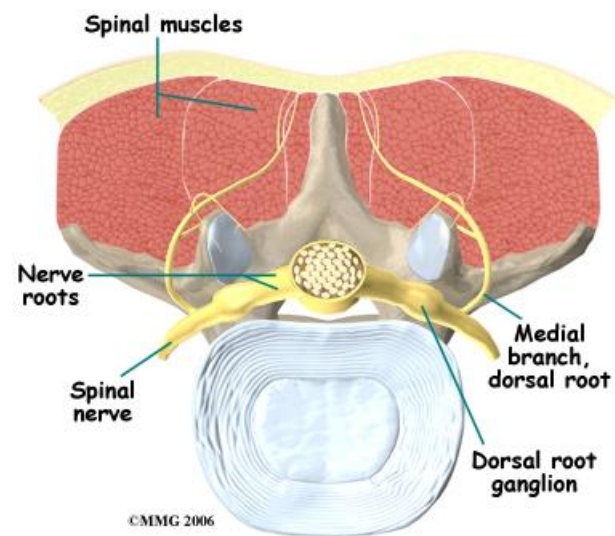
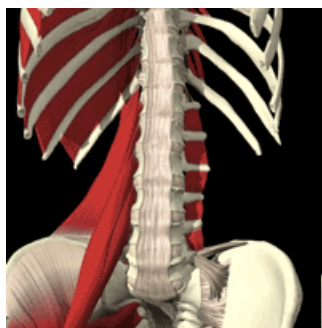
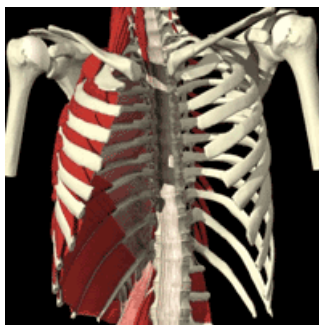


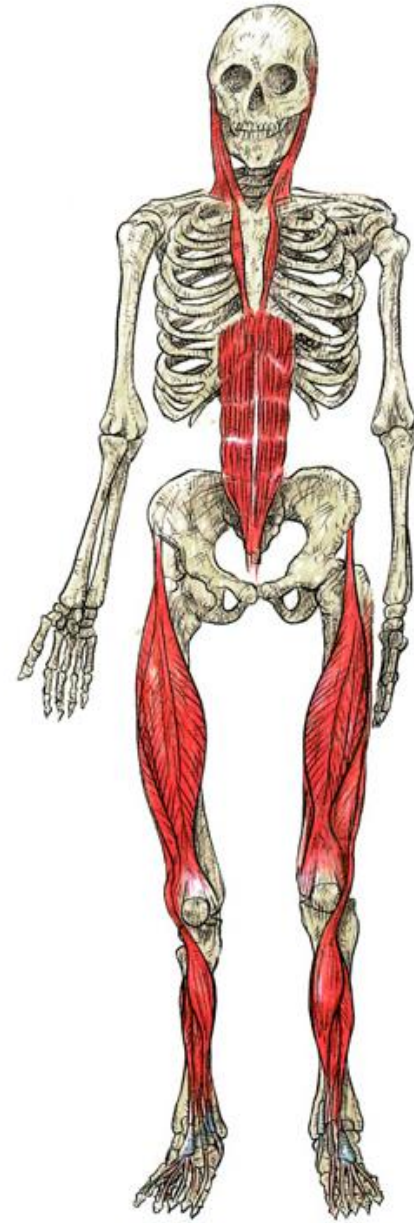
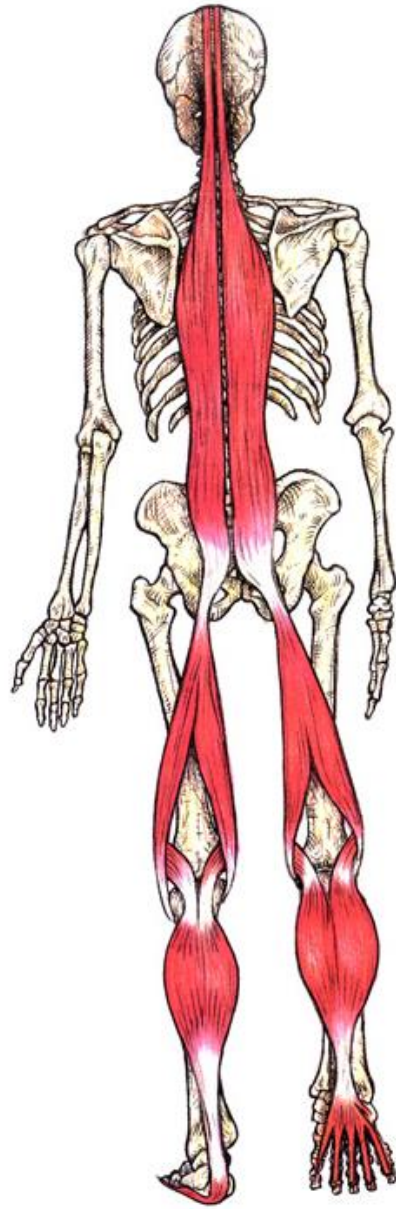
F. J. Netter M.D.





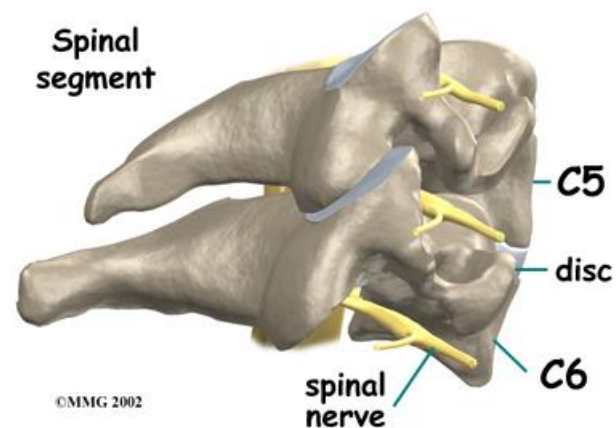
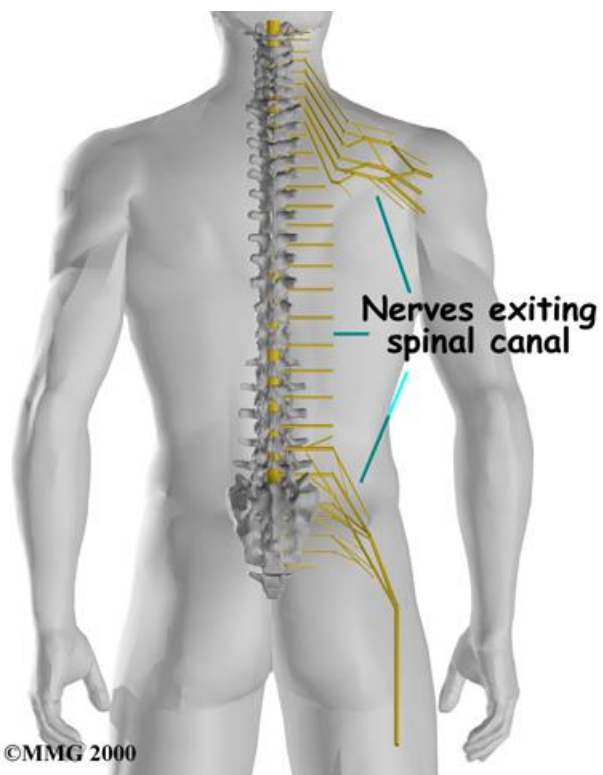
Mięśnie





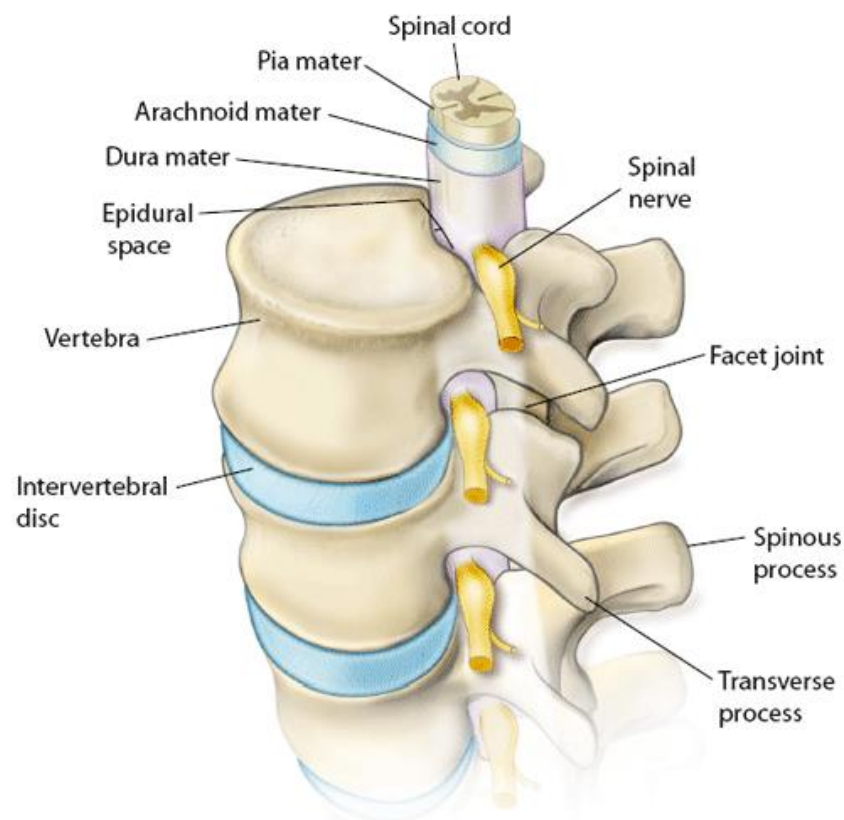


Układ nerwowy



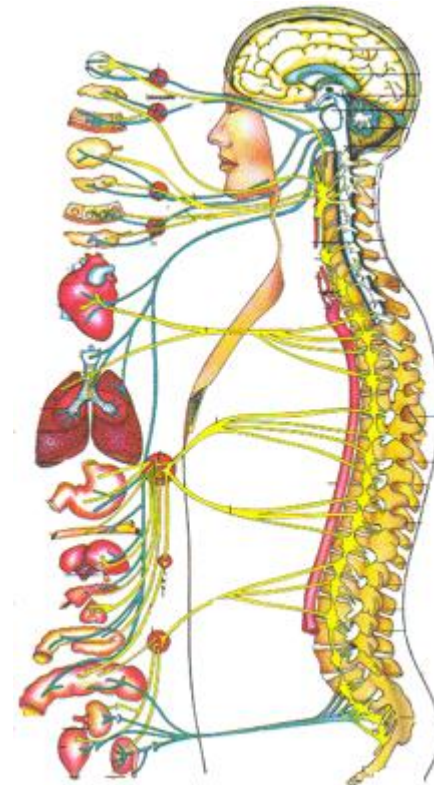


Rdzeń kręgowy, korzenie nerwów

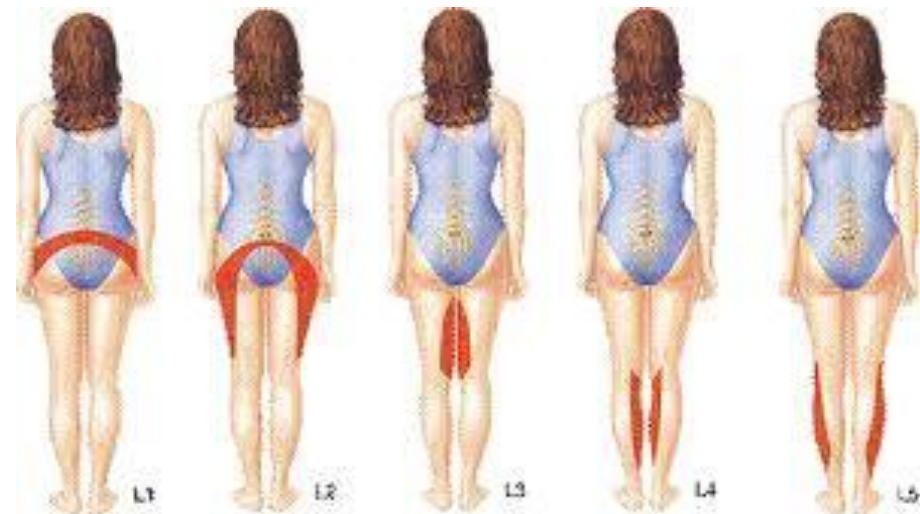
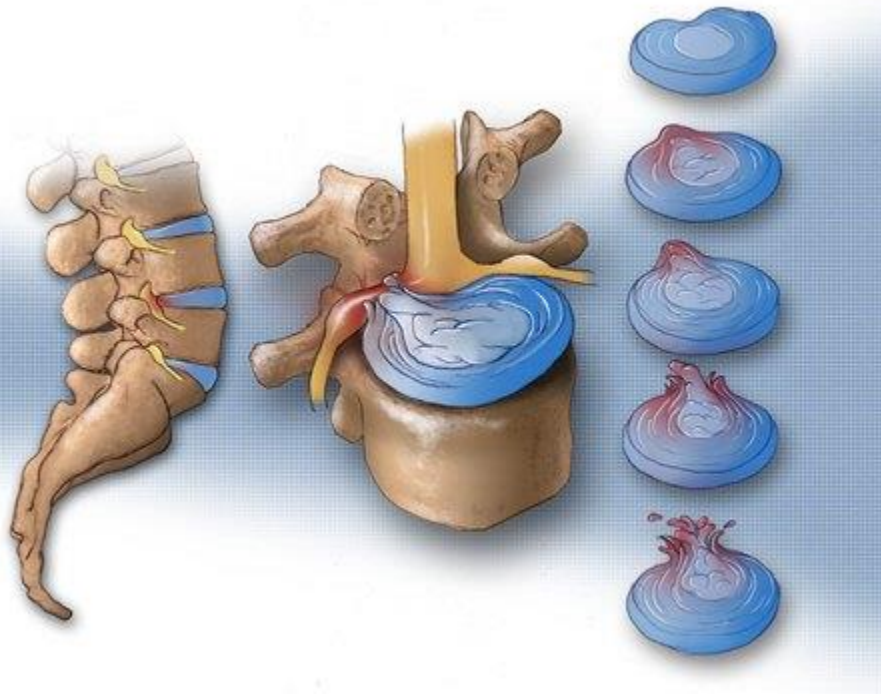




Układ nerwowy

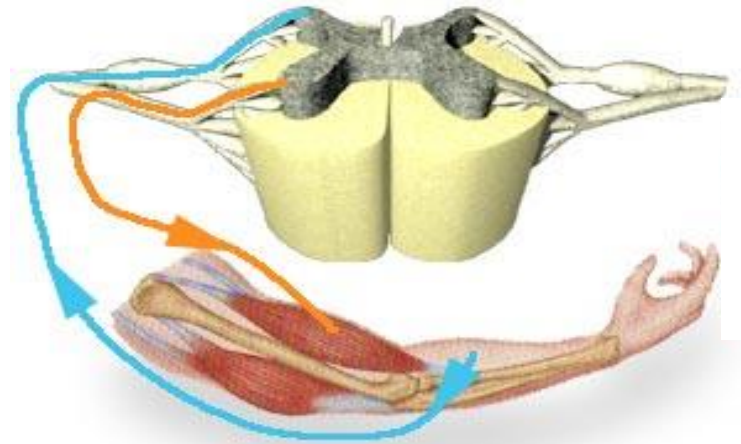
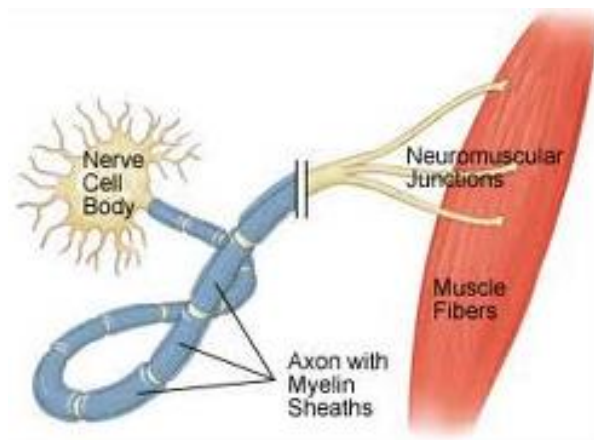


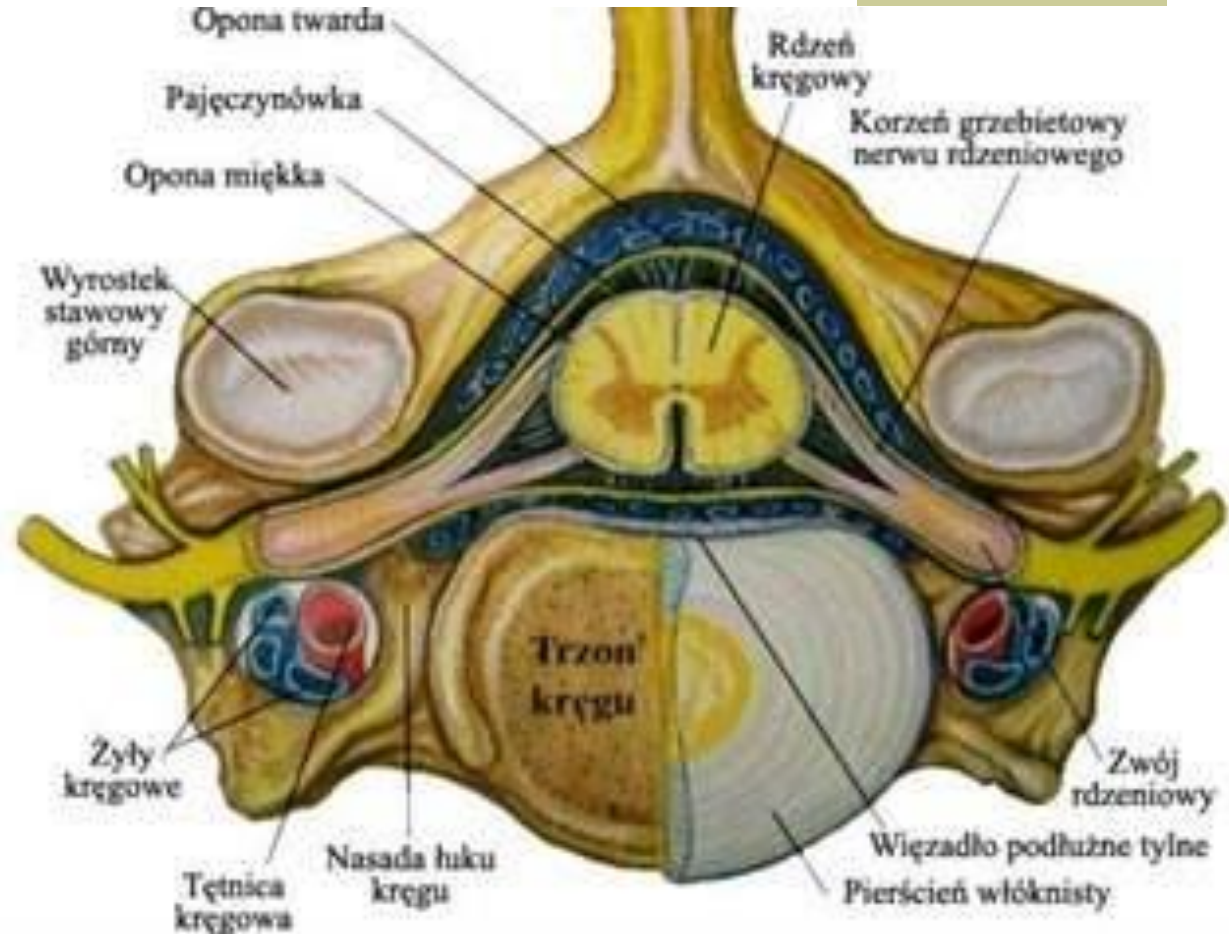
Odczuwanie bulu





Sterowanie mięśniami







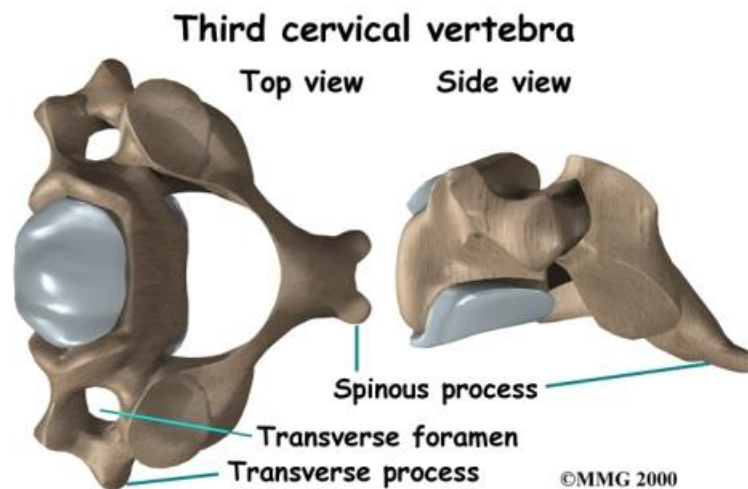
Odcinek szyjny



Cervical Spine

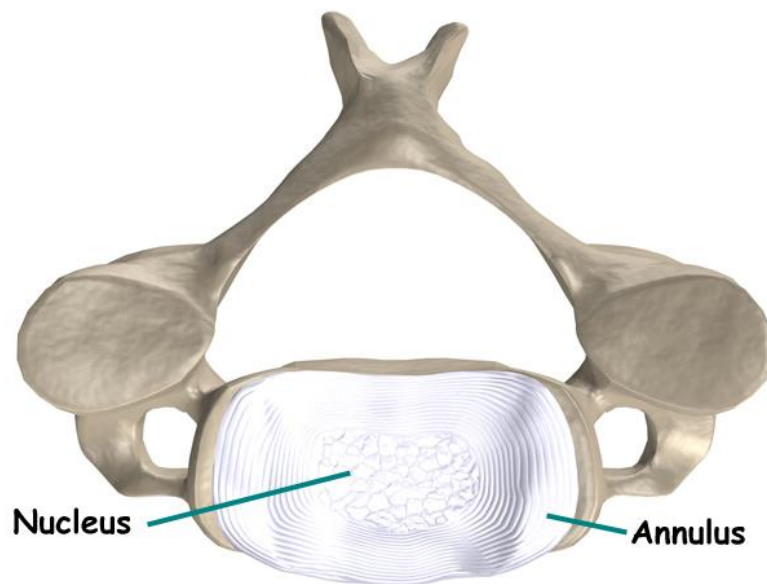


©MMG 2000

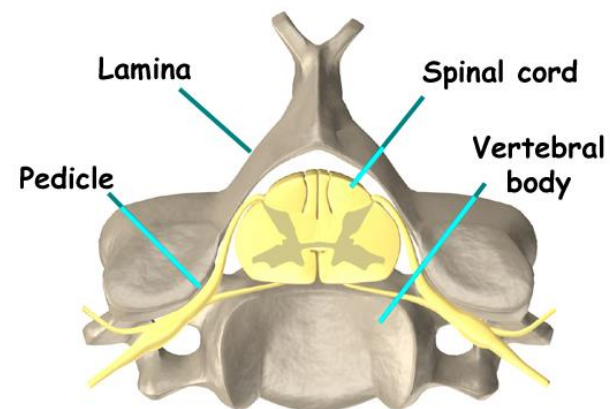




Kręgi szyjne



Intervertebral disc



©MMG 2002



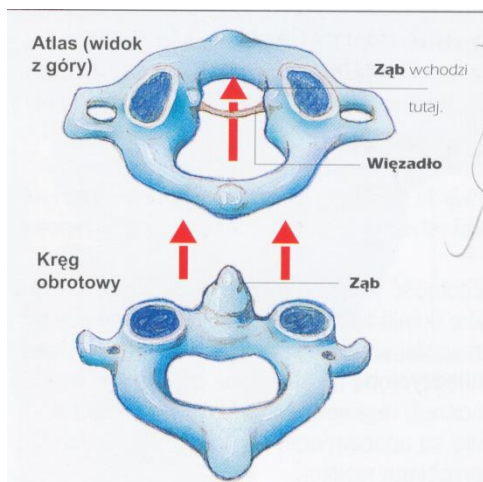
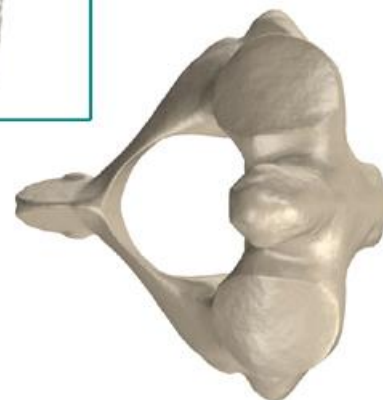
C1 i C2



Atlas



Axis

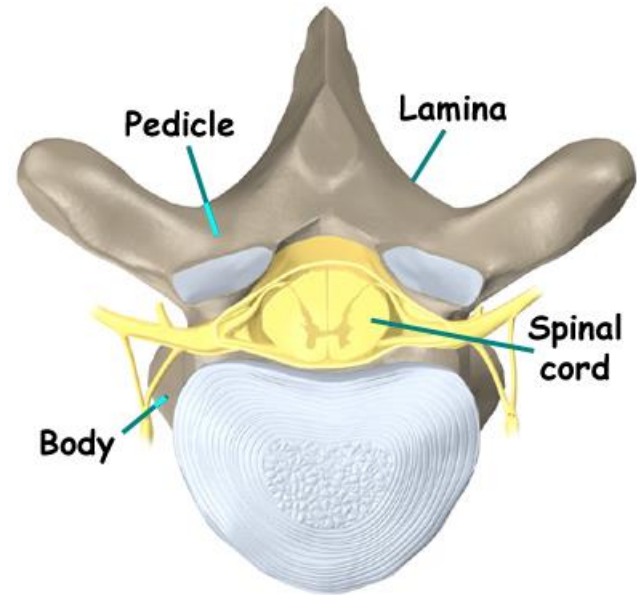




Odcinek piersiowy

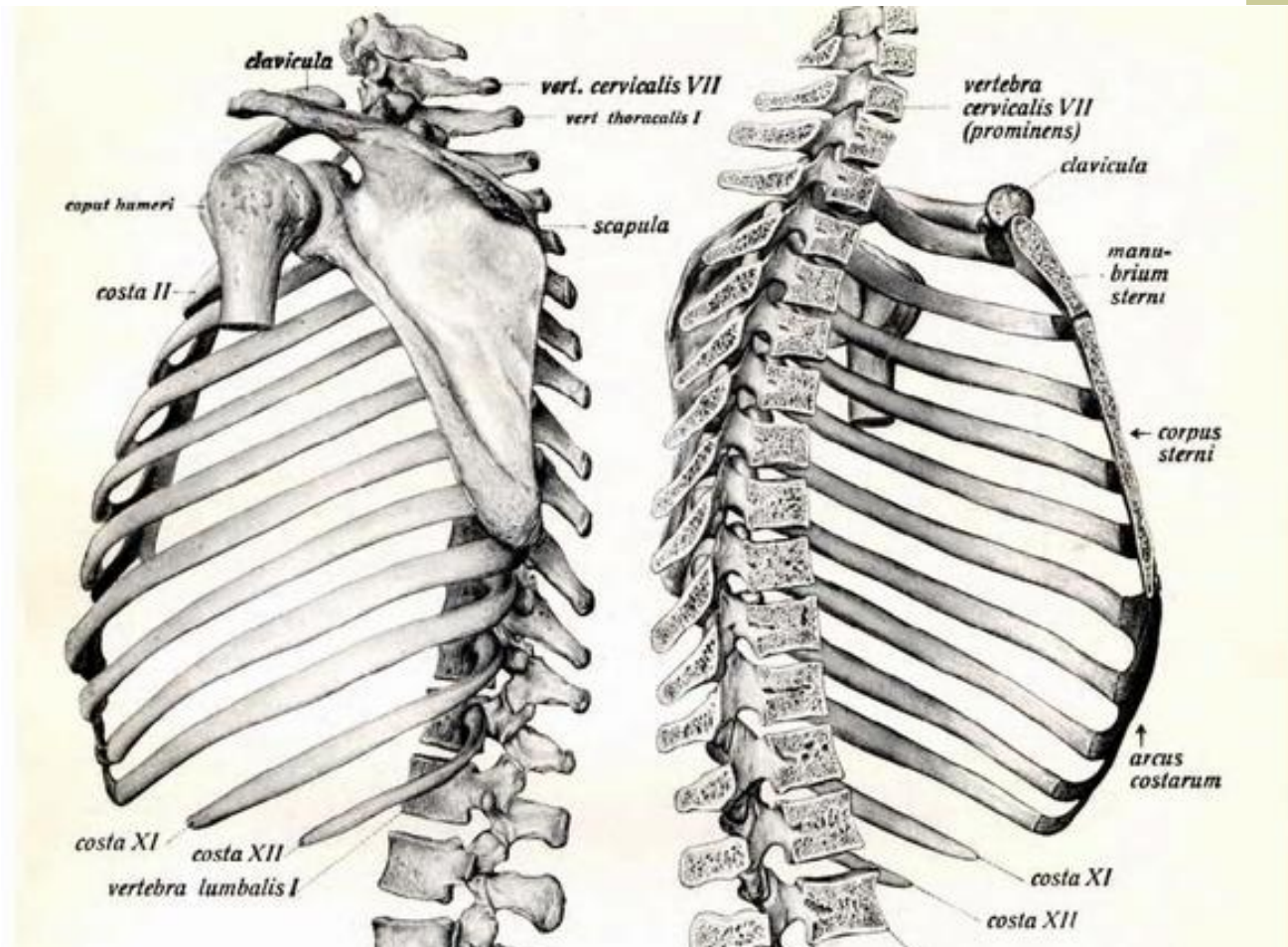


Thoracic
Spine
Anatomy



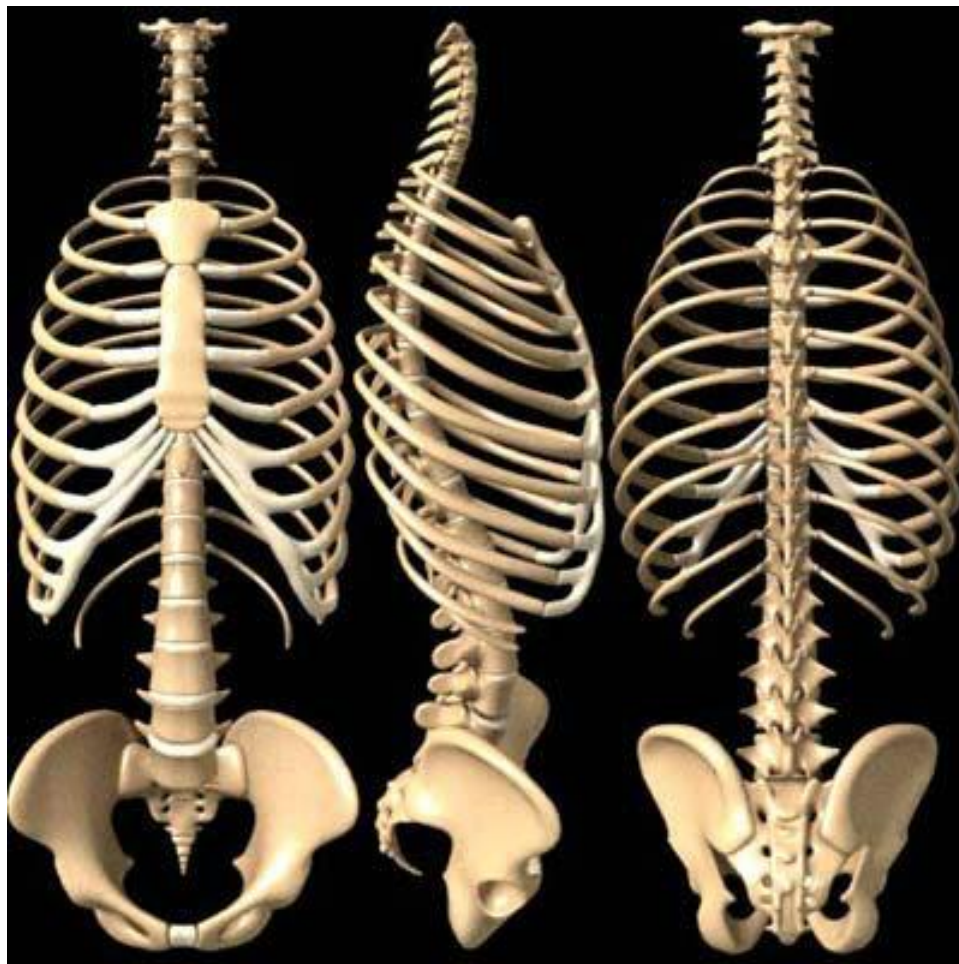


Odcinek piersiowy





Odcinek piersiowy



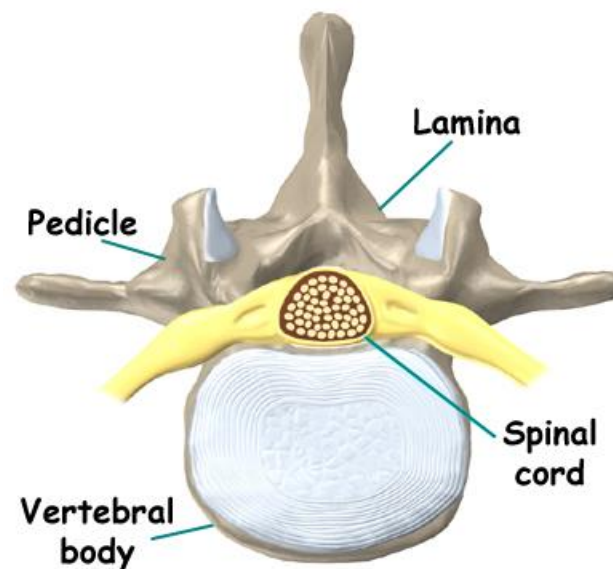
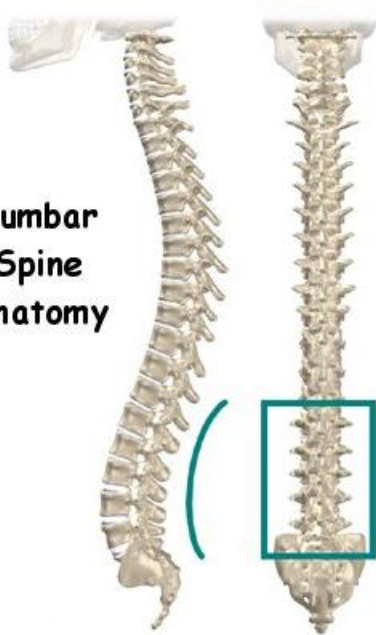
Odcinek piersiowy





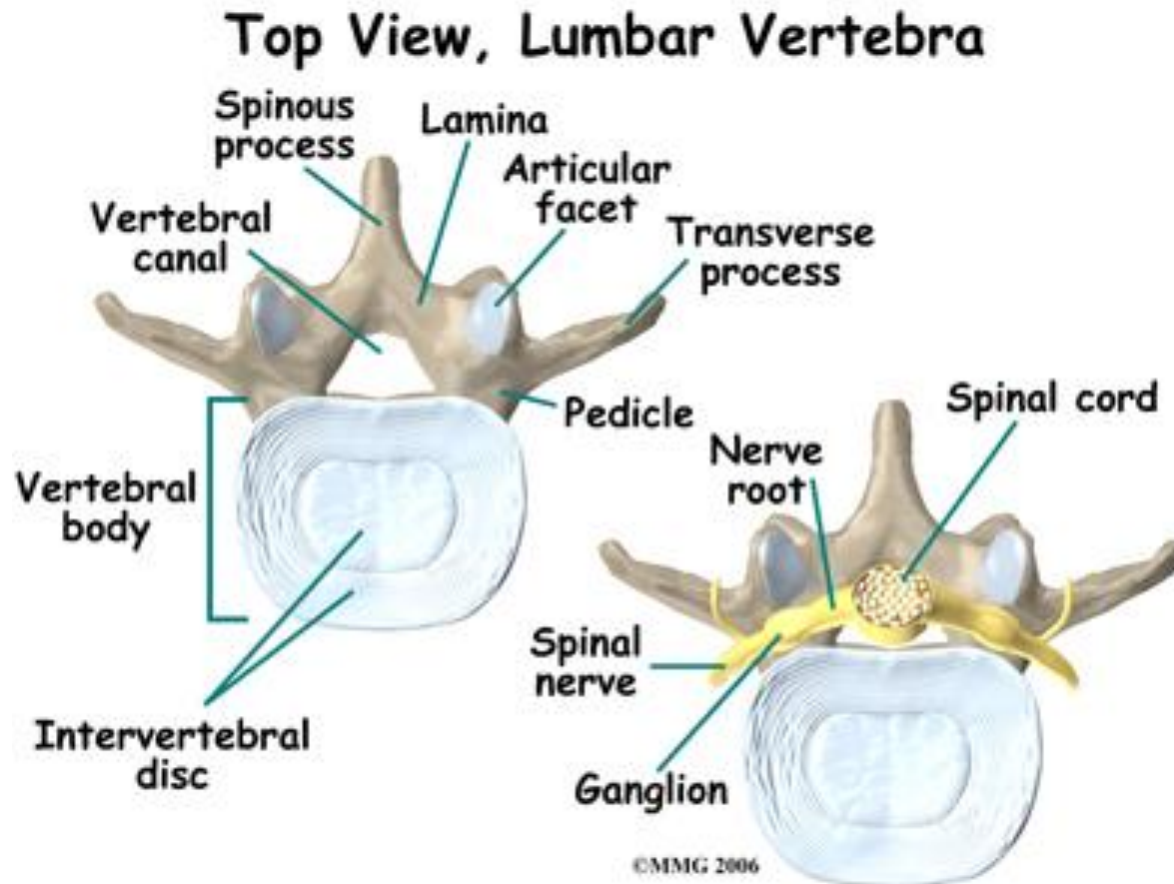
Odcinek lędźwiowy

Lumbar
Spine
Anatomy



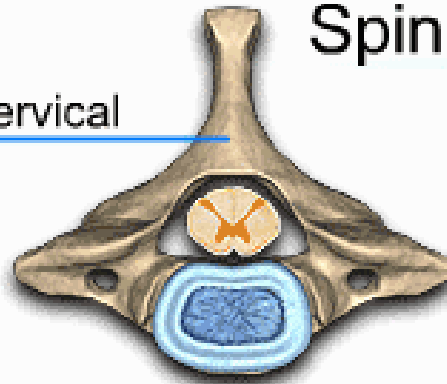


Odcinek lędźwiowy

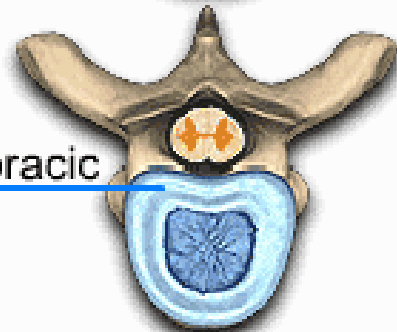


Spine Anatomy

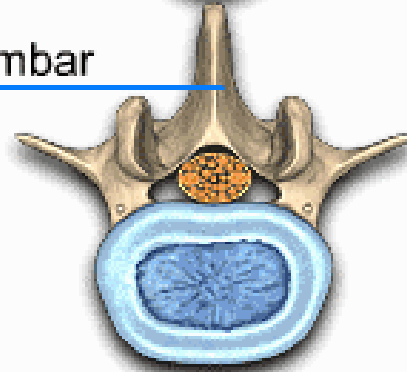
Cervical



Thoracic

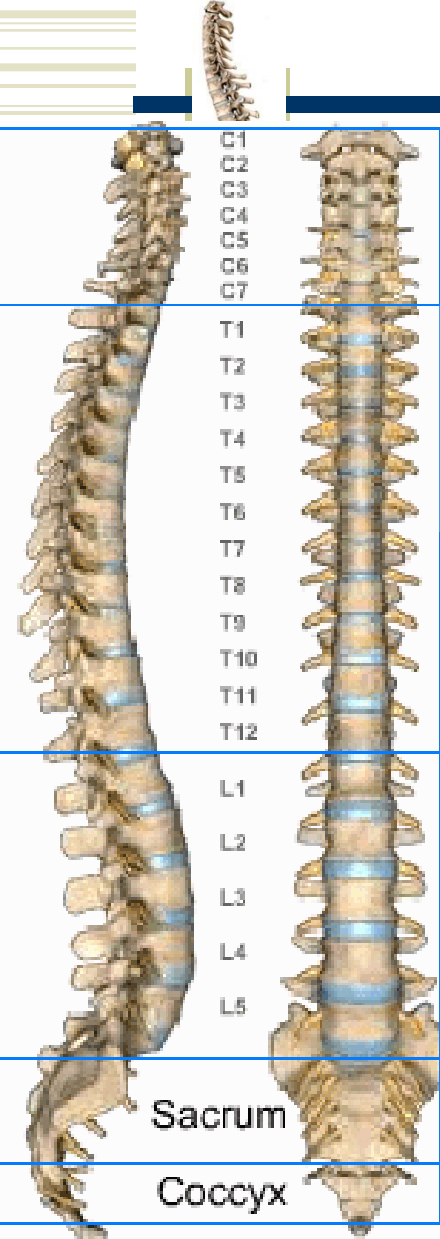
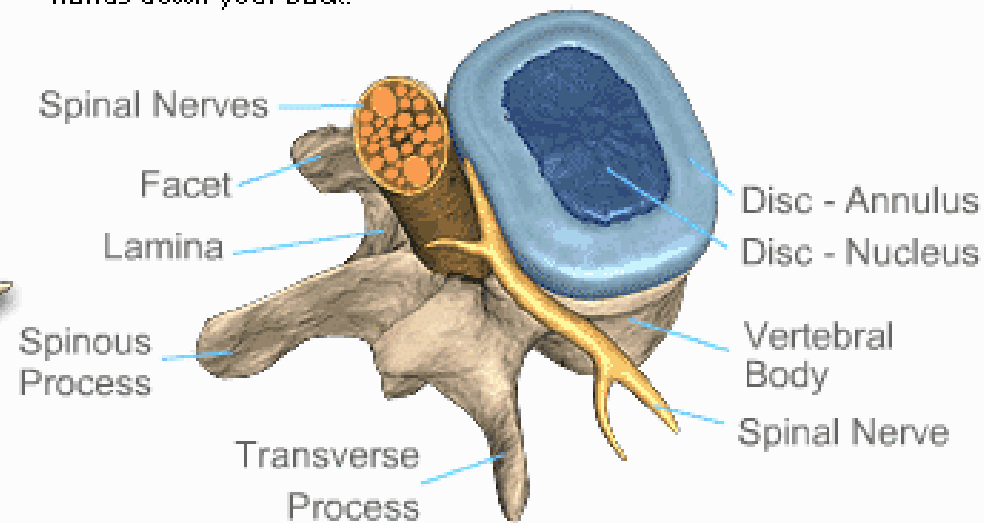


Lumbar



The spinal column begins at the base of the skull and runs down to the coccyx (tailbone). It has three main sections: the cervical (neck), the thoracic (mid-back), and the lumbar (lower back); and the lower section of the spine is composed of the sacrum and coccyx. The function of the spinal column is to provide an upright posture and to protect the spinal cord, which conveys electrical signals from the brain to the arms and legs, allowing movement and sensation. The nerves at the sacrum and coccyx leave the bones and control the bowel and bladder.

Discs, which are made up of the outer annulus and the inner nucleus pulposus, are located between each vertebral body. In the neck region, spinal nerves go into the arms to provide strength and sensation to the arms and hands. In the lumbar region, the nerves join together to form the sciatic nerve, which travels down the legs. The lamina covers the spinal canal, through which the spinal nerve passes and the spinous process is the bone you can feel when running your hands down your back.





Rozwój kręgosłupa



Kifoza
całkowita



Lordoza
szyjna



Kifoza
piersiowa

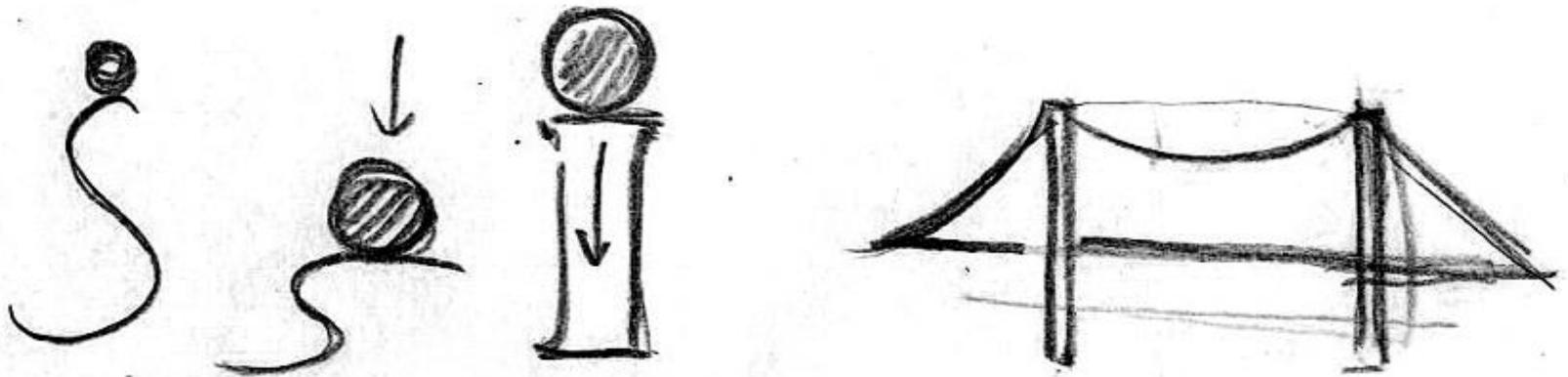


Lordoza
lędźwiowa





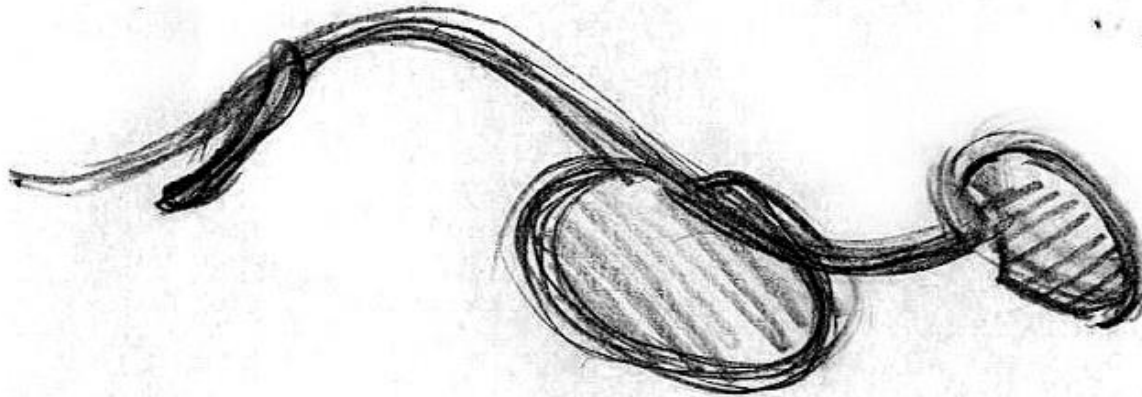
Równowaga pomiędzy przenoszeniem sił a ruchliwością



IT'S HELPFUL TO THINK LIKE AN ENGINEER ABOUT SKELETONS-- WHAT KIND OF SHAPES SUPPORT WEIGHT WELL FOR EXAMPLE. SKELETONS ARE A BALANCE BETWEEN SUPPORT AND FLEXIBILITY, AND DIFFERENT ANIMALS FAVOUR ONE OVER THE OTHER.



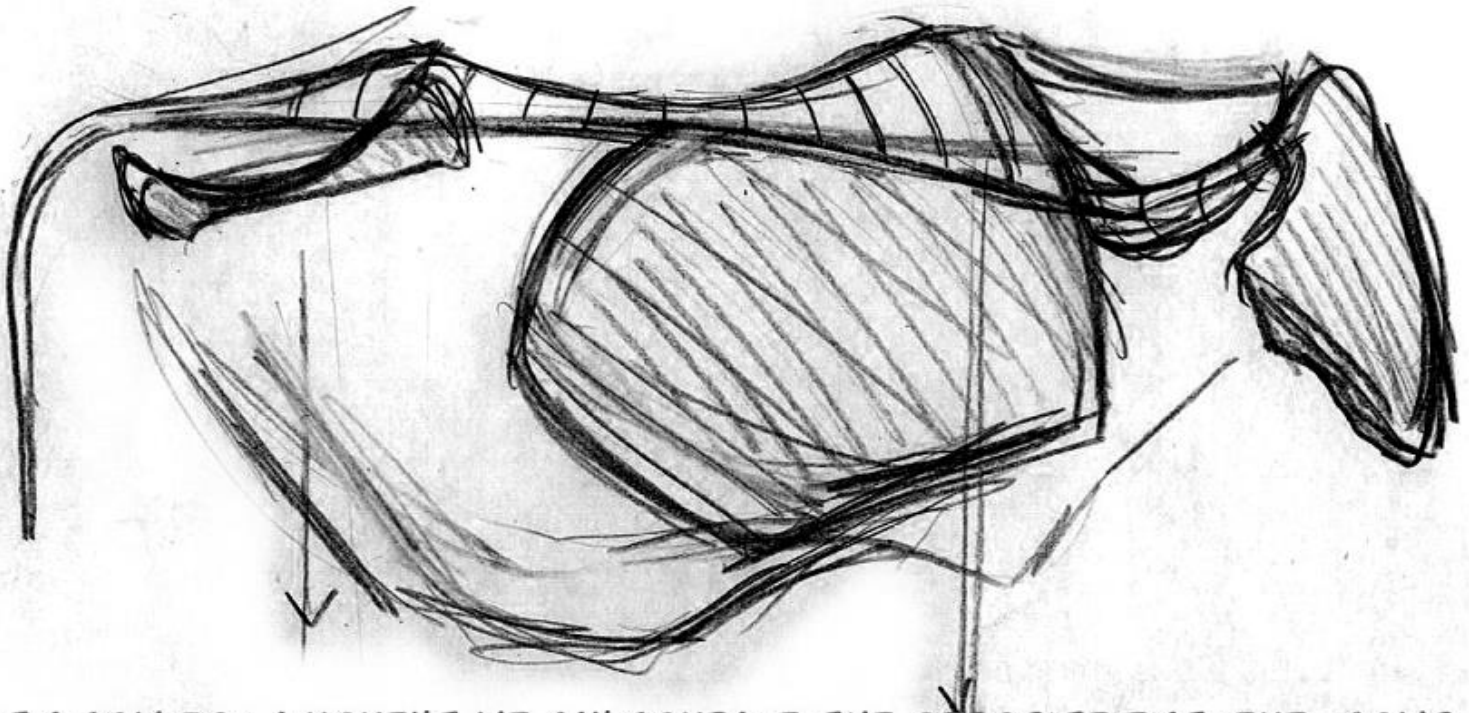
Duża ruchliwość



A CAT IS AN EXTREME IN FAVOUR OF FLEXIBILITY. IT'S A VERY LIGHTWEIGHT ANIMAL-- ITS HEAD IS SMALL BECAUSE IT DOESN'T NEED BIG TEETH (CATS DON'T CHEW BONES LIKE DOGS DO). IT DOESN'T NEED TO SUPPORT A BIG RIBCAGE BECAUSE ITS HEART AND LUNGS ARE VERY SMALL. AS A HUNTER, IT RELIES ON WAITING AND SUDDEN ATTACK SO IT ONLY NEEDS SHORT BURSTS OF ENERGY. DOGS ARE 'ENDURANCE HUNTERS' WHO CAN RUN FOR HOURS, THAT IS WHY THEIR RIBCAGE IS SO MUCH BIGGER-- AND THEY CAN'T CLIMB TREES!



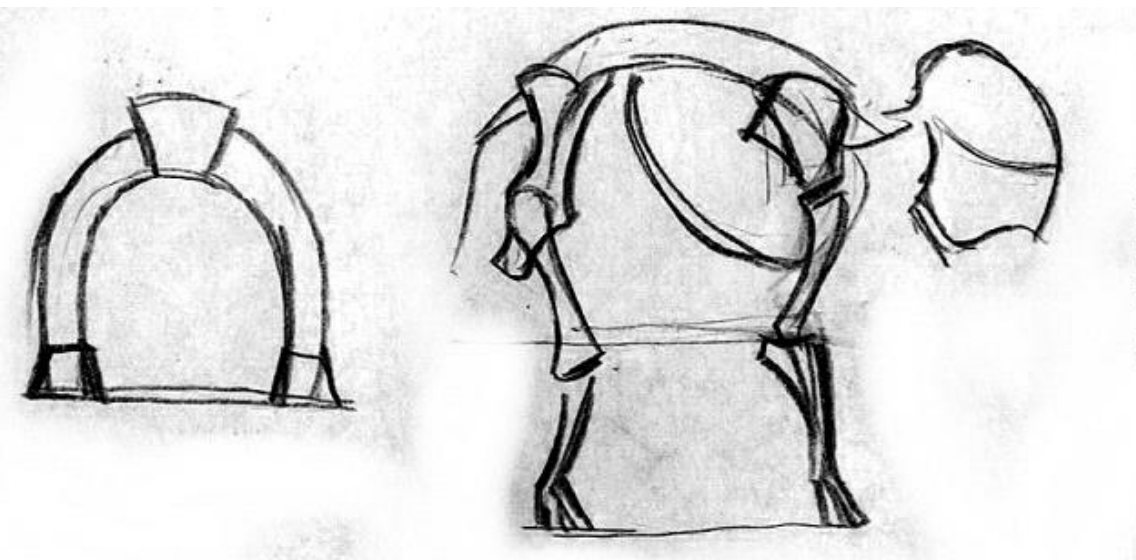
Most wiszący



IF WE LOOK AT A COW FOR A MOMENT WE CAN COMPARE THE OPPOSITE EXTREME. COWS HAVE NOT ONLY A MASSIVE RIBCAGE BUT ALSO A HUGE BELLY, BECAUSE DIGESTING GRASS IS VERY INEFFICIENT AND TAKES A BIG LENGTH OF GUT. THE SKULL IS HUGE AS WELL, FOR THE BIG TEETH NEEDED TO CHEW GRASS. TO SUPPORT ALL THIS WEIGHT THE SKELETON GIVES UP MOST OF IT'S FLEXIBILITY, AND IS BUILT IN HORIZONTAL LINES LIKE A SUSPENSION BRIDGE.



Sklepienie łukowe



ANOTHER SOLUTION FOR WEIGHT IS AN ARCH SHAPE LIKE AN INDIAN ELEPHANT-- NOTICE THE PELVIS IS TILTED STRAIGHT BUT THE OPPOSITE WAY TO A COW'S.



Kręgosłup konia

