

Kardiovaskulárny systém

Biológia živočíšnej produkcie

Katedra fyziológie živočíchov, FBP, SPU v Nitre

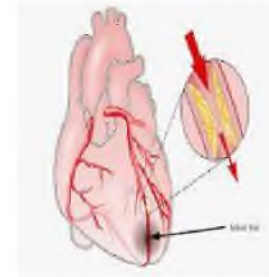
Kardiovaskulárny systém

- funkcie:
 - zabezpečenie výživy
 - odstraňovanie odpadových látok
- zloženie:
 - cievy: tepny; kapiláry; žily
 - Srdce
 - pomocný cievny systém – lymfatický obeh

Srdce a osrdcovník

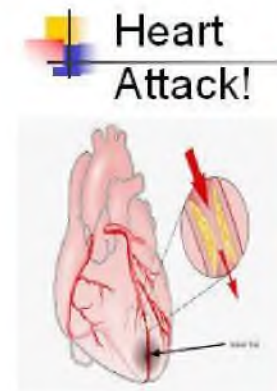
- dutý sval
- kuželovitý tvar
- vrstvy srdca
 - perikard
 - epikard
 - myokard
 - endokard

Heart
Attack!

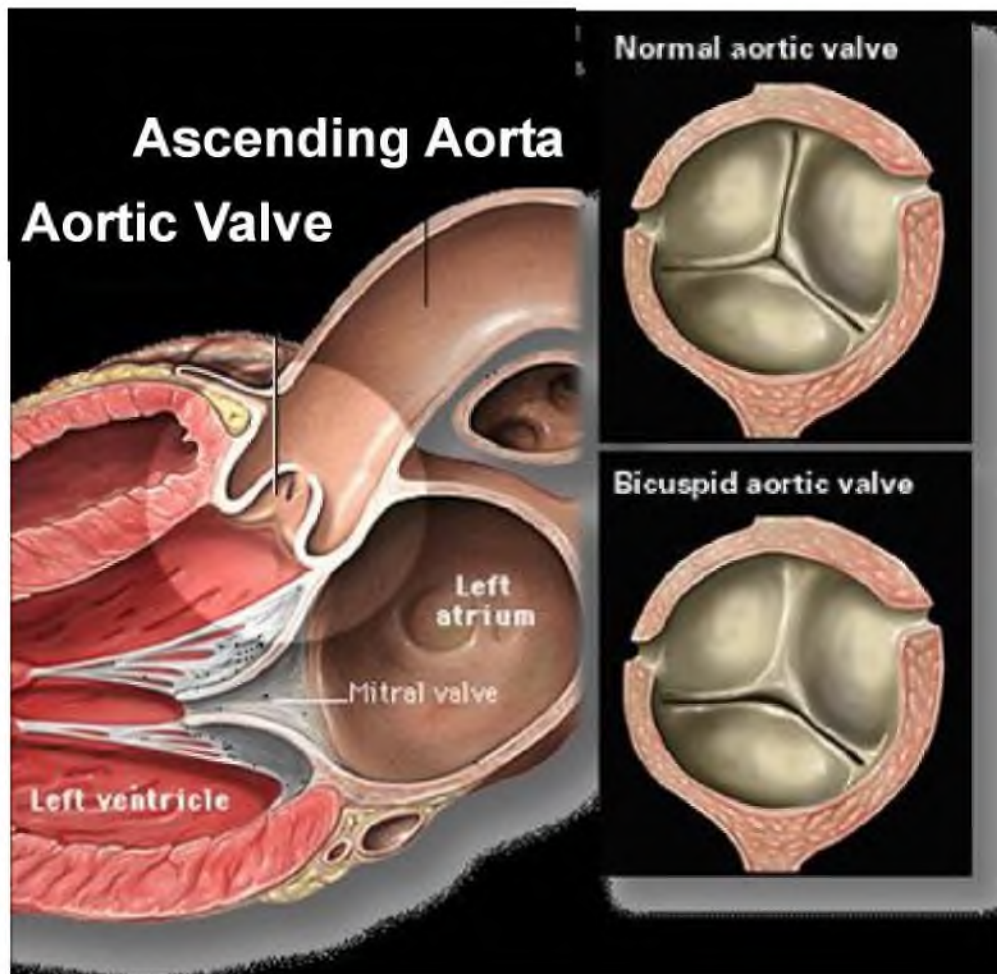


Srdce a osrdcovník

- srdcové chlopne
 - cípate chlopne (atrio–ventrikulárne; A–V)
 - dvojcípa (mitrálna – L')
 - trojcípa (P)
 - polmesiačikové chlopne
 - pľúcnicová (P)
 - aortálna (L')

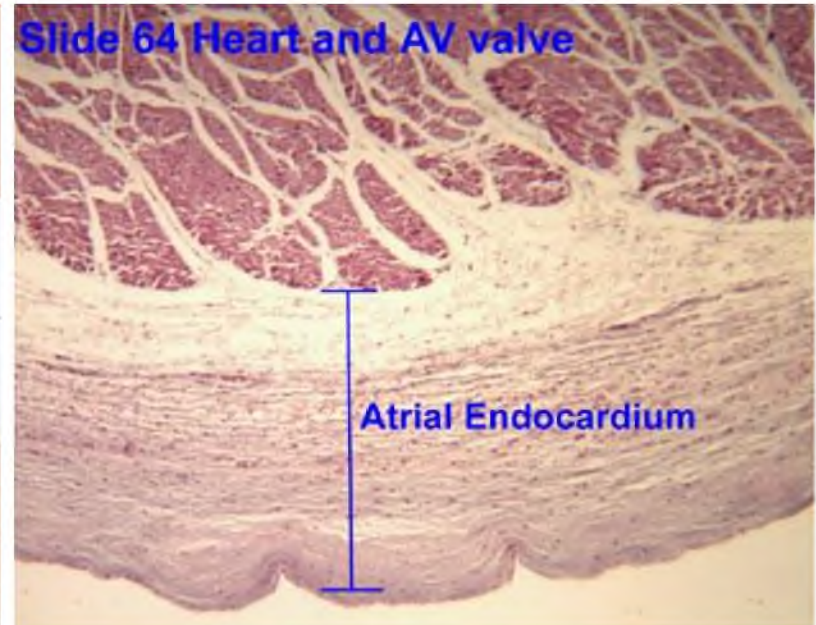
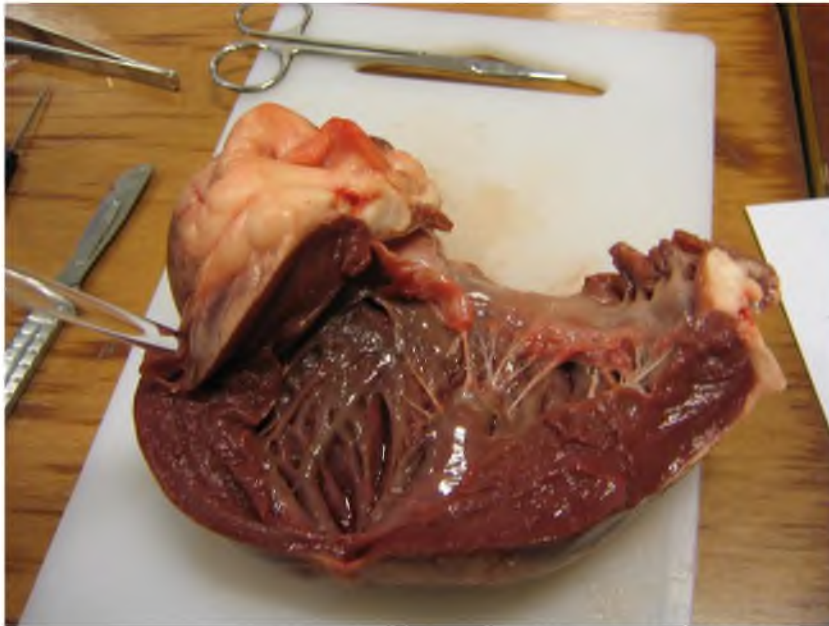


Srdcové chlopne

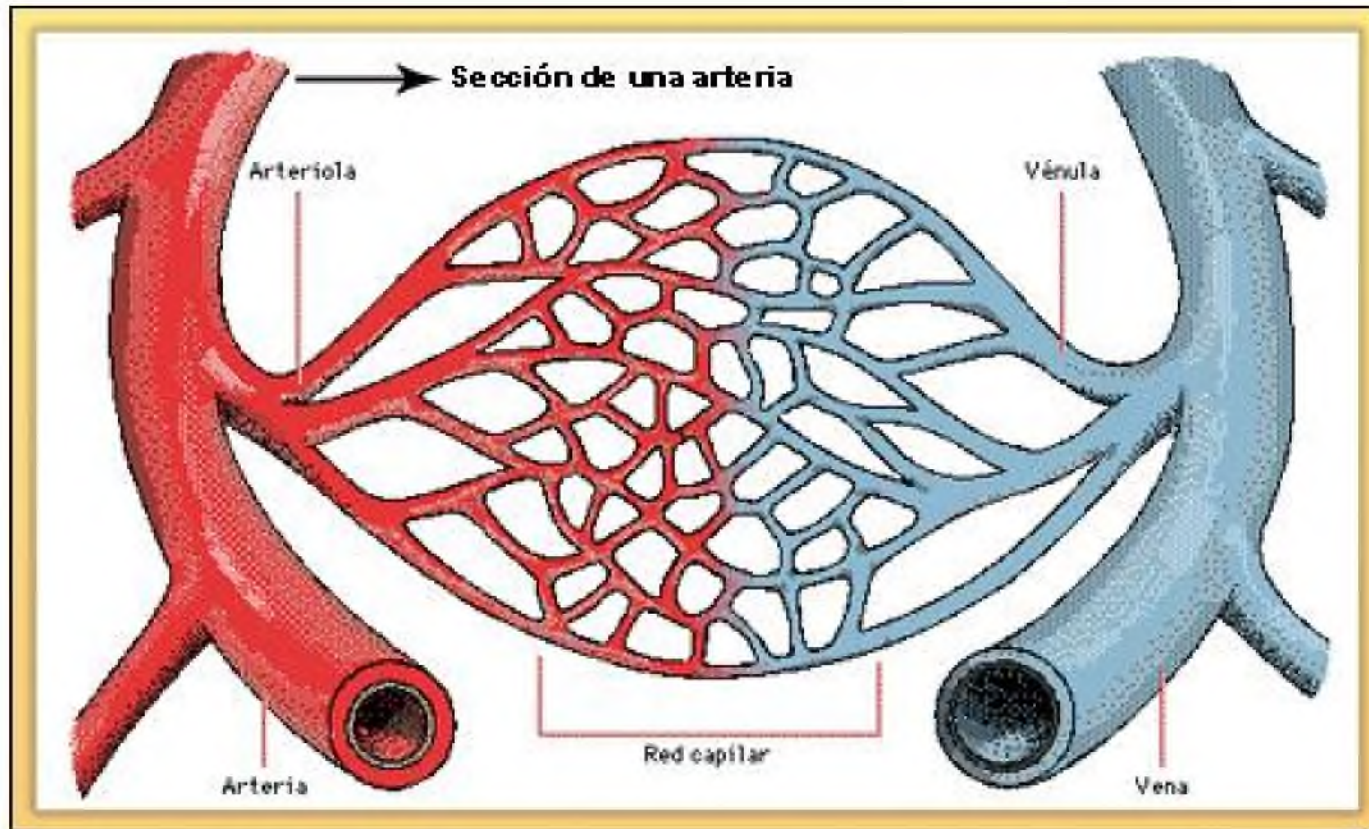


Krvné cievy

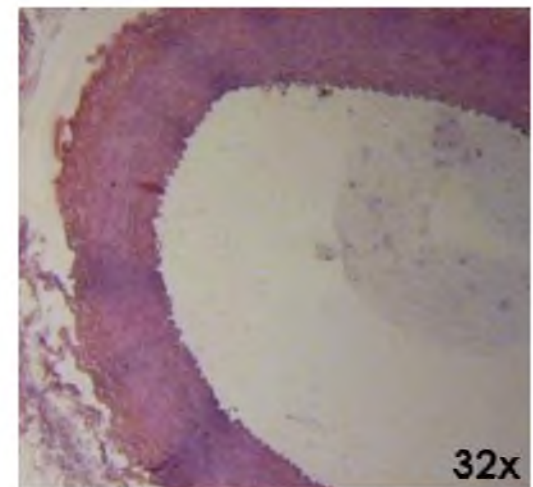
- endokard – vnútorná vrstva srdca (endotel)



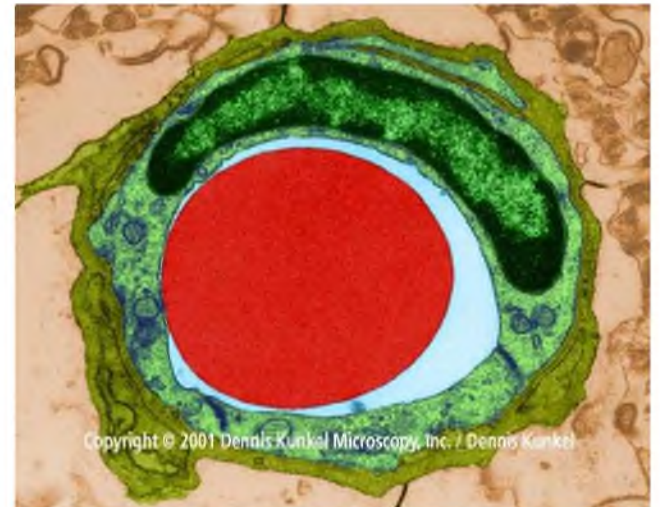
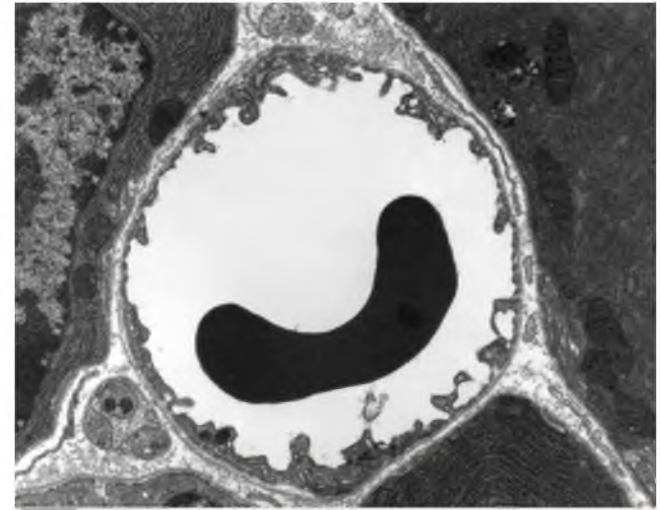
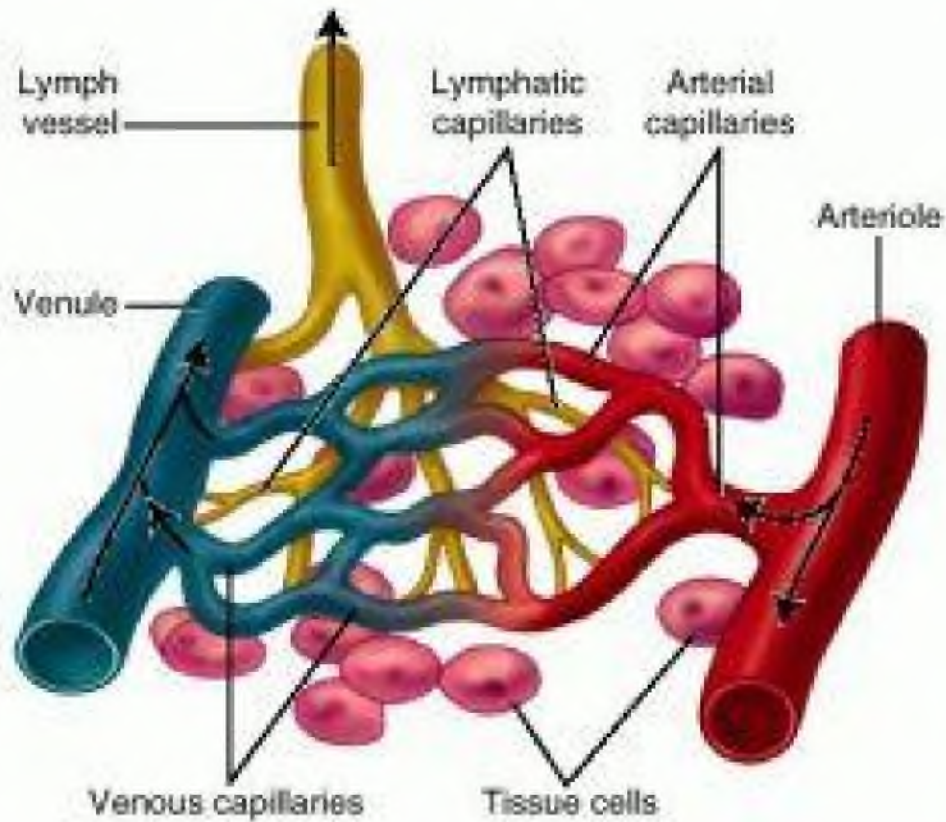
Krvné cievy



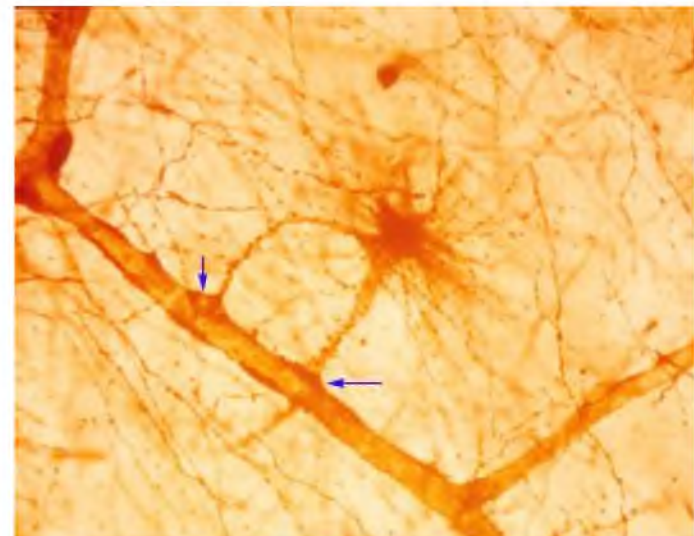
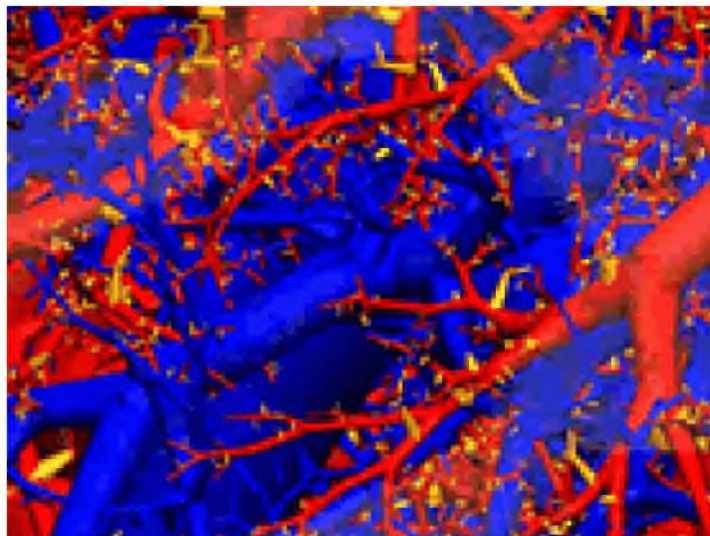
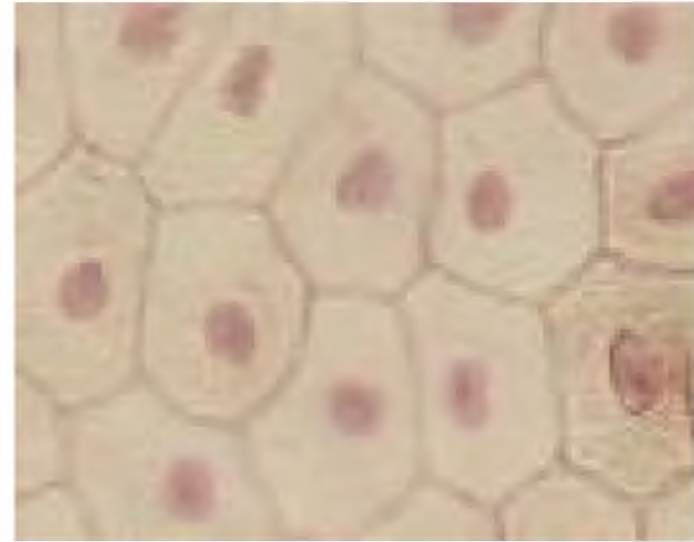
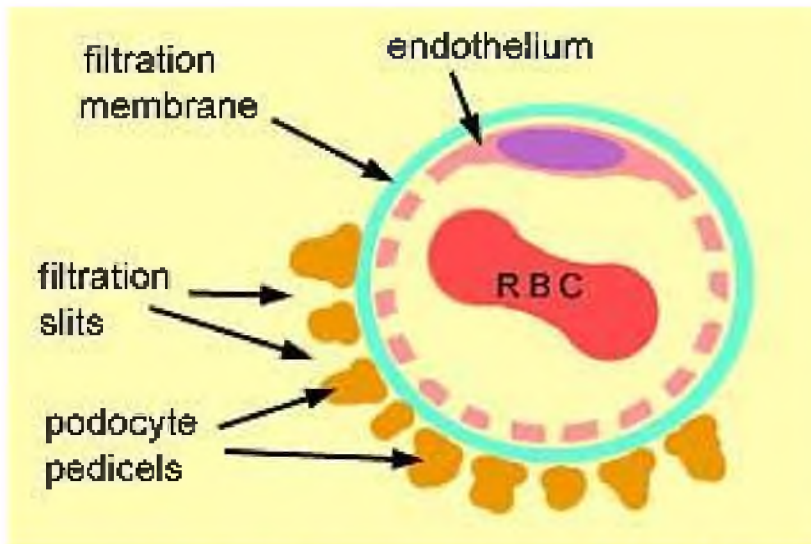
Tepny; tepienky



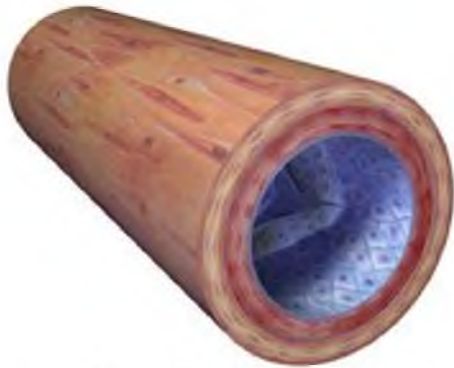
Kapiláry (vlásočnice)



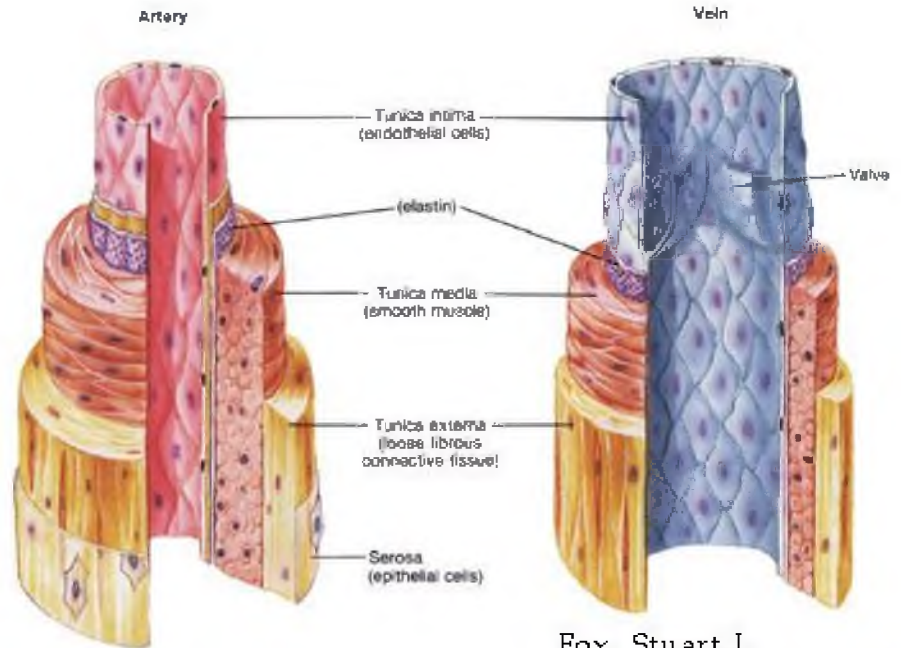
Kapiláry (vlásočnice)



Žily, žilky



3D SCIENCE.COM



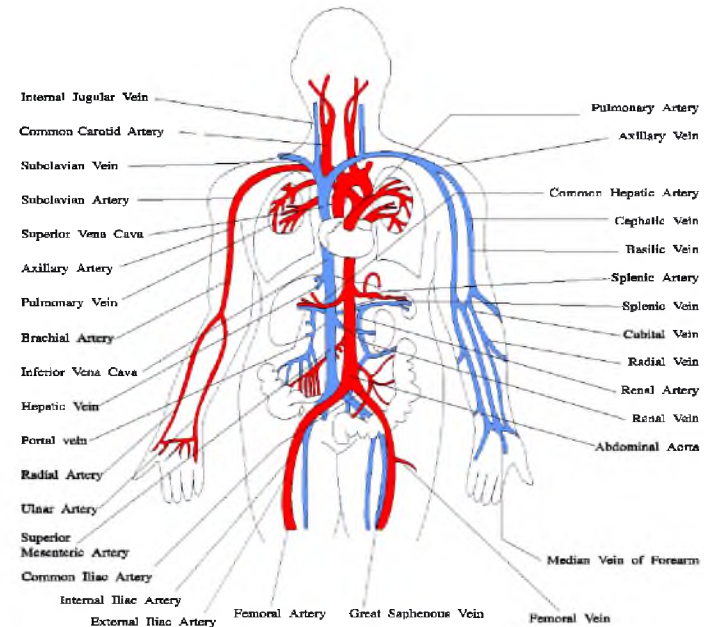
Fox, Stuart I.
Human Physiology 4th
Brown Publishers

Obehové systémy (krvné obehy)

Blood Circulation
Principal Veins and Arteries

- krvné obehy:

- pľúcny (malý) KO
- telový (veľký) KO
- portálny KO



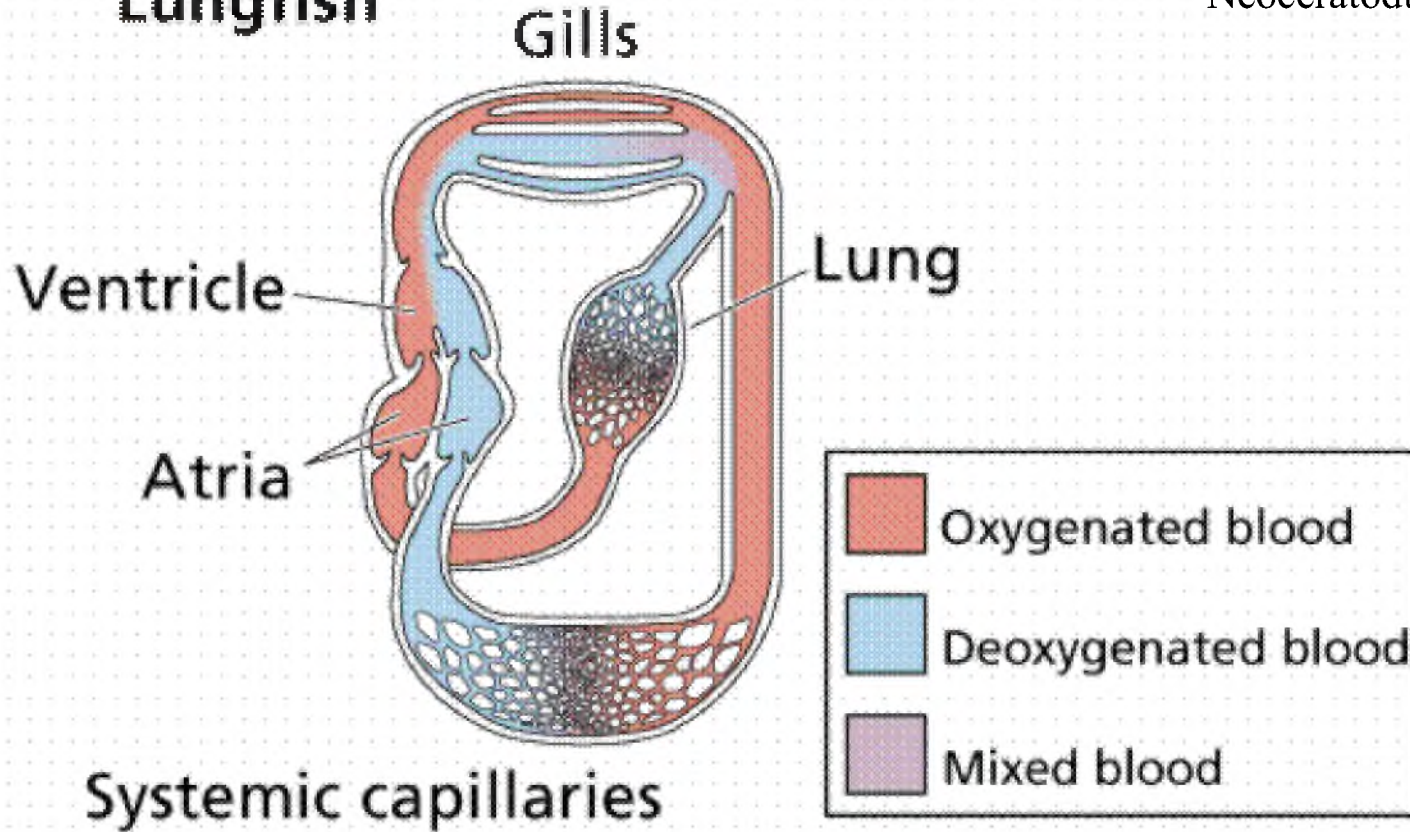
- žila vracajúca krv smerom k srdcu vytvára kapiláry a tie sa následne opäť spájajú do žíl

Krvné obehy



Lungfish

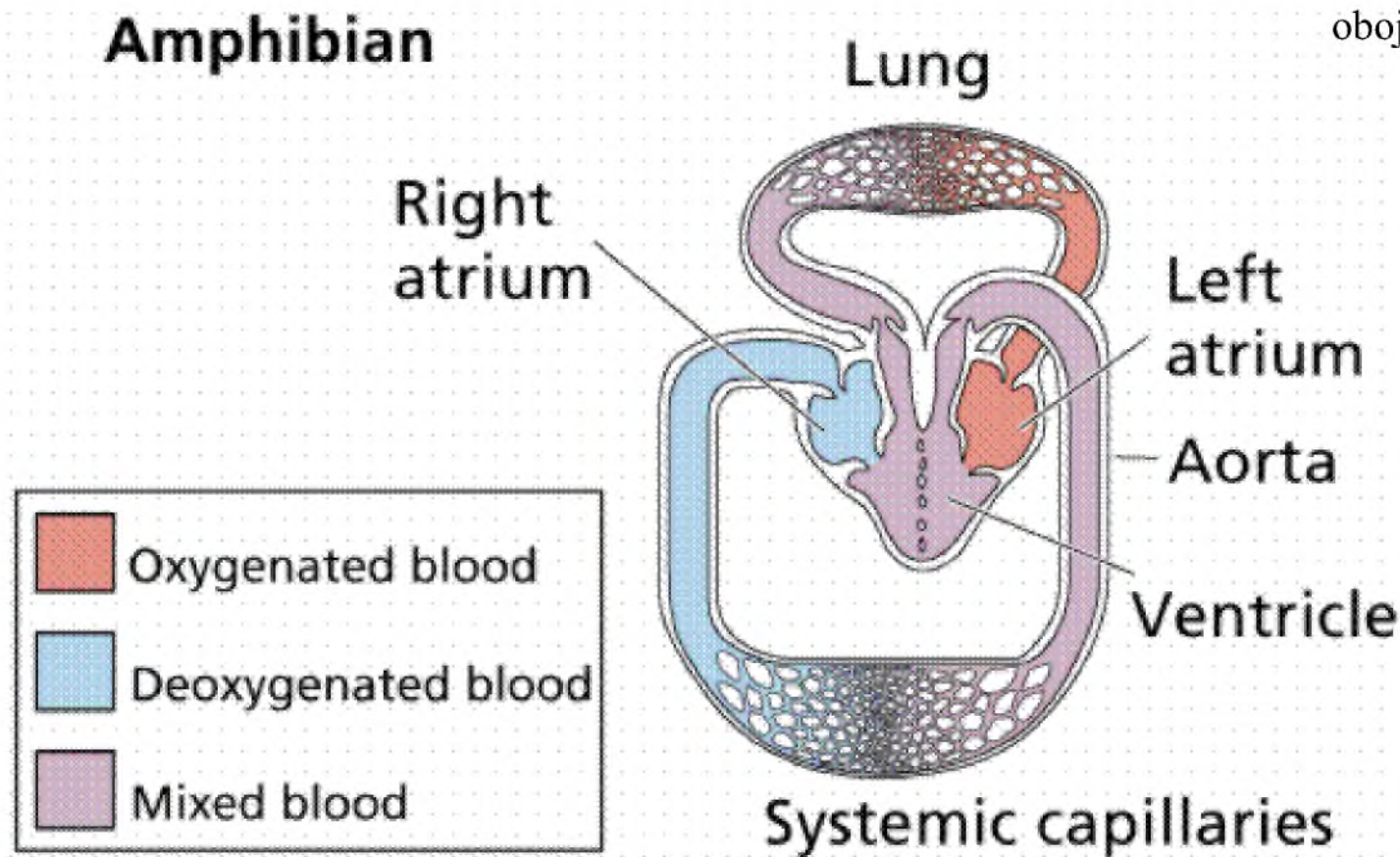
Neoceratodus forsteri



Krvné obehy



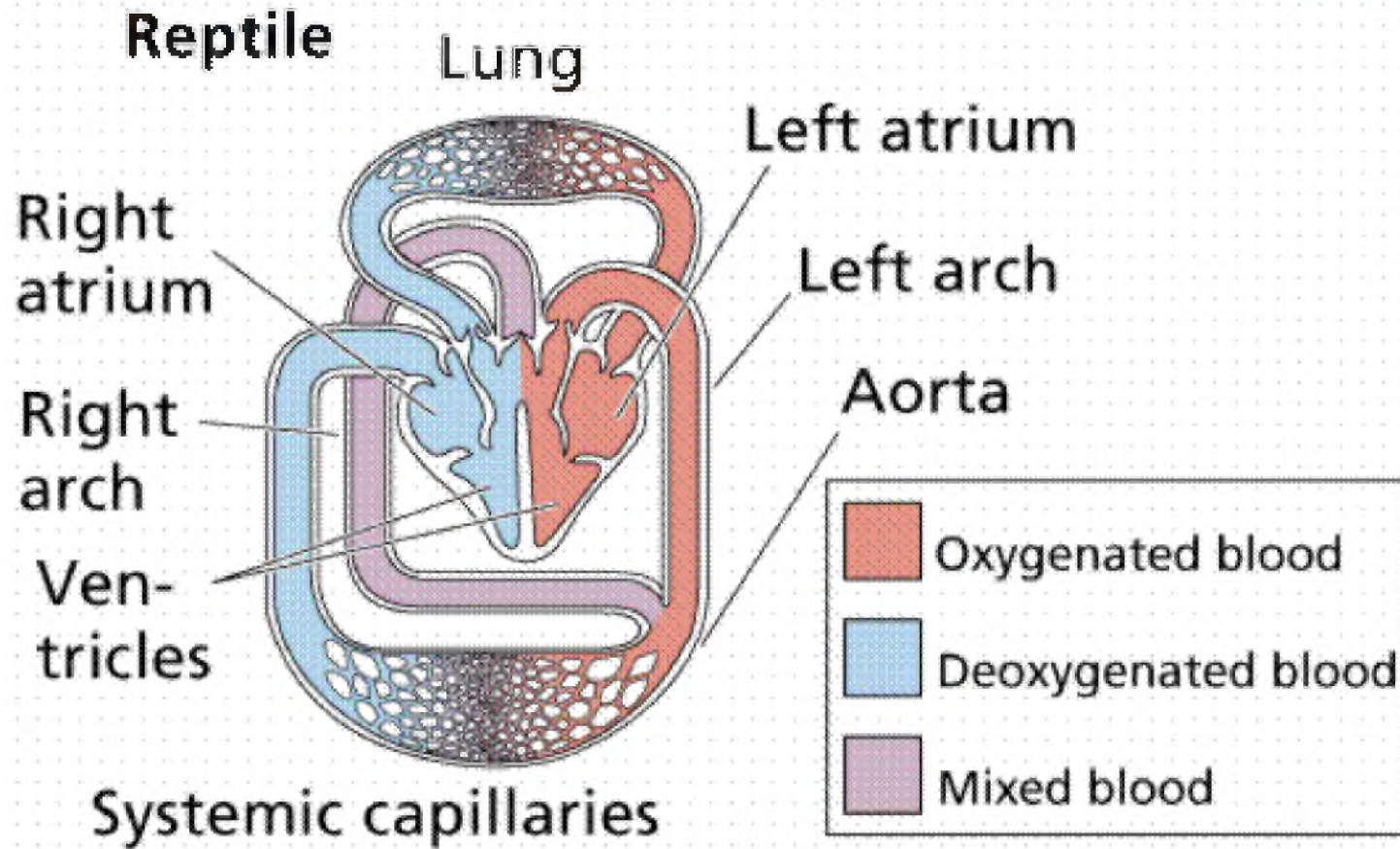
obojživelníky



Krvné obehy



plazy

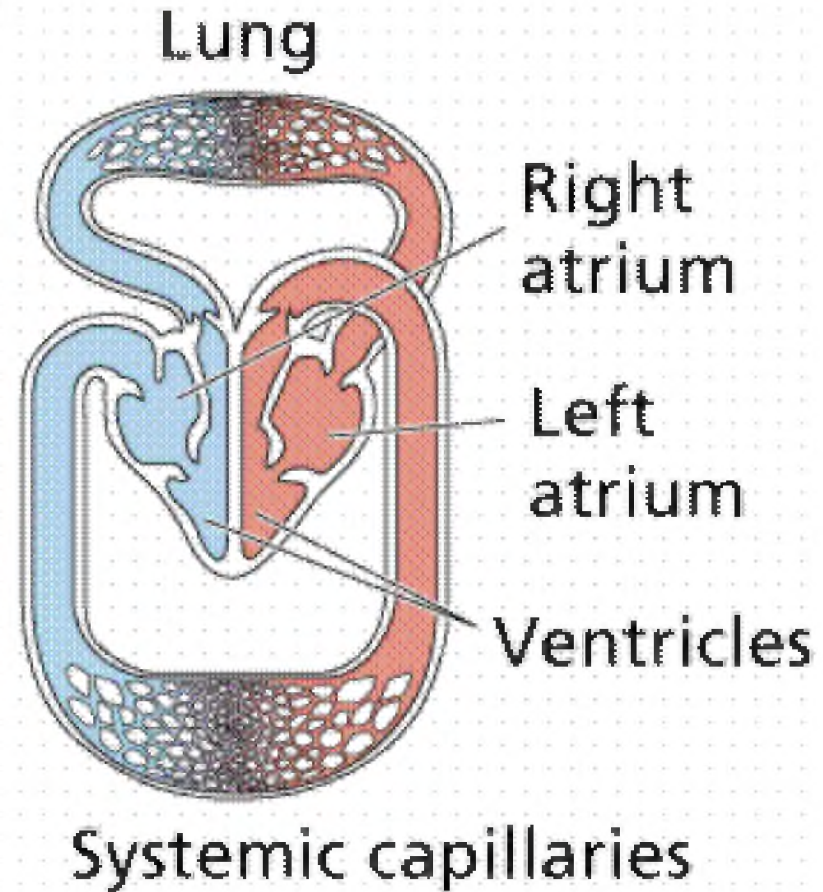
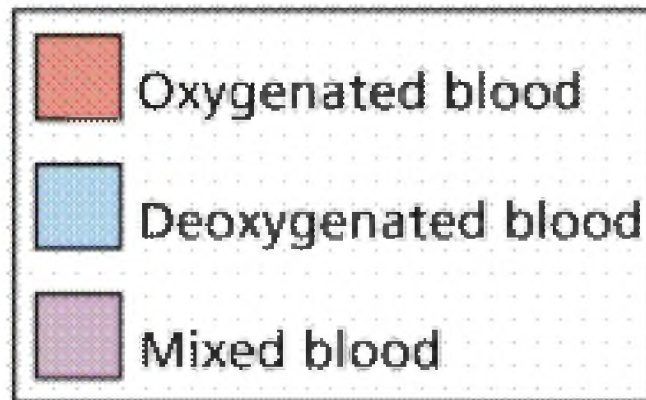




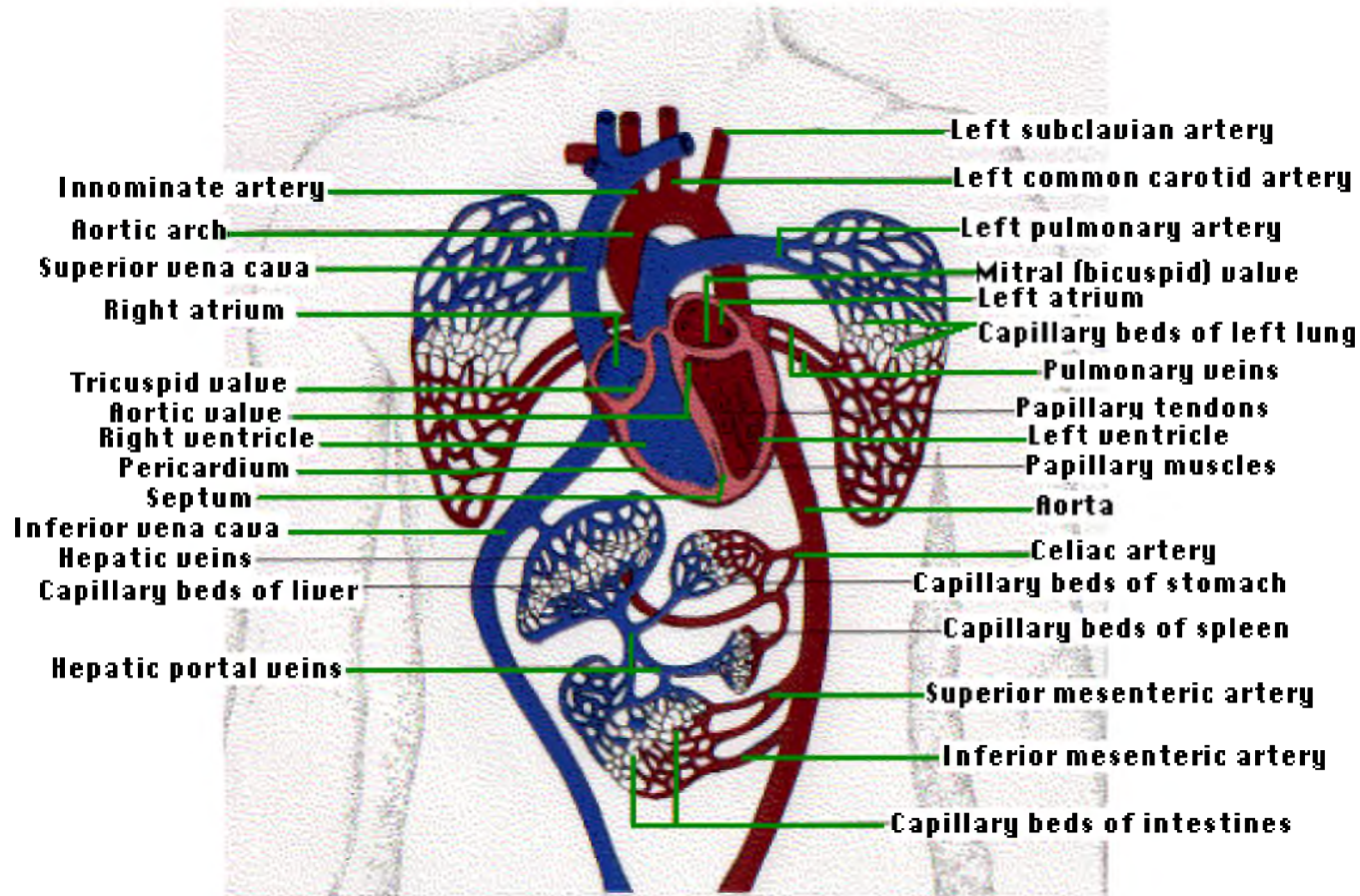
Krvné obehy



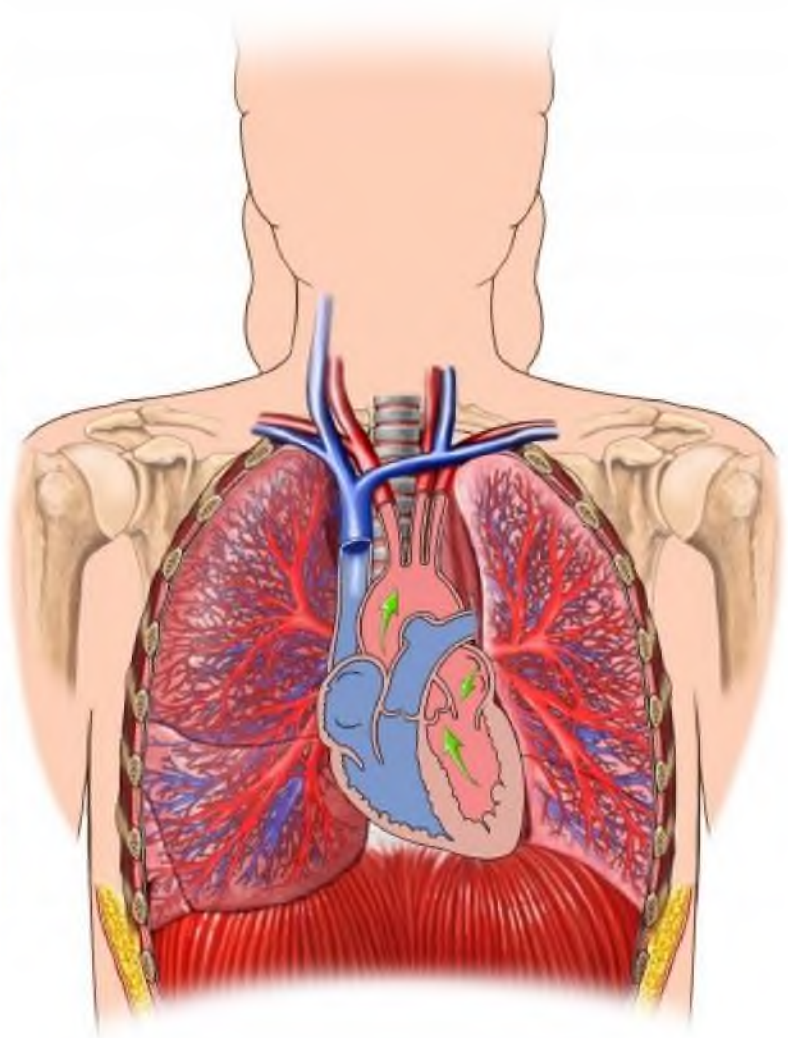
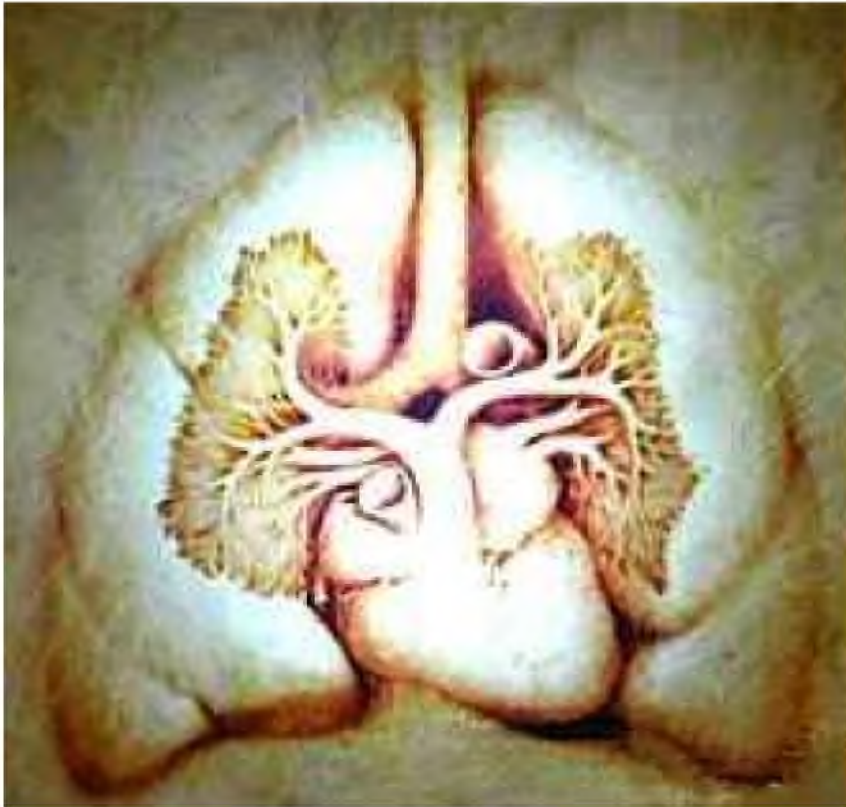
Mammal and bird



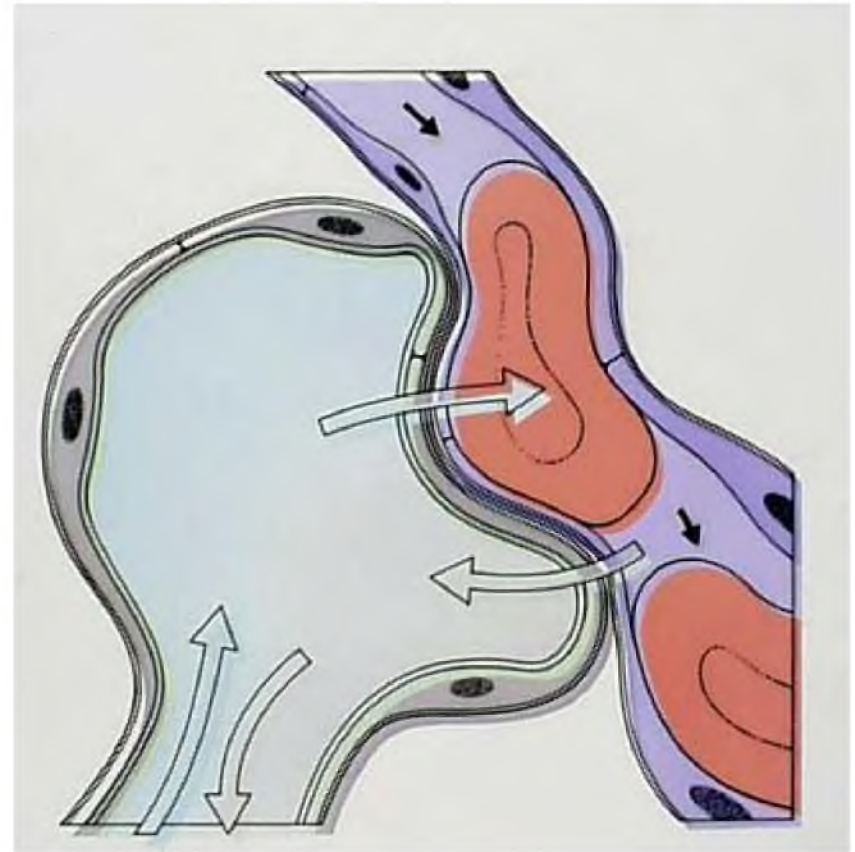
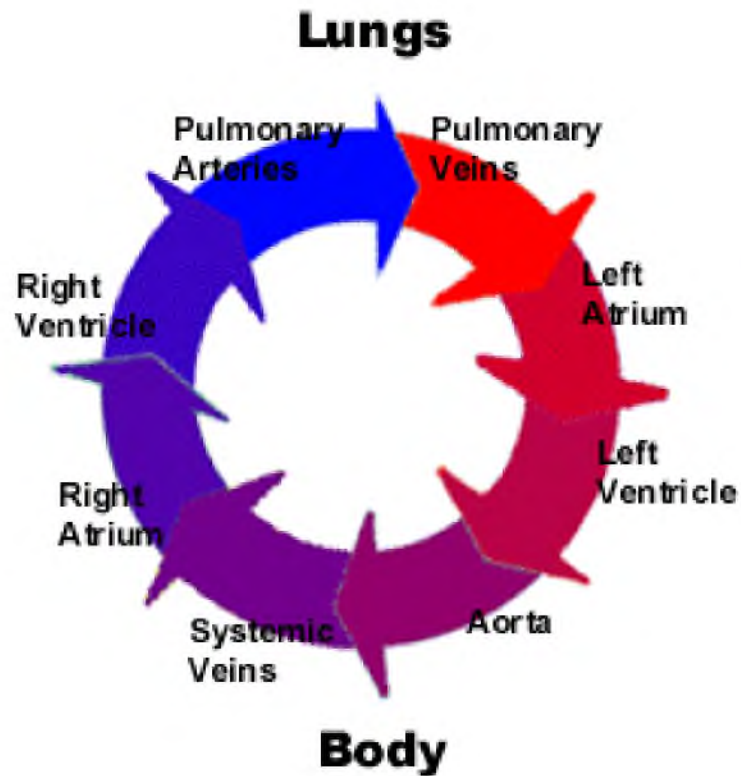
Plúcny (malý) krvný obeh



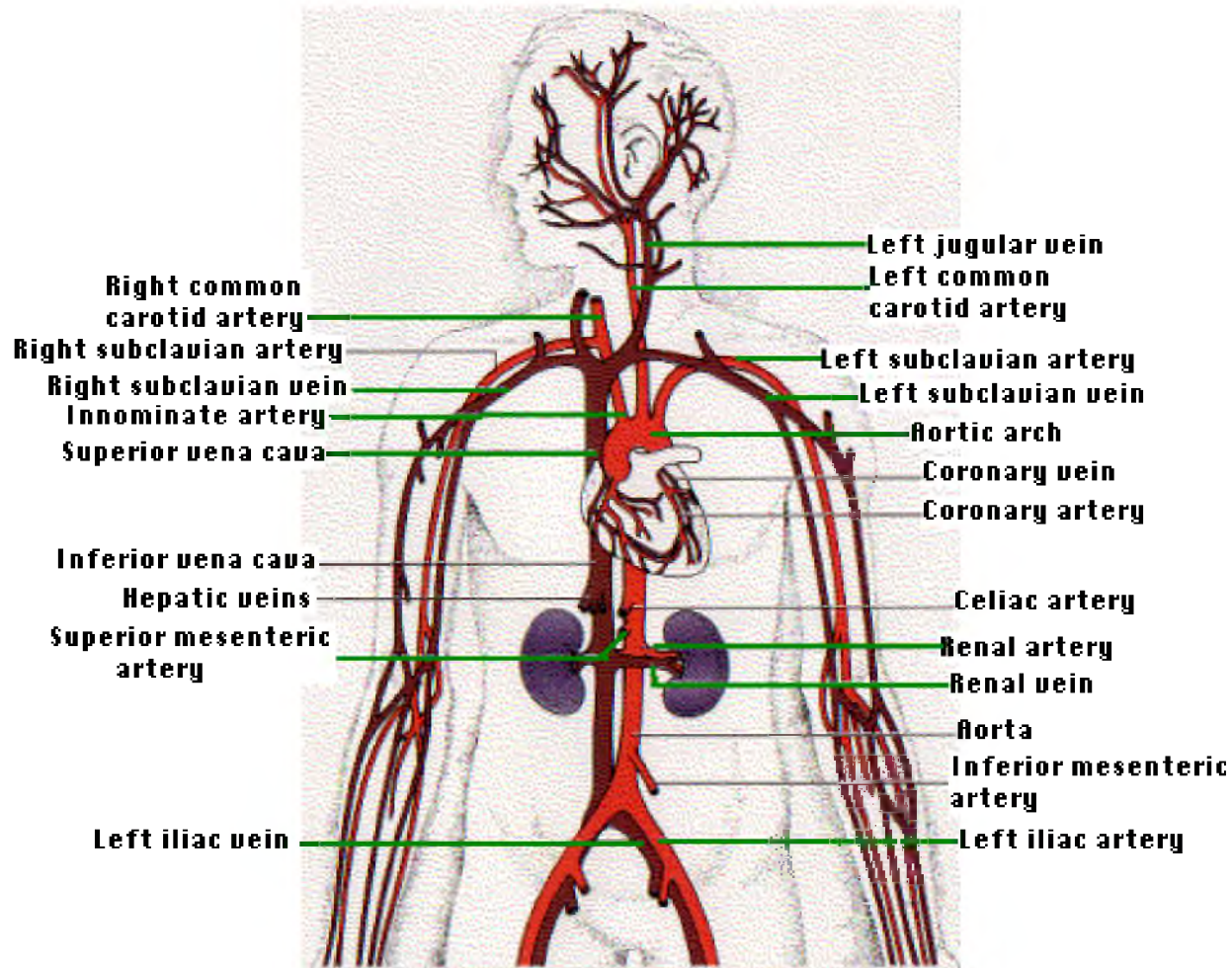
Plúcny (malý) krvný obeh



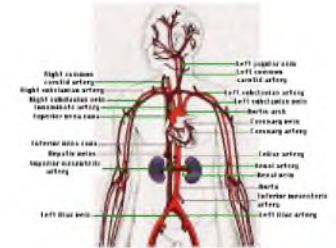
Plúcny (malý) krvný obeh



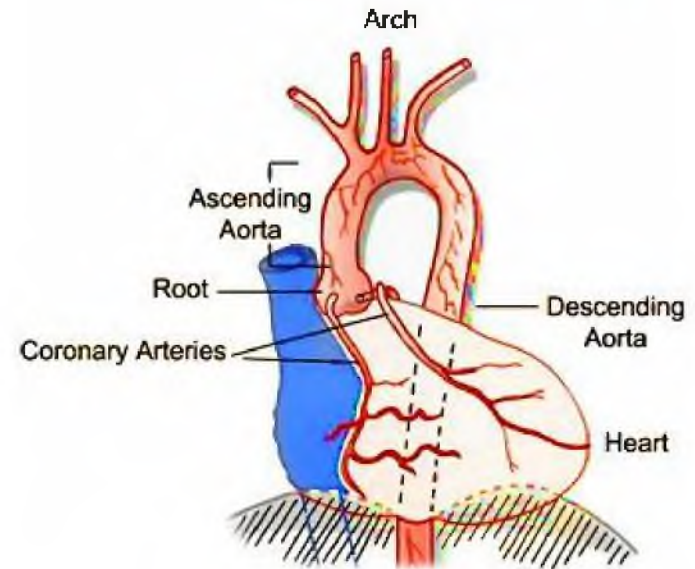
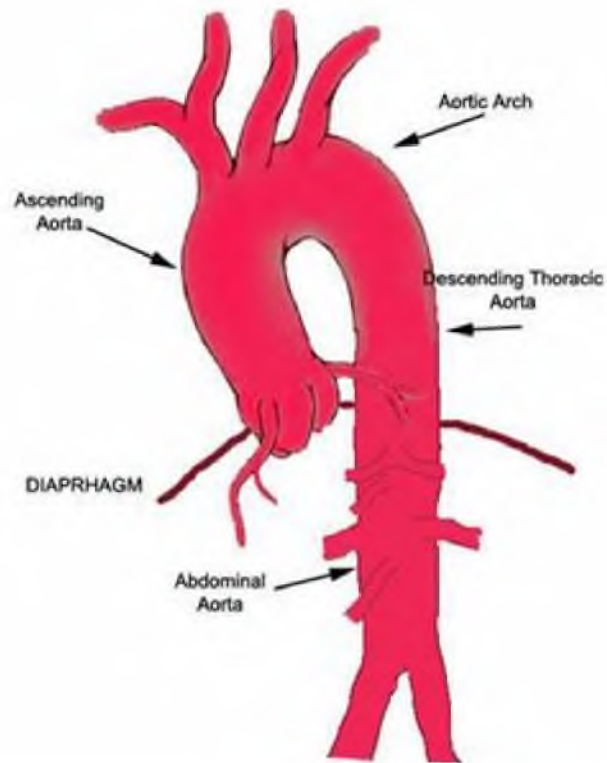
Telový (vel'ký) KO



Telový (velký) KO

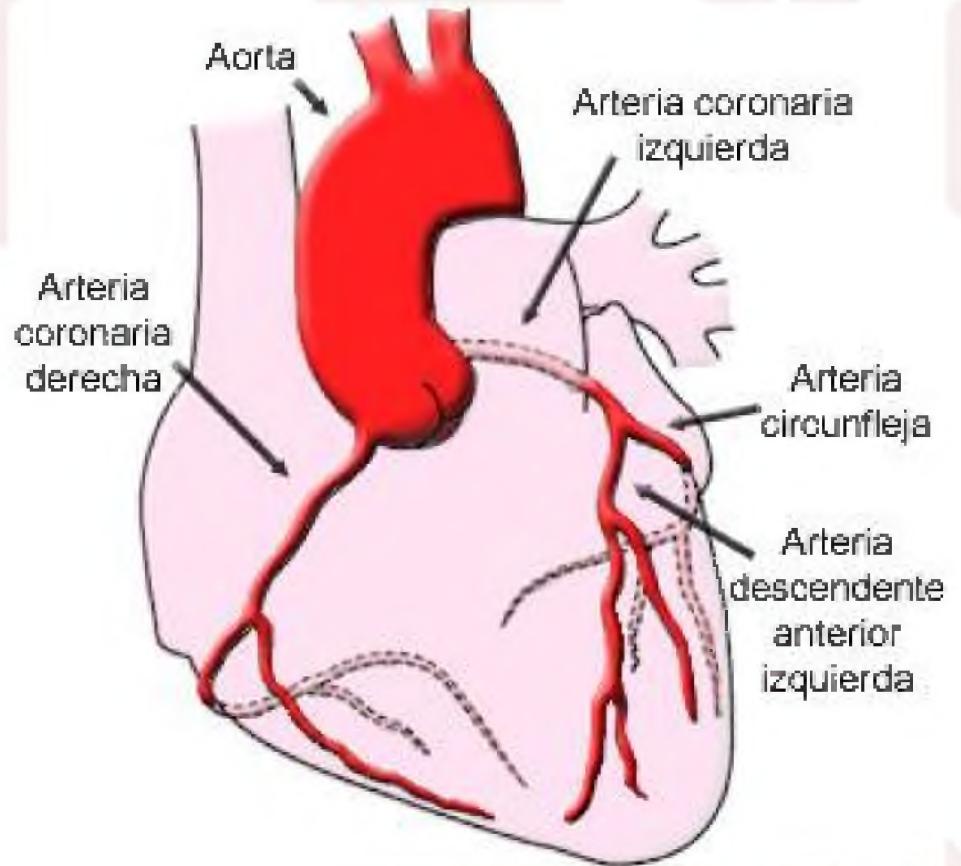


Structure of the Aorta



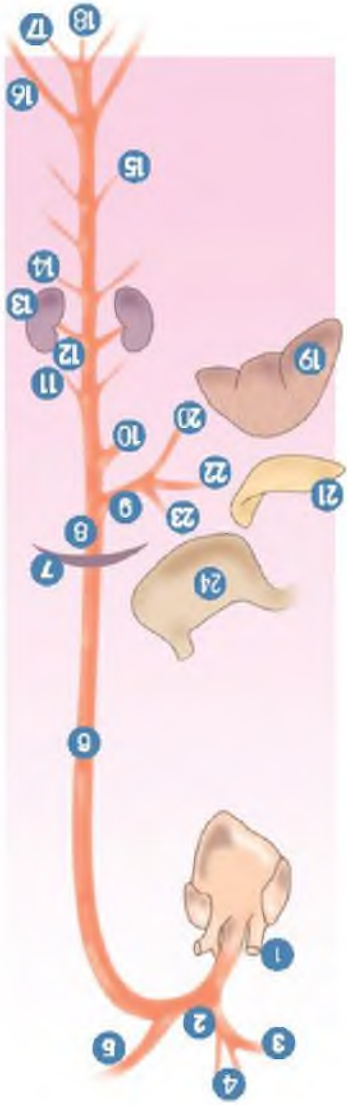
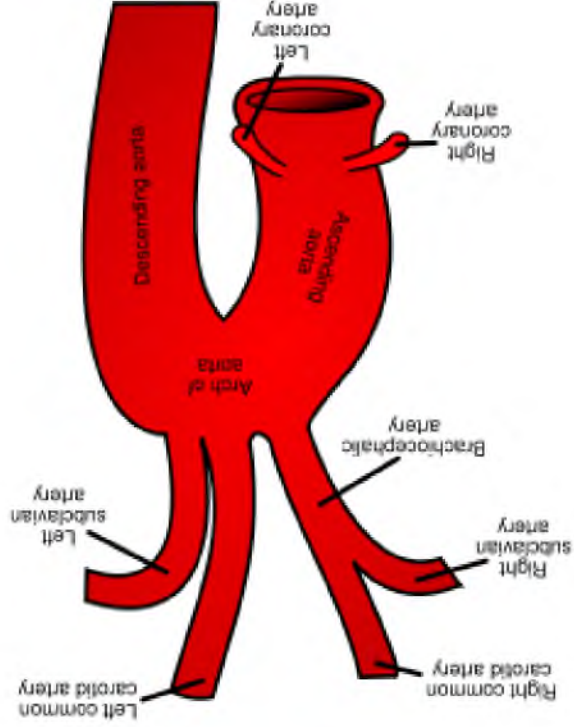
Telový (velký) KO

- aorta ascendens



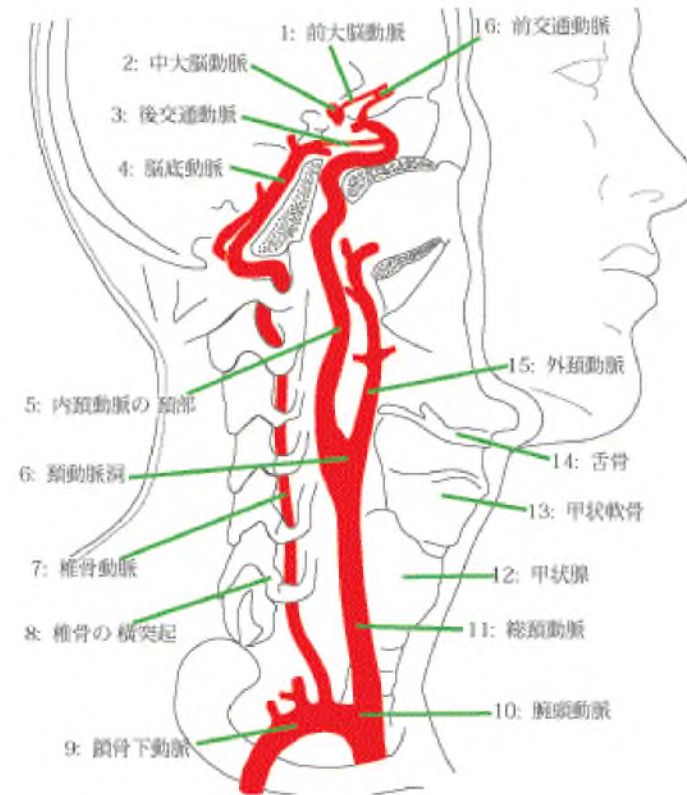
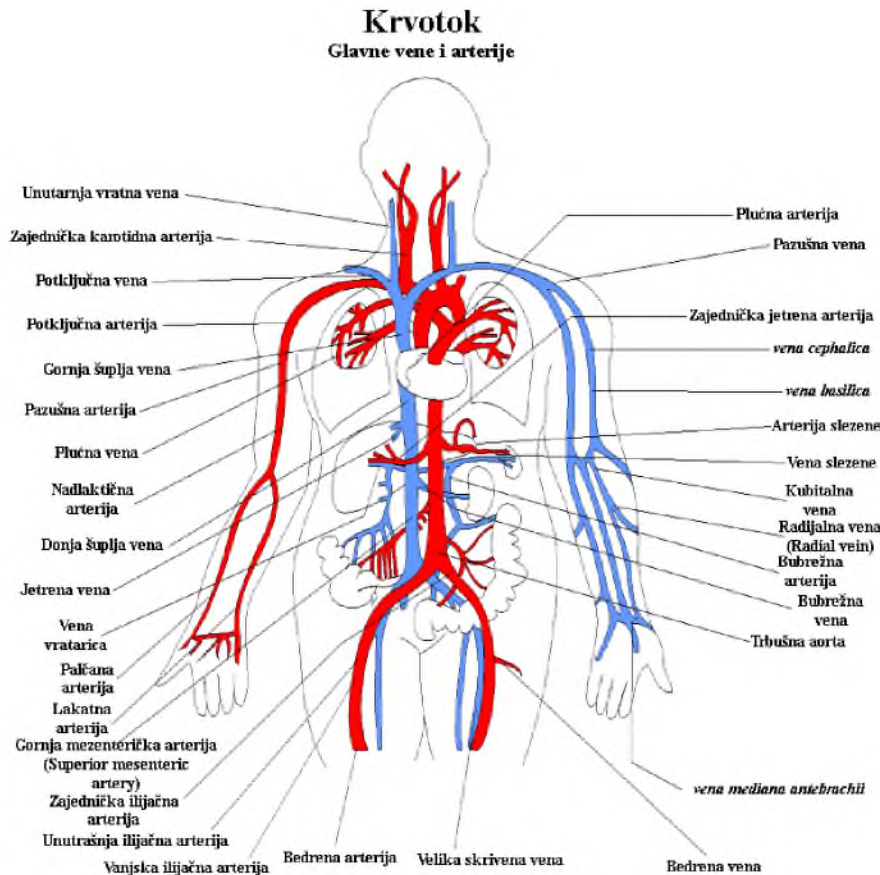
Telový (velký) KO

- arcus aortae



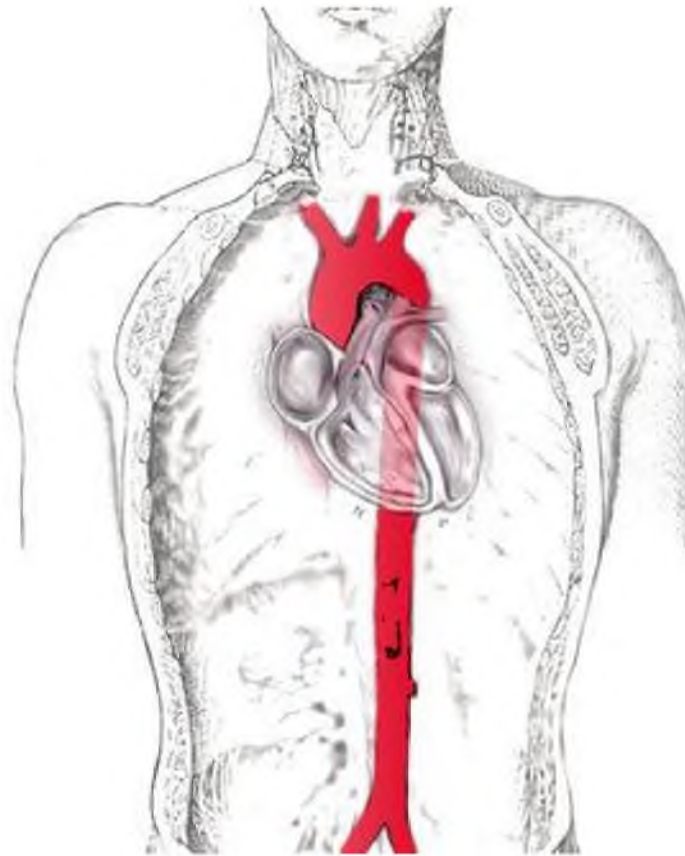
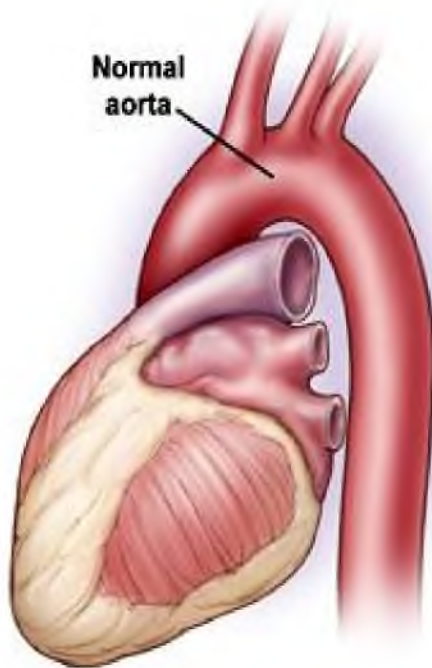
Telový (vel'ký) KO

- arcus aortae



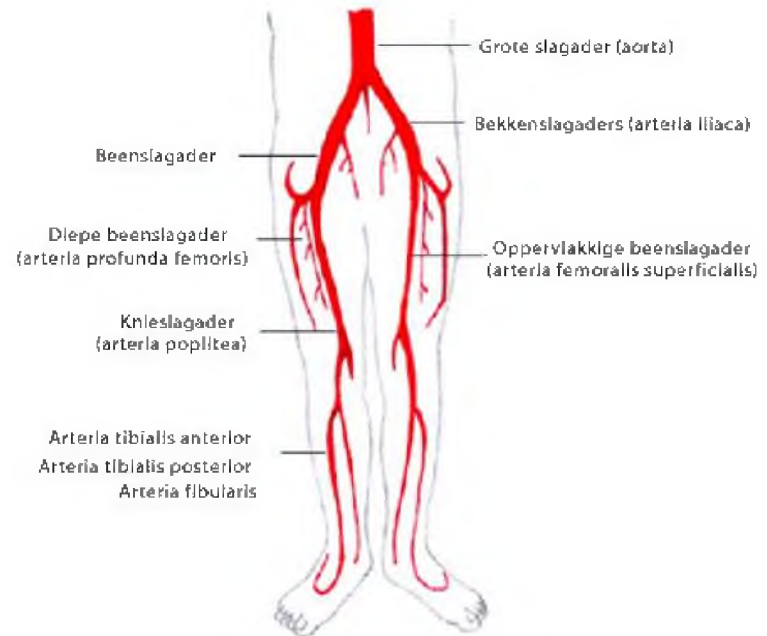
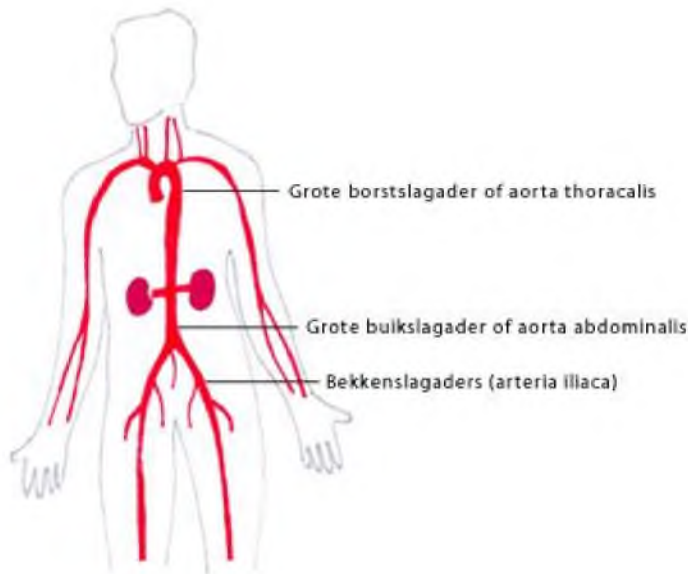
Telový (velký) KO

- aorta descendens



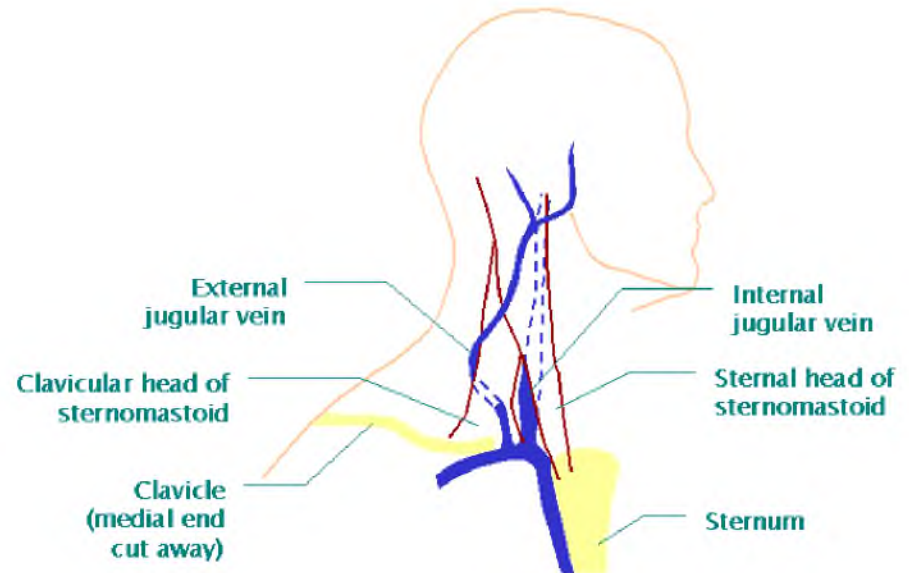
Telový (veľký) KO

- aorta descendens



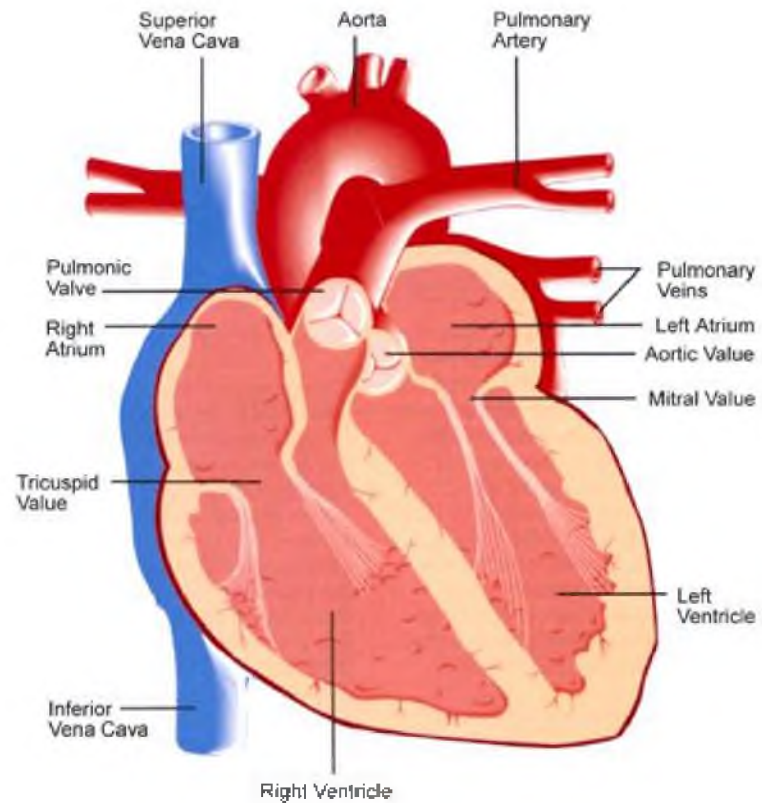
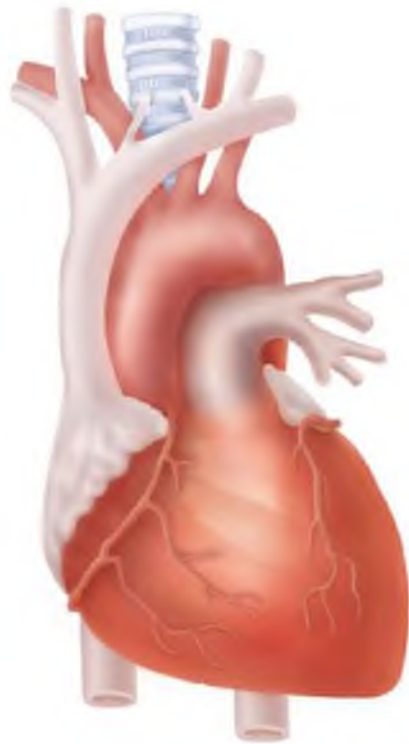
Telový (velký) KO

- vena cava cranialis



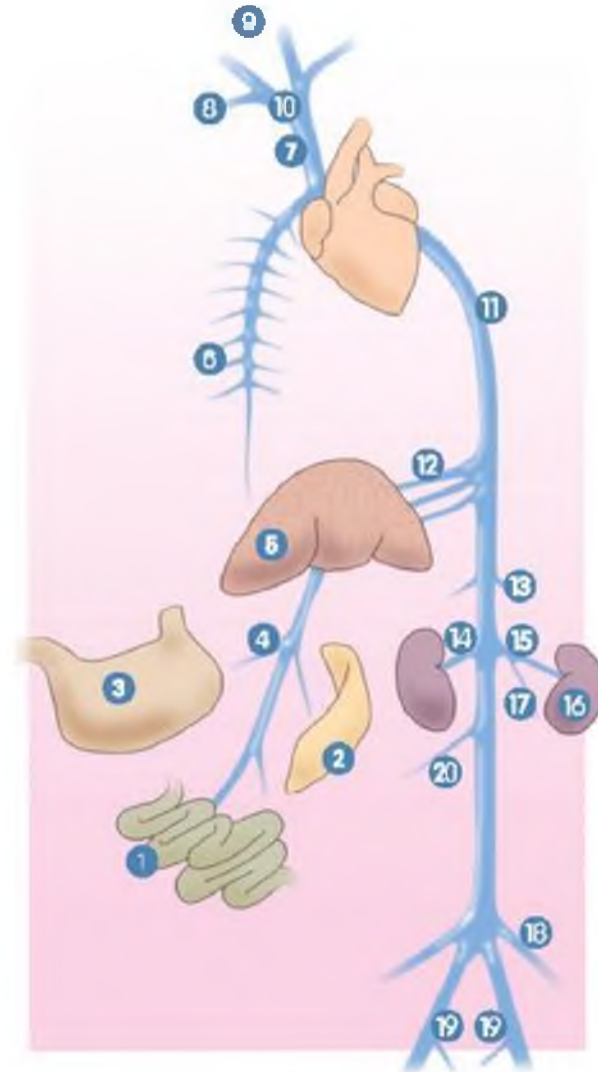
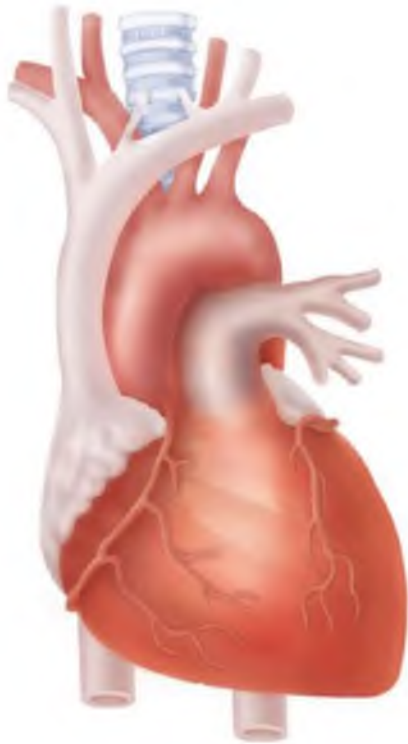
Telový (velký) KO

- vena cava cranialis

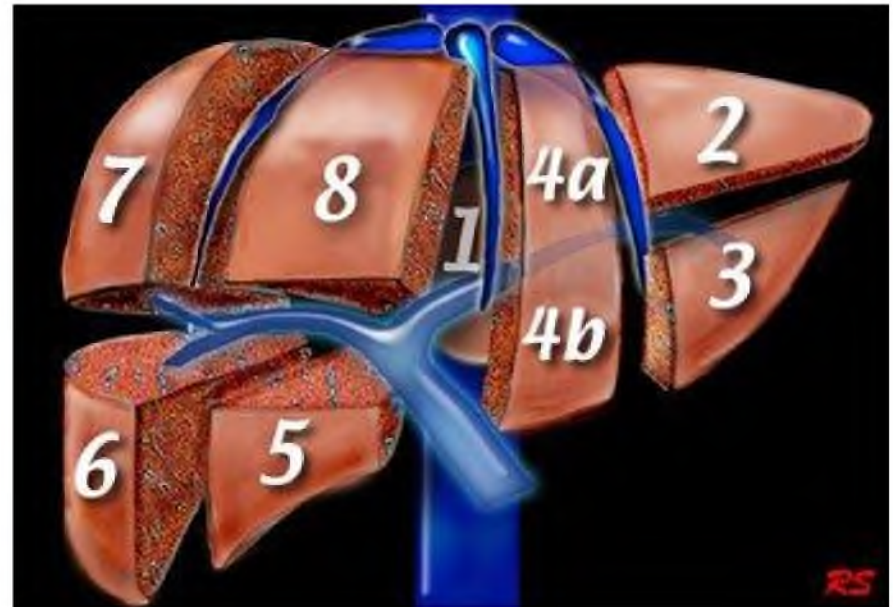
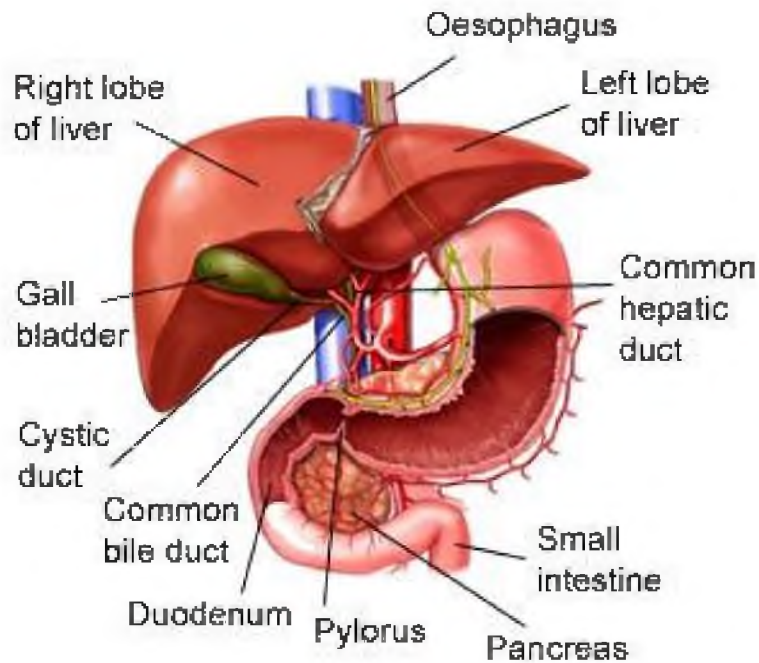


Telový (velký) KO

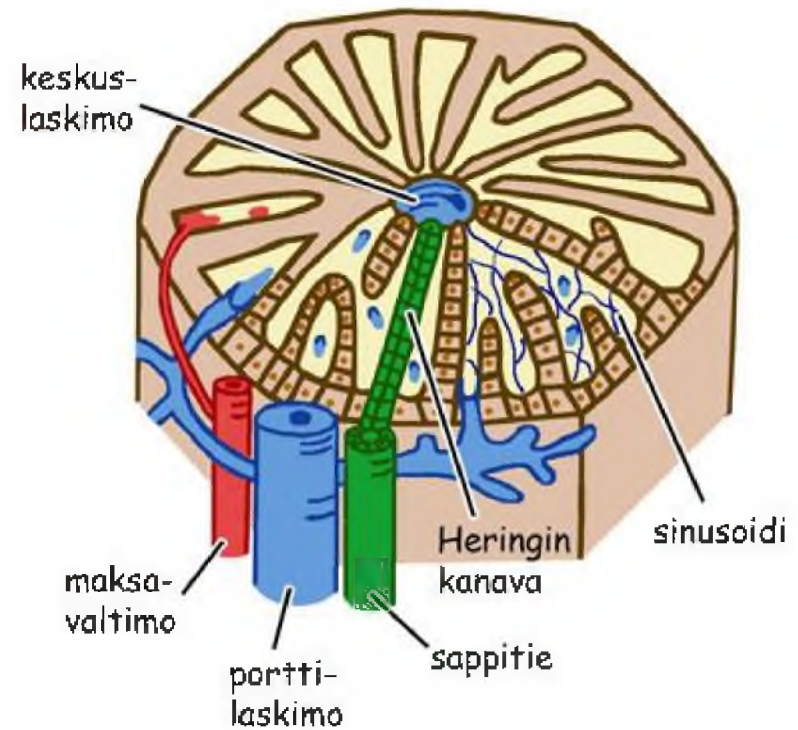
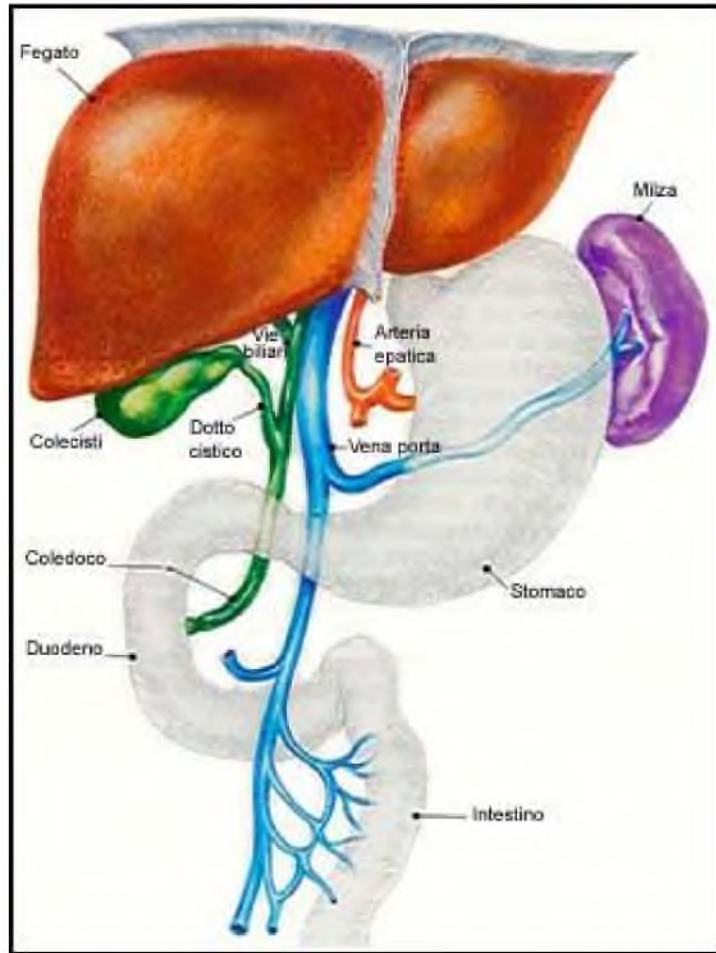
- vena cava caudalis



Portální (velký) KO

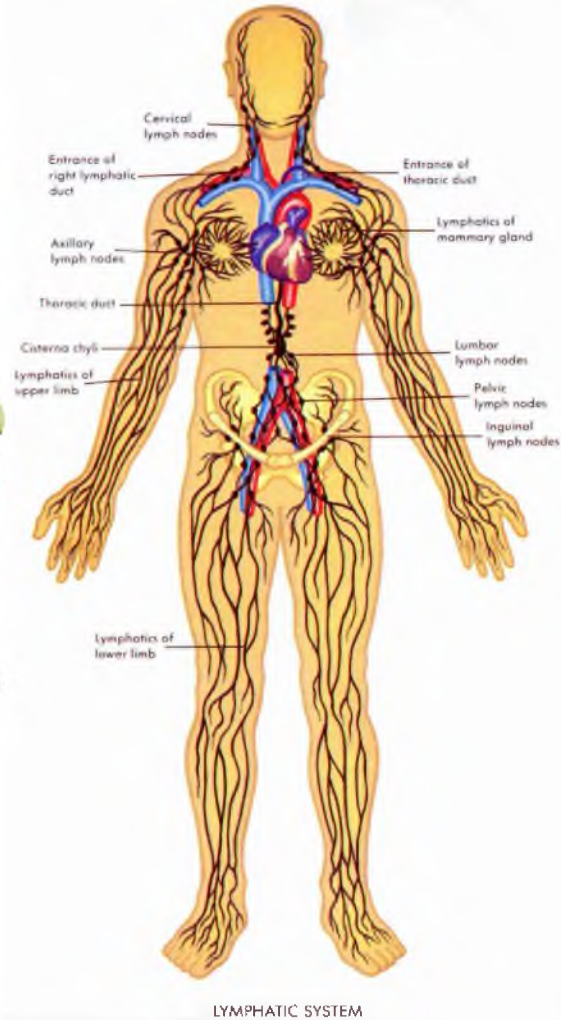
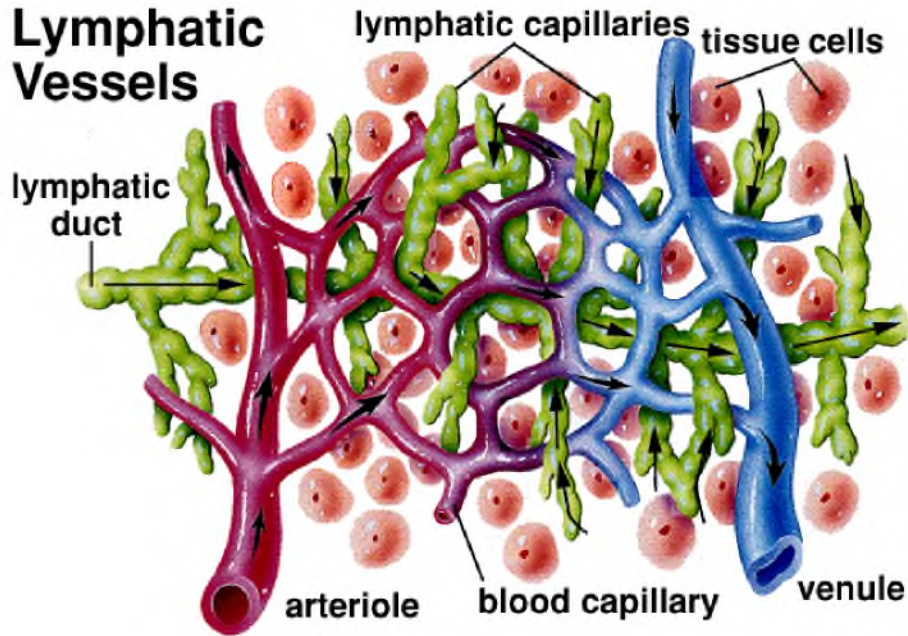


Portaalny (veľký) KO

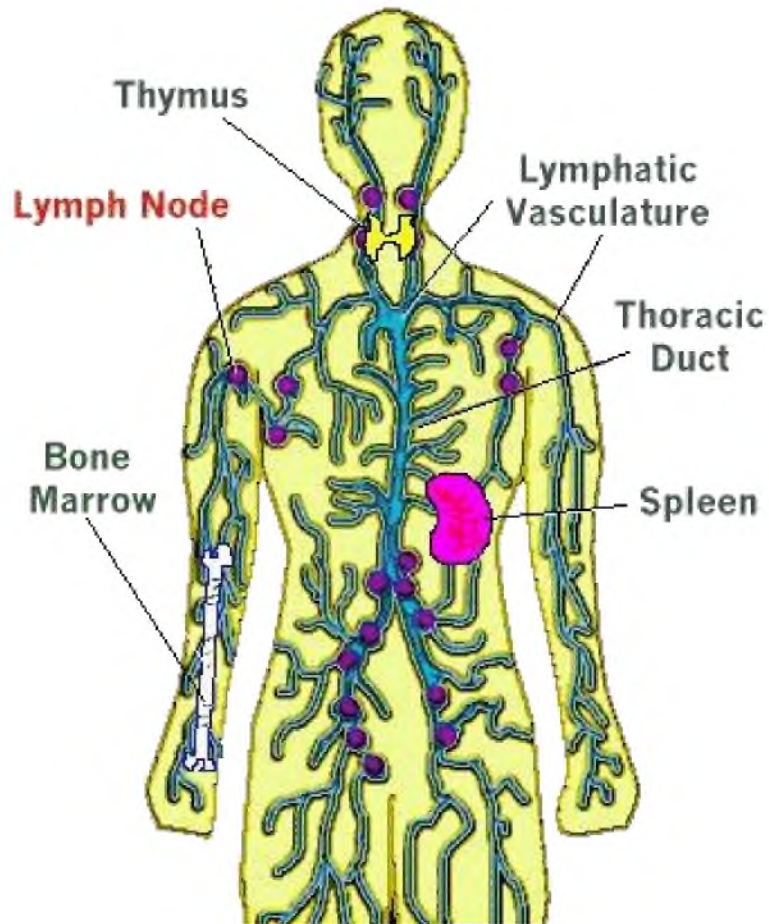


Lymfatický systém

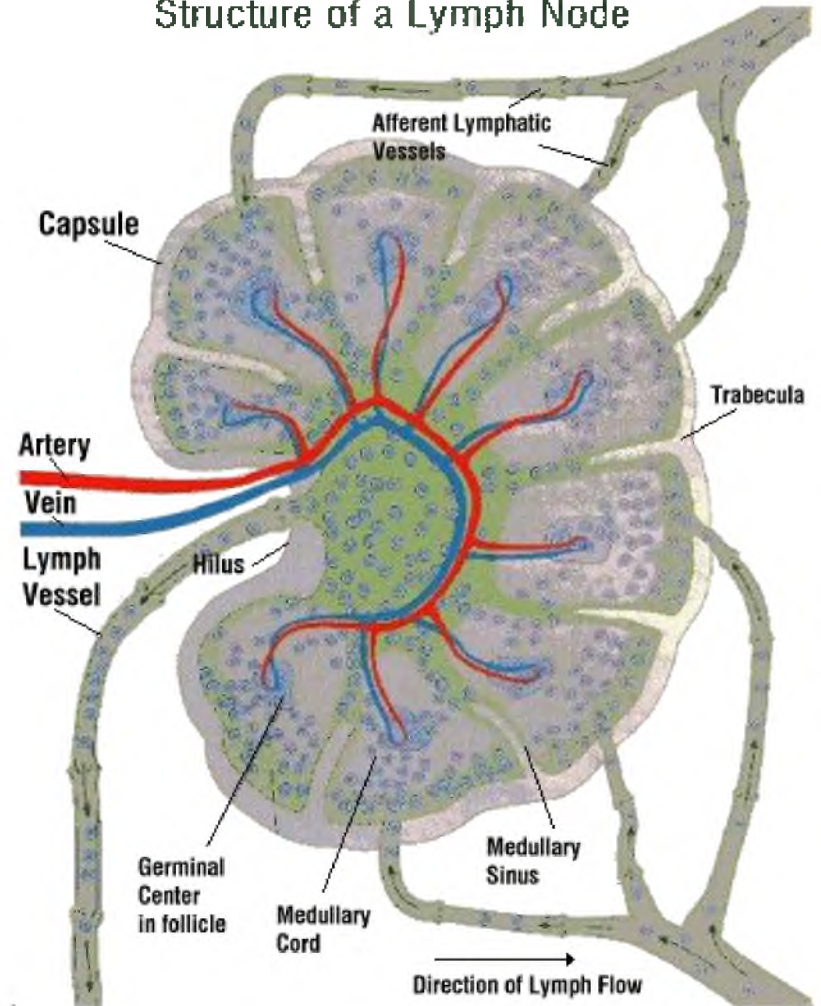
Sylvia S. Mader, Inquiry Into Life, 8th ed. Copyright © 1997 Wm. C. Brown Publishers



Lymfatický systém

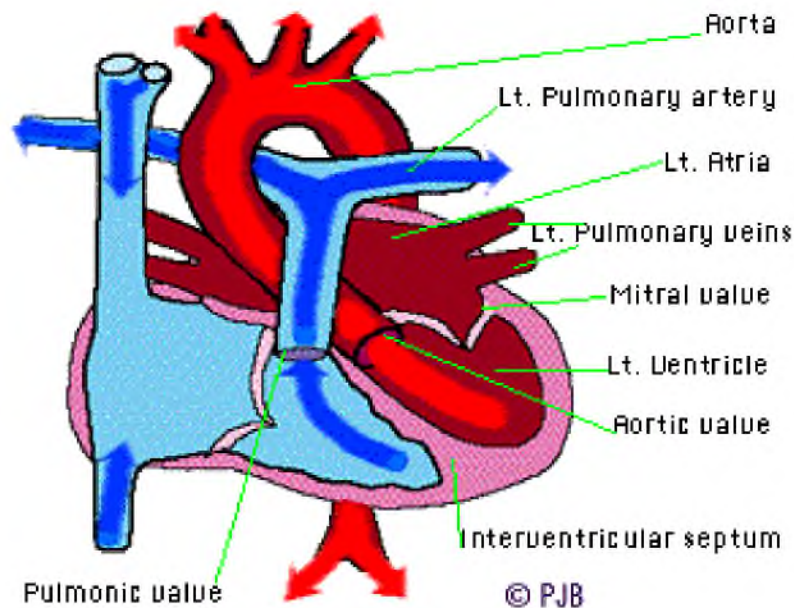


Structure of a Lymph Node



Kontrakcie srdca

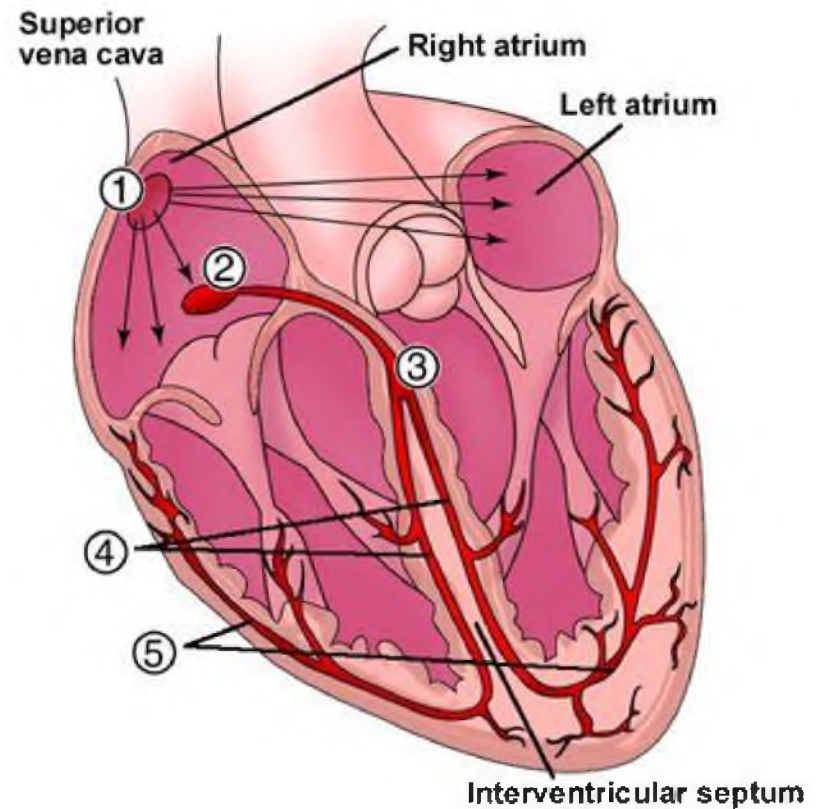
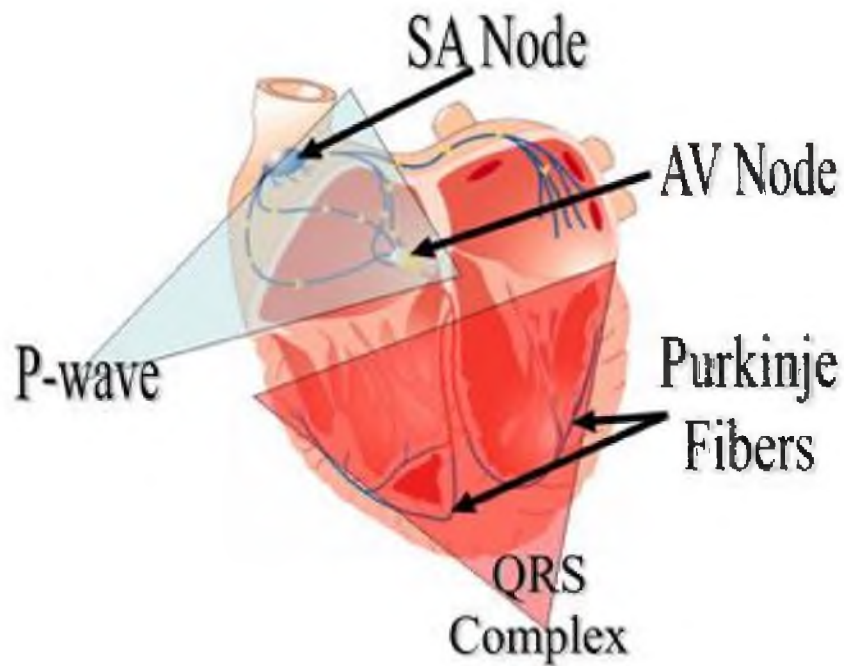
- rytmické kontrakcie
- špecializovaná srdcová svalovina



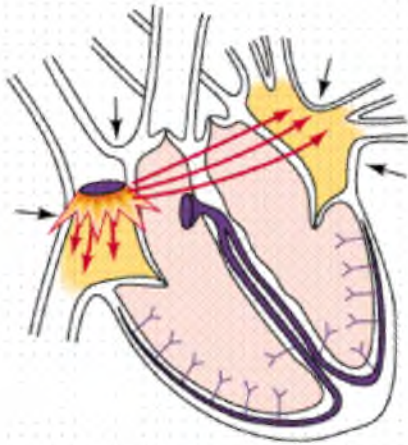
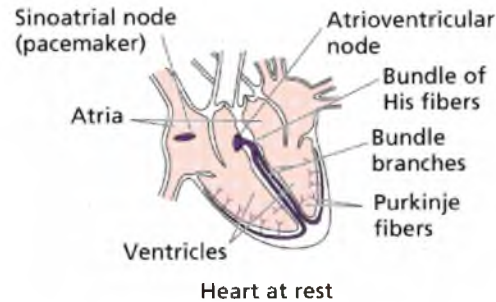
Vedenie vzruchov v srdci

- špecializovaná srdcová svalovina (prevodný systém)
 - sinoatriálny (S–A) uzlík
 - atrioventrikulárny (A–V) uzlík
 - predsieňovo–komorový (A–V) zväzok – Purkyňove vlákna
 - pravé ramienko
 - ľavé ramienko

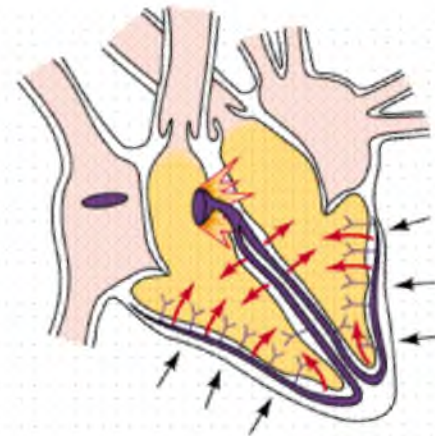
Vedenie vzruchov v srdci



Vedenie vzruchov v srdci



Sinoatrial node fires, action potentials spread through atria which contract



Atrioventricular node fires, sending impulses along conducting fibers; ventricles contract

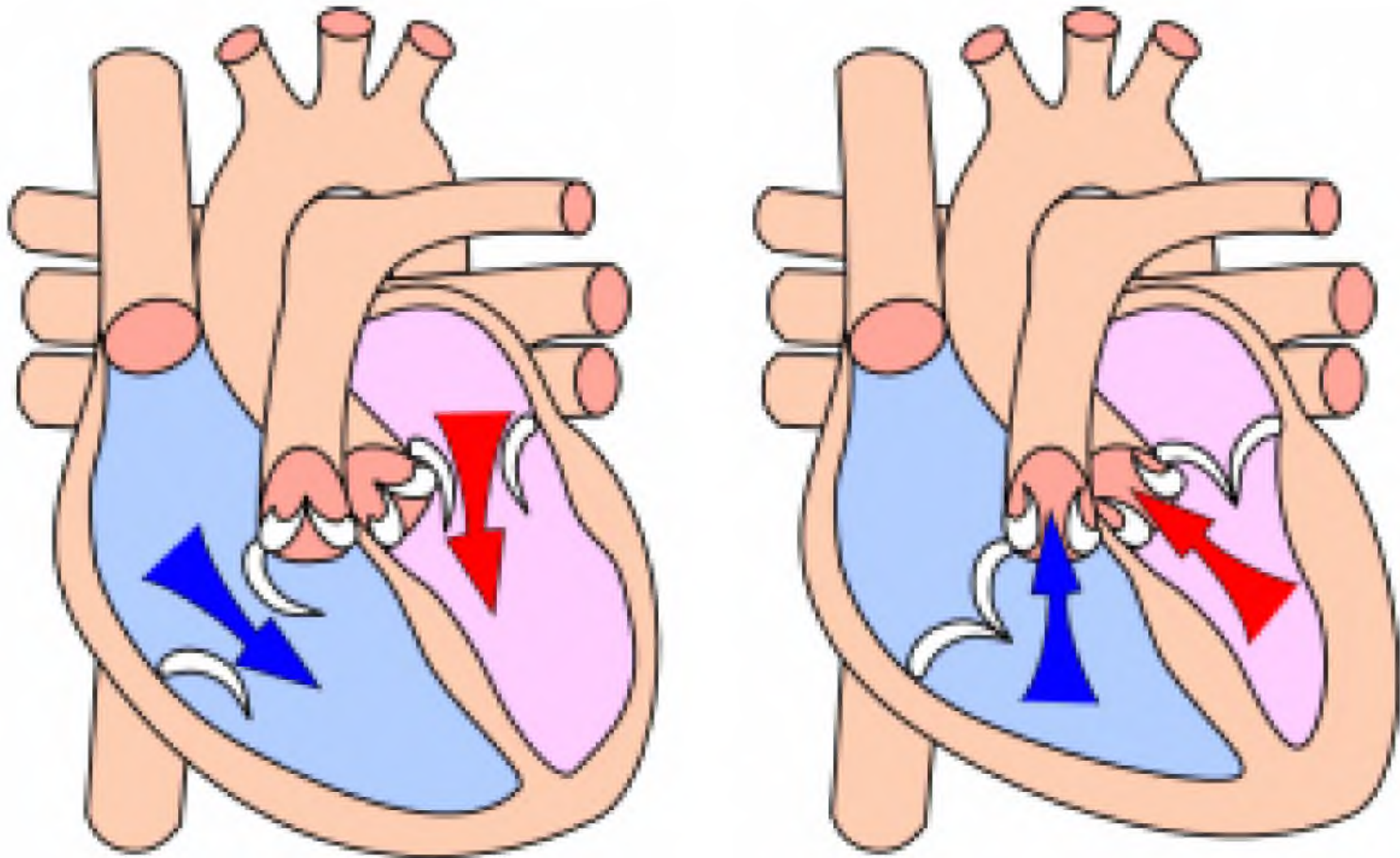
Cyklus srdca

- kontrakcia a relaxácia srdca
 - **diastola**
 - uvoľnenie svaloviny dutiny srdca pred a počas plnenia
 - **systola**
 - kontrakcia dutiny srdca v priebehu vyprázdňovania

Cyklus srdca

- objem a tlak v predsieňach v dobe ich plnenia krvou z dutých a pľúcnych žíl stúpa (počas **diastoly komôr**); cípate chlopne sa otvárajú vtedy, keď tlak v predsieňach je vyšší ako tlak v komorách (na začiatku diastoly komôr)
- krv prúdi do ochabnutých komôr (70%)
- nastáva **systola predsiení** (dokončí sa úplne napĺňanie komôr)
- predsieňe ochabujú a začína sa opäť plniť
- začínajú sa **zmrašťovať komory** a cípate chlopne sú uzavreté, pretože tlak v komorách je väčší ako tlak v predsieňach
- pokračujúca **kontrakcia komôr** vytvára dostatočný tlak pre prekonanie tlaku v tepnách
- otvárajú sa polmesiačikové chlopne
- krv je vypudzovaná z komôr (ejekcia)
- komory začínajú ochabovať
- tlak v tepnách začína prevyšovať tlak v komorách a polmesiačikové chlopne sa uzatvárajú

Cyklus srdca

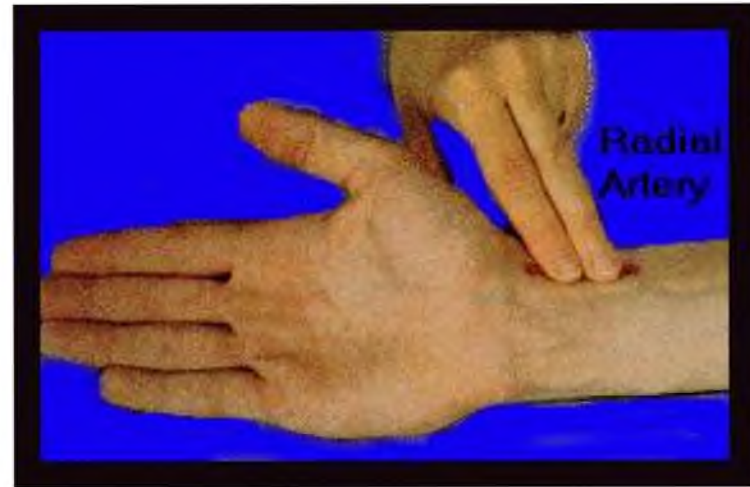
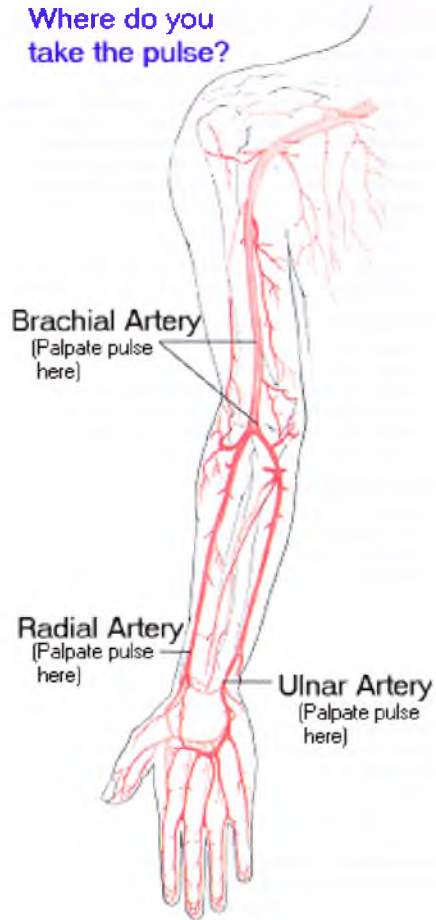


Frekvencia srdcovej činnosti v kl'ude

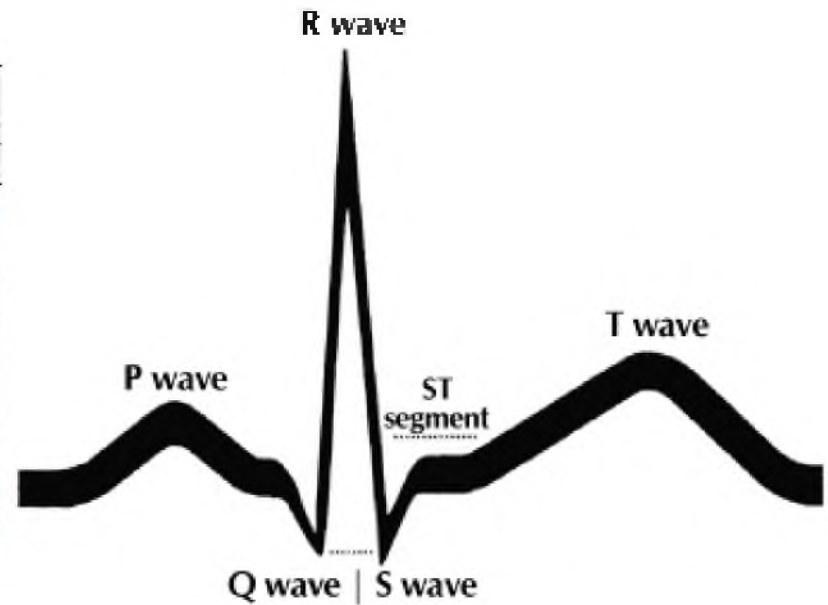
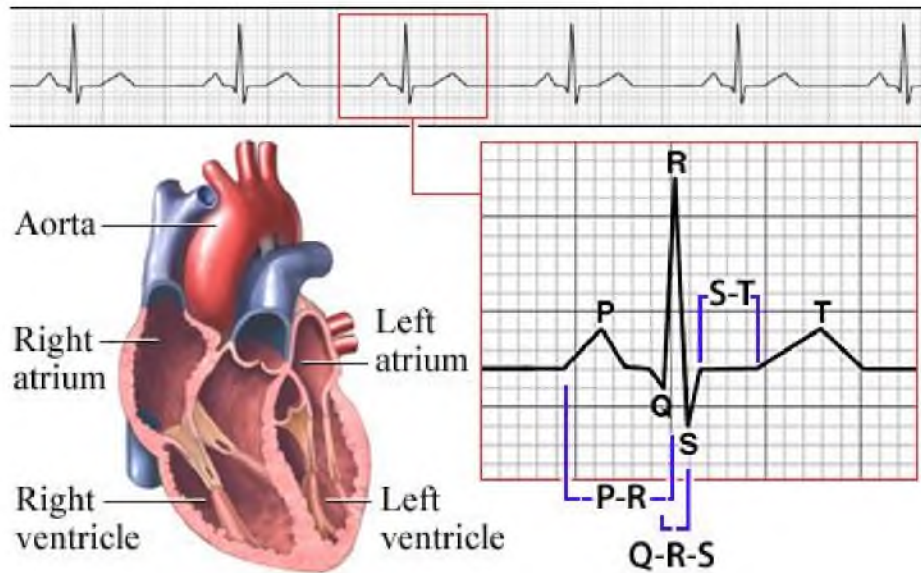
Druh	Srdcová frekvencia (úderý za minútu)
Kôň	32 – 44
HD	60 – 70
Ovca, koza	70 – 80
Sviňa	60 – 80
Pes	70 – 120
Mačka	110 – 130
Kura	200 – 400
Človek	60 – 90

Pulz

Where do you
take the pulse?



Elektrokardiogram



Krvný tlak

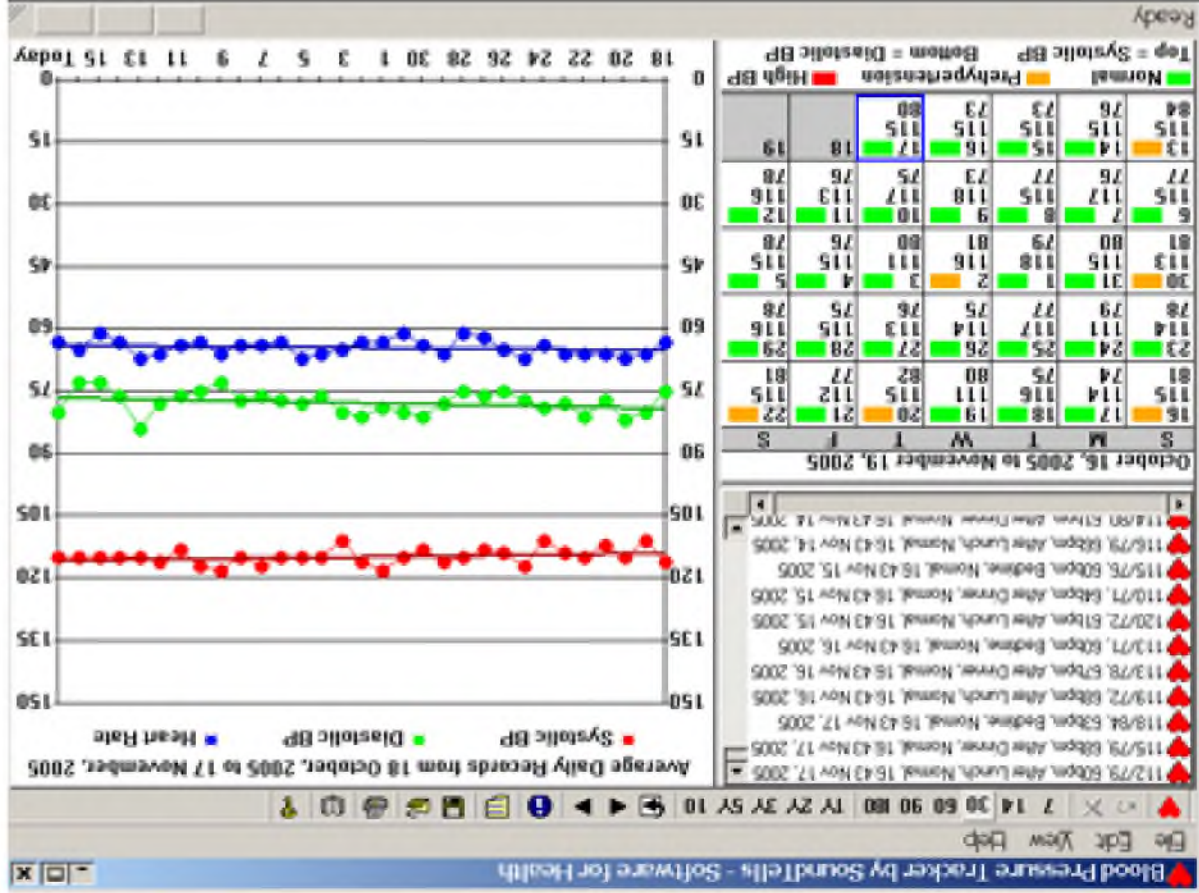


- **systolický tlak**
 - najvyššia hodnota, ktorá sa dosahuje v tepnách pri systole ľavej komory
- **diastolický tlak**
 - najnižšia hodnota tlak v tepnách v dobe diastoly ľavej komory
- **tepový tlak**
 - rozdiel medzi hodnotou systolického a diastolického tlaku
- **stredný tlak**
 - diastolický tlak + 1/3 hodnota tepového tlaku

120 – 90 – 30 – 80+10

- hodnoty – mm Hg; torr

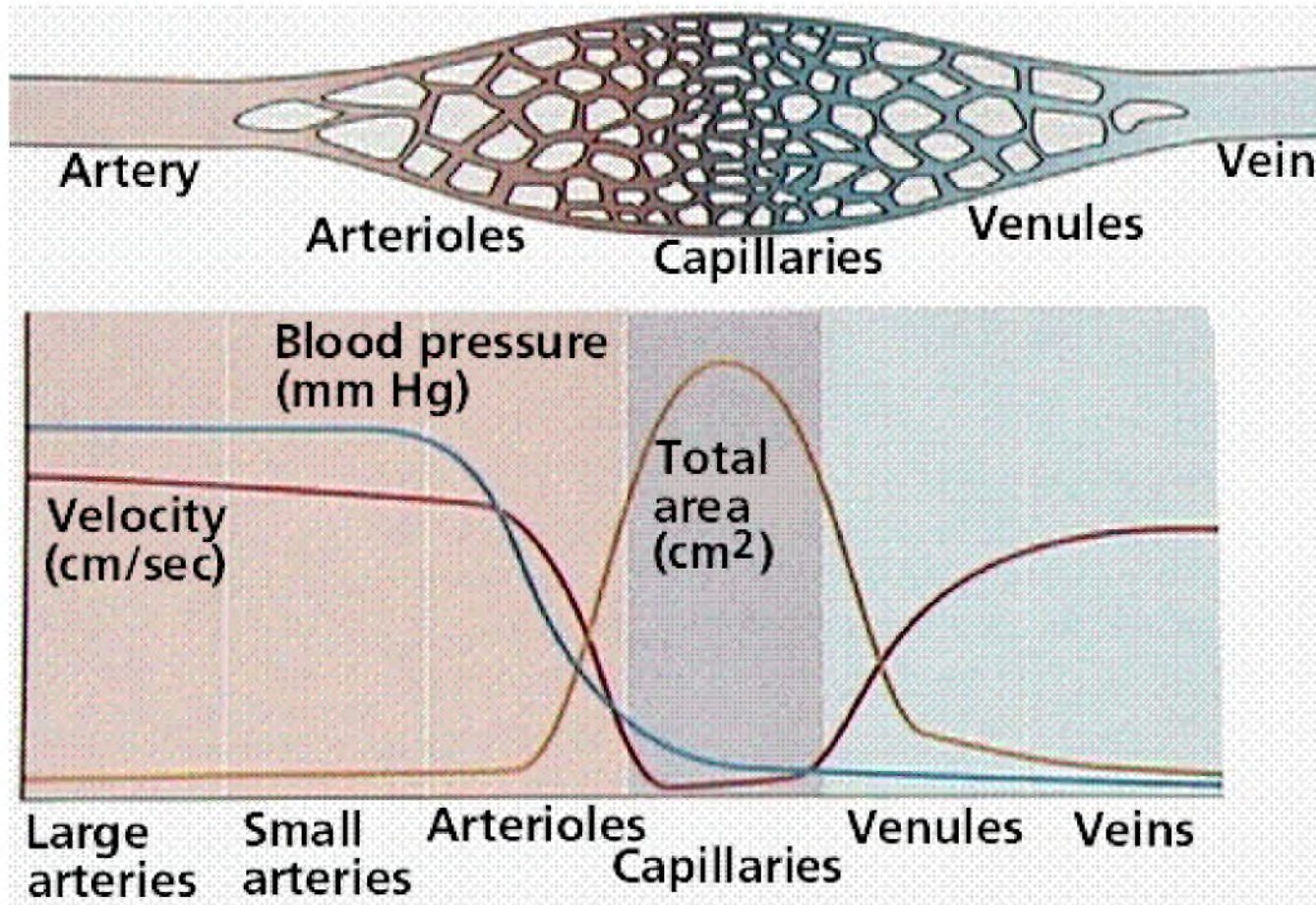
Krvný tlak



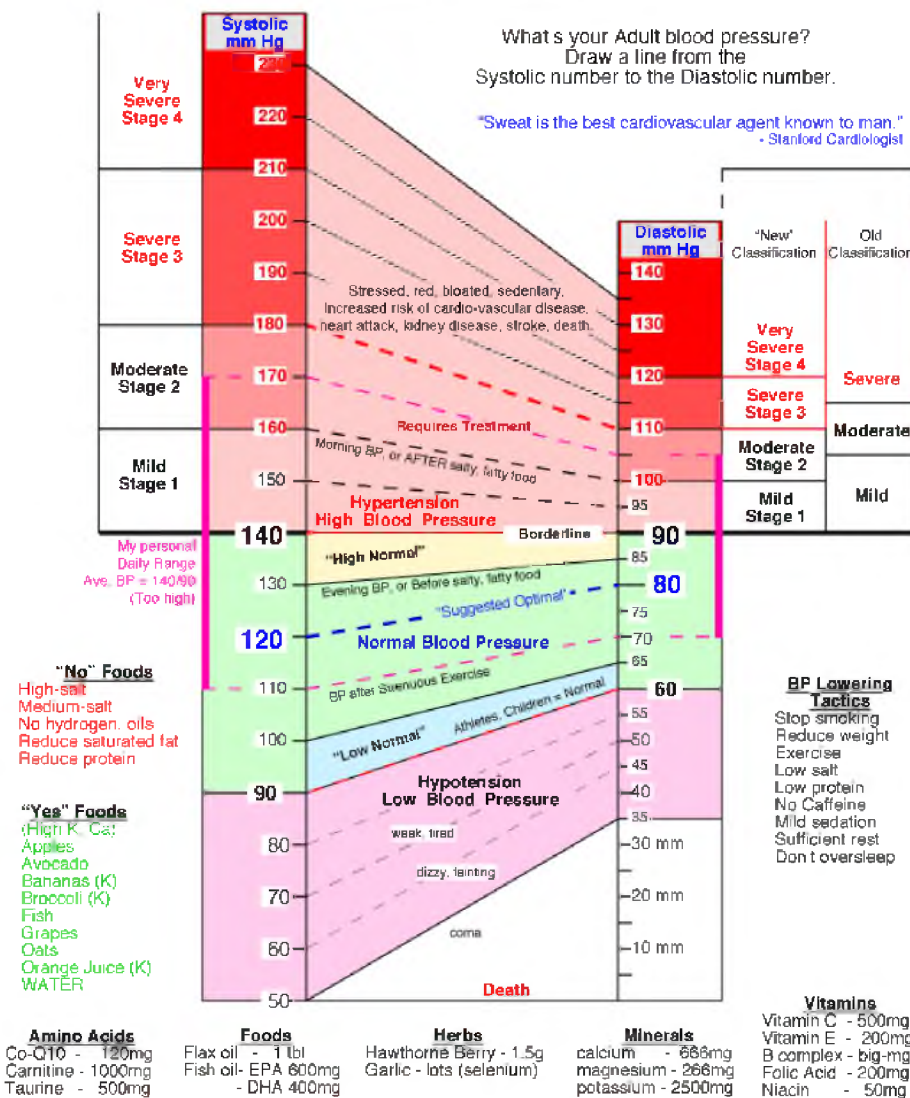
Krvný tlak

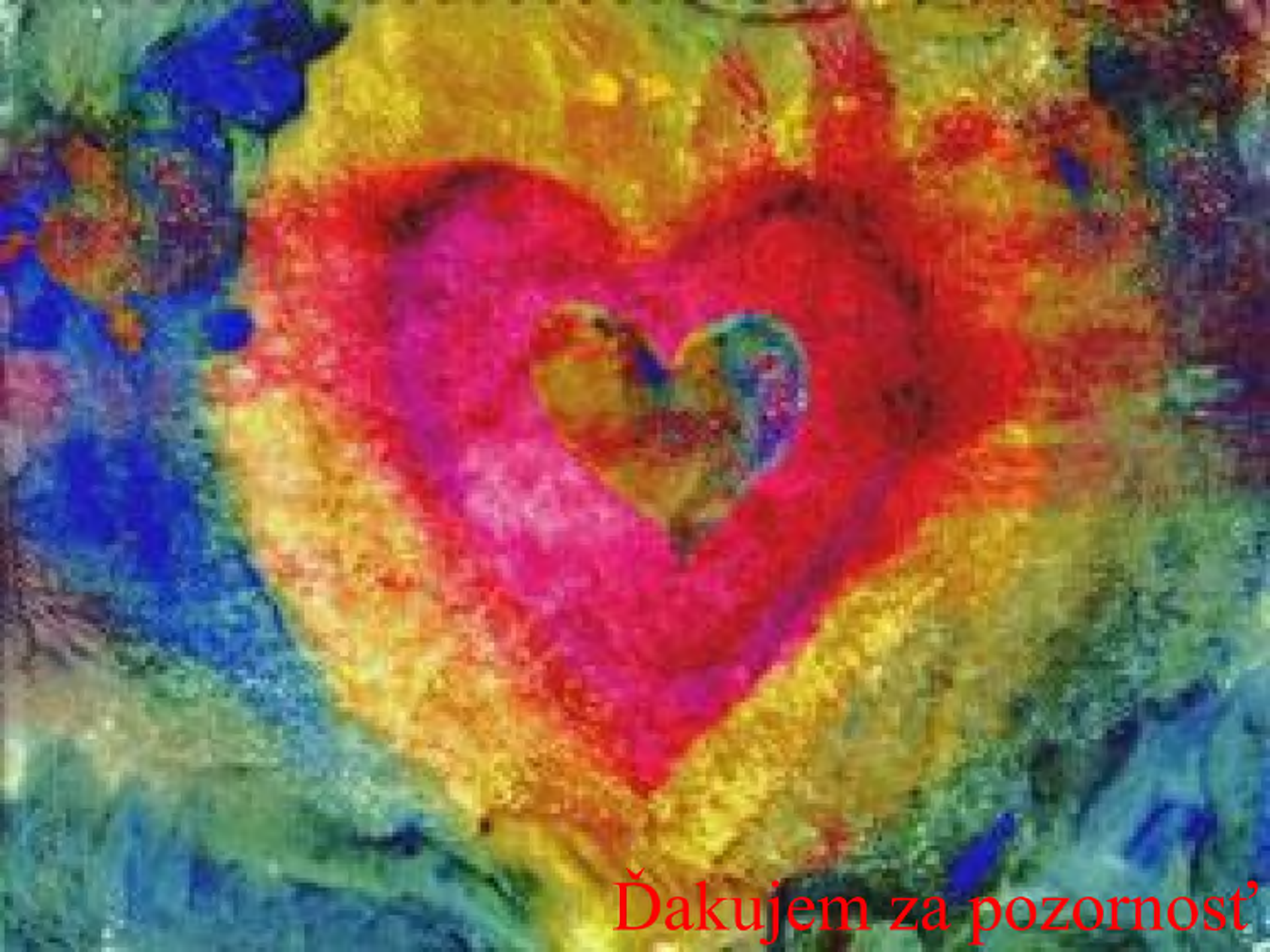
Systolický/diastolický tlak		
Druh	(mm Hg)	Stredný tlak (mm Hg)
Žirafa	260/160	219
Kôň	130/95	115
Krava	140/95	120
Sviňa	140/80	110
Ovca	140/90	114
Človek	120/70	100
Pes	120/70	100
Mačka	140/90	110
Králík	120/80	100
Morča	100/60	80
Potkan	110/70	90
Myš	110/80	100
Moriak	250/170	190
Kura	175/145	160
Kanárík	220/150	185

Krvné cievy a tlak



Blood Pressure Chart





Ďakujem za pozornosť