Maastricht UMC+

Surgical Anatomy of the liver

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Maastricht UMC+

ESCAM

Uniklinik RWTH Aachen

Disclosures

Potential conflict of interest	None	
Potentially relevant company relationships in connection with event	None	


WHY DO I HAVE TO GO FIRST?
THERE'S NO I IN TEAM
Marc
search ID: swlm13
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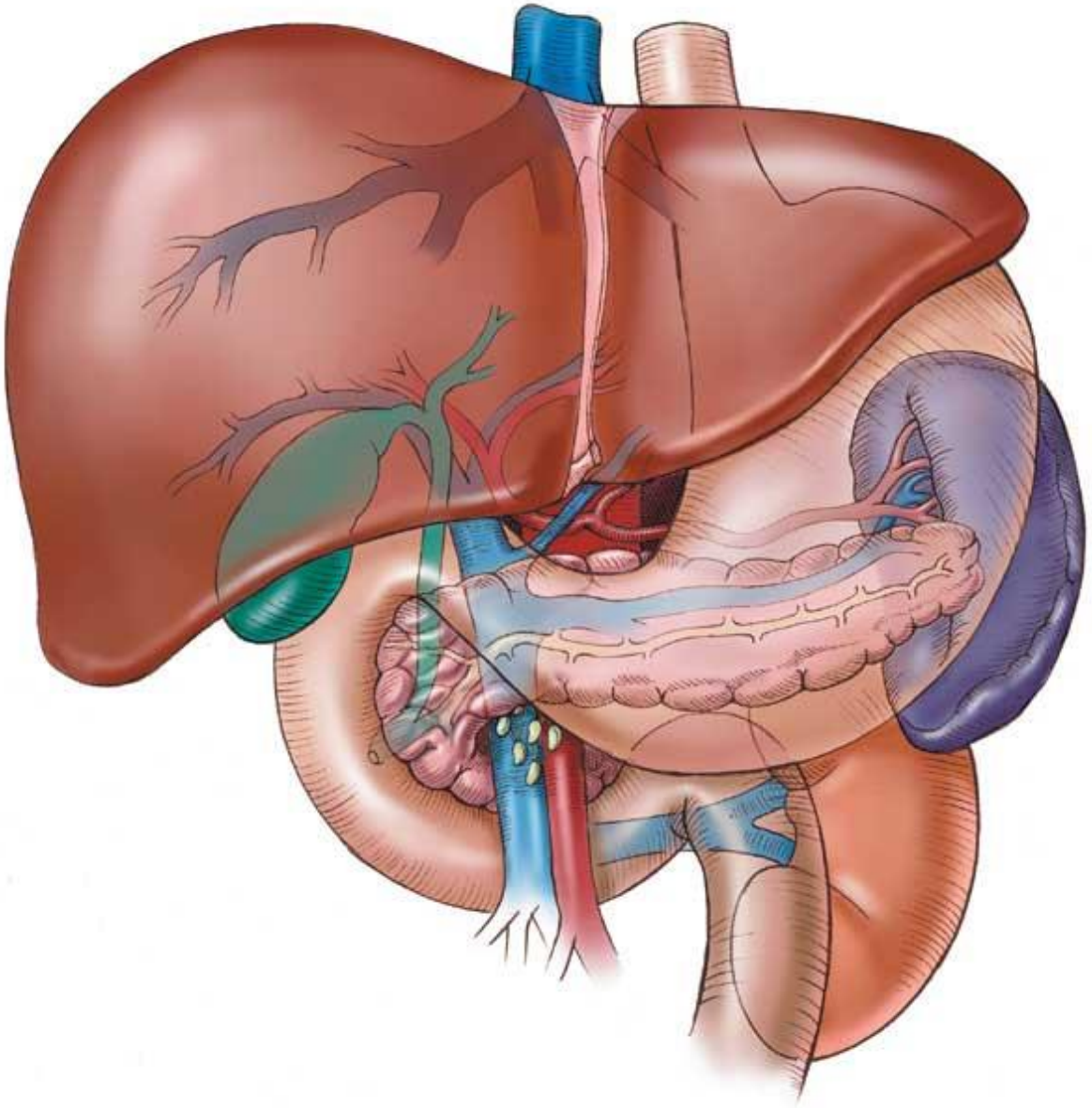
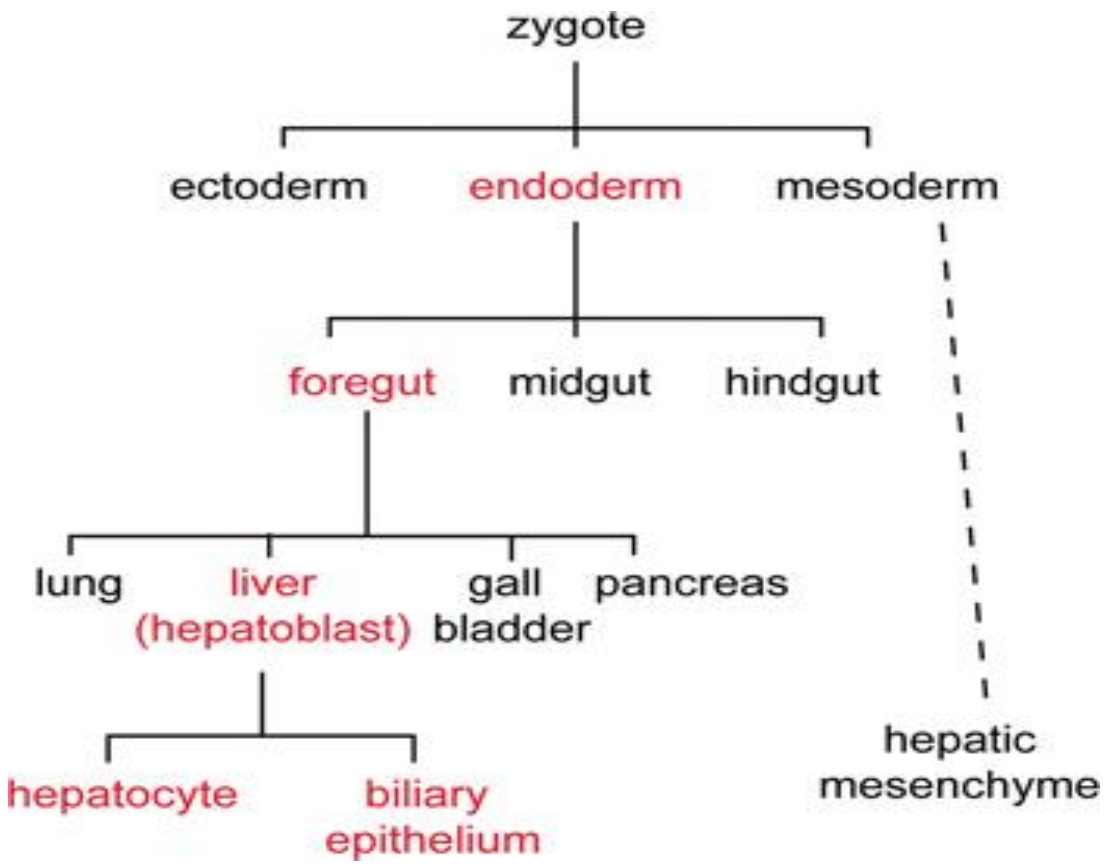
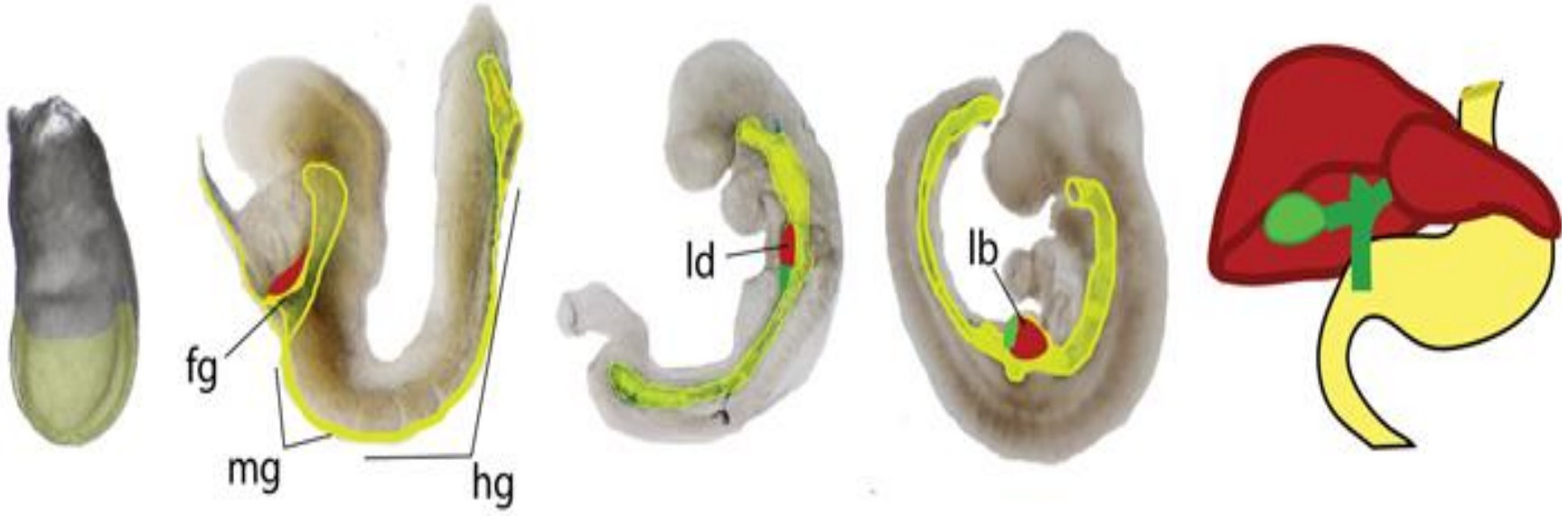
SCOTTIE



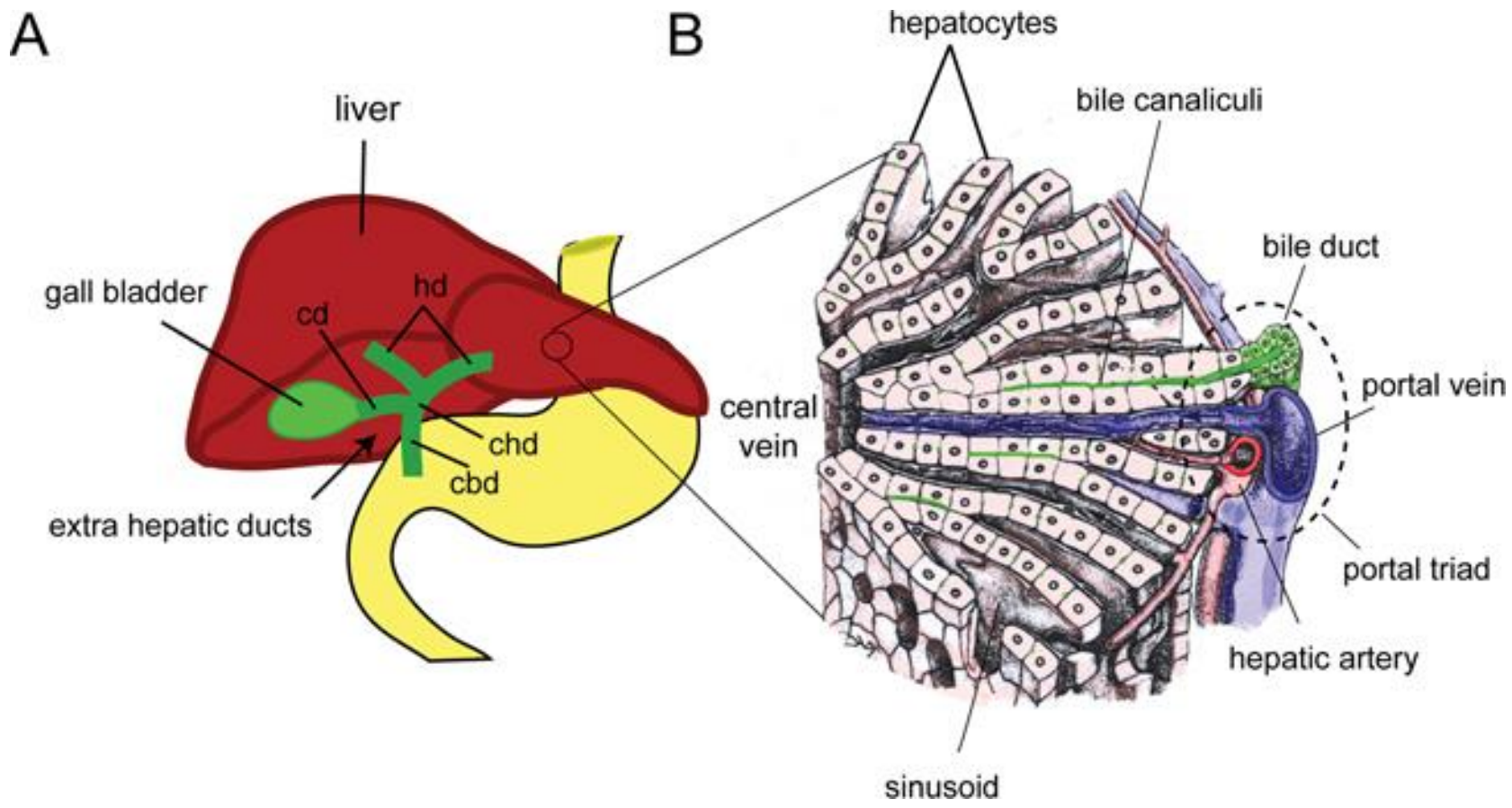
The cell lineage steps during hepatic development (red) from uncommitted endoderm to functional adult hepatocytes and biliary epithelium



Time line mouse liver development



Adult liver


A
liver
gall bladder
cd
hd
chd
cbd
extra hepatic ducts
B
hepatocytes
bile canaliculi
bile duct
central vein
portal vein
portal triad
hepatic artery
sinusoid

Galen (circa 130–200 BC) was one of the first who described the liver. He thought that the liver was five-lobed. Such opinion dominated until the 15th century.

Vesalius founder modern anatomy (1514-1564)

1st book on human anatomy Vesalius

In 1654, F. Glisson (1597–1677) studied the liver. He discussed topography of the intrahepatic vessels and surrounding connective tissue. Even today this is referred to as Glisson’s capsule and the triad (portal vein, biliary duct and hepatic artery) is called portal pedicle or Glisson’s pedicle

Francois Glisson

1597-1677

N. A. Goldsmith and R. T. Woodburne supported division of the liver into four segments, each having two subsegments with second order of portal vein branches (1957)

C. Couinaud suggested that the liver should be divided into eight segments, based on third order portal vein distribution

(1957)

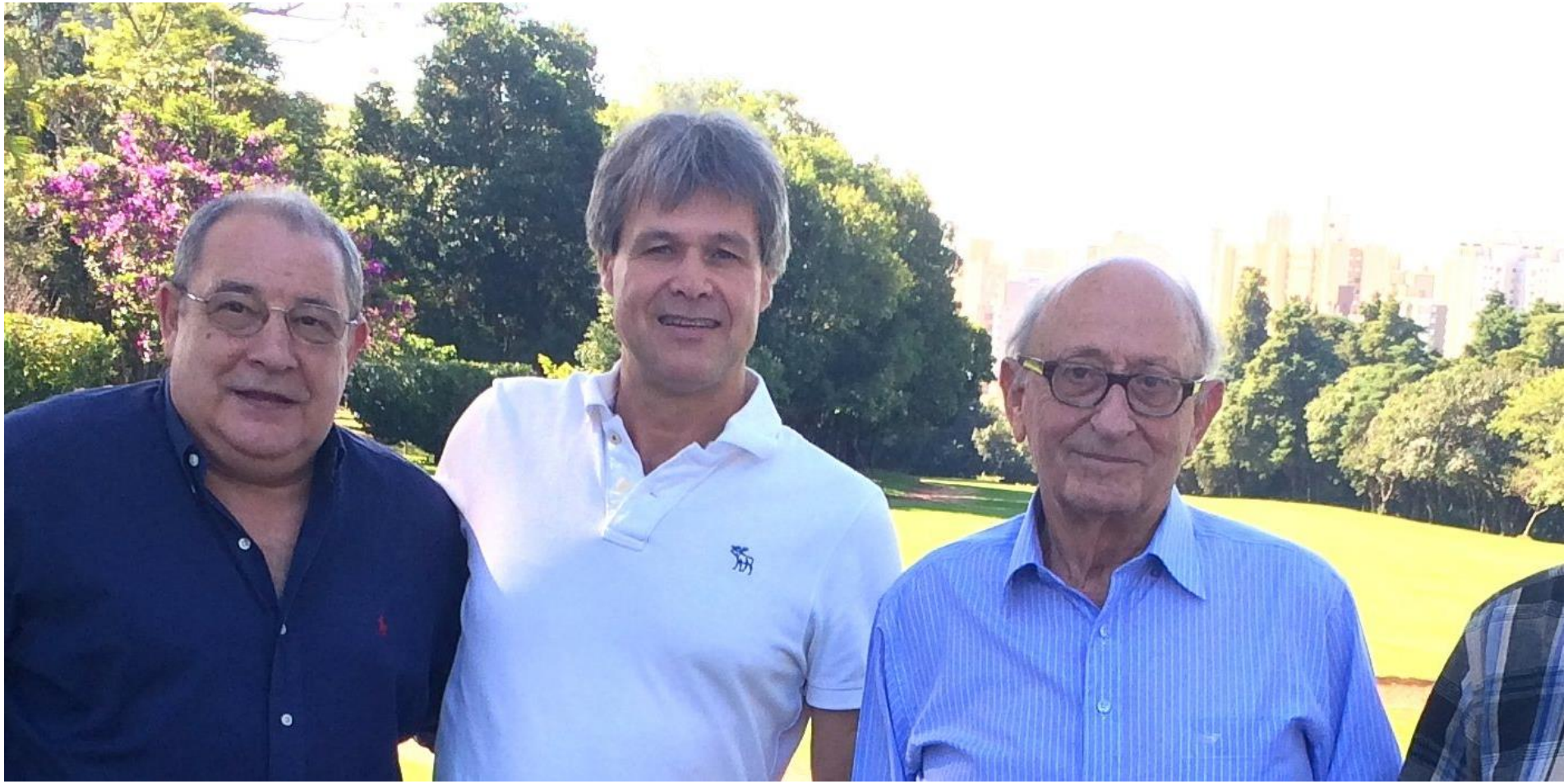
Claude Couinaud

A good knowledge of the anatomy is a prerequisite for modern surgery of the liver.”

H. Bismuth

Henri Bismuth

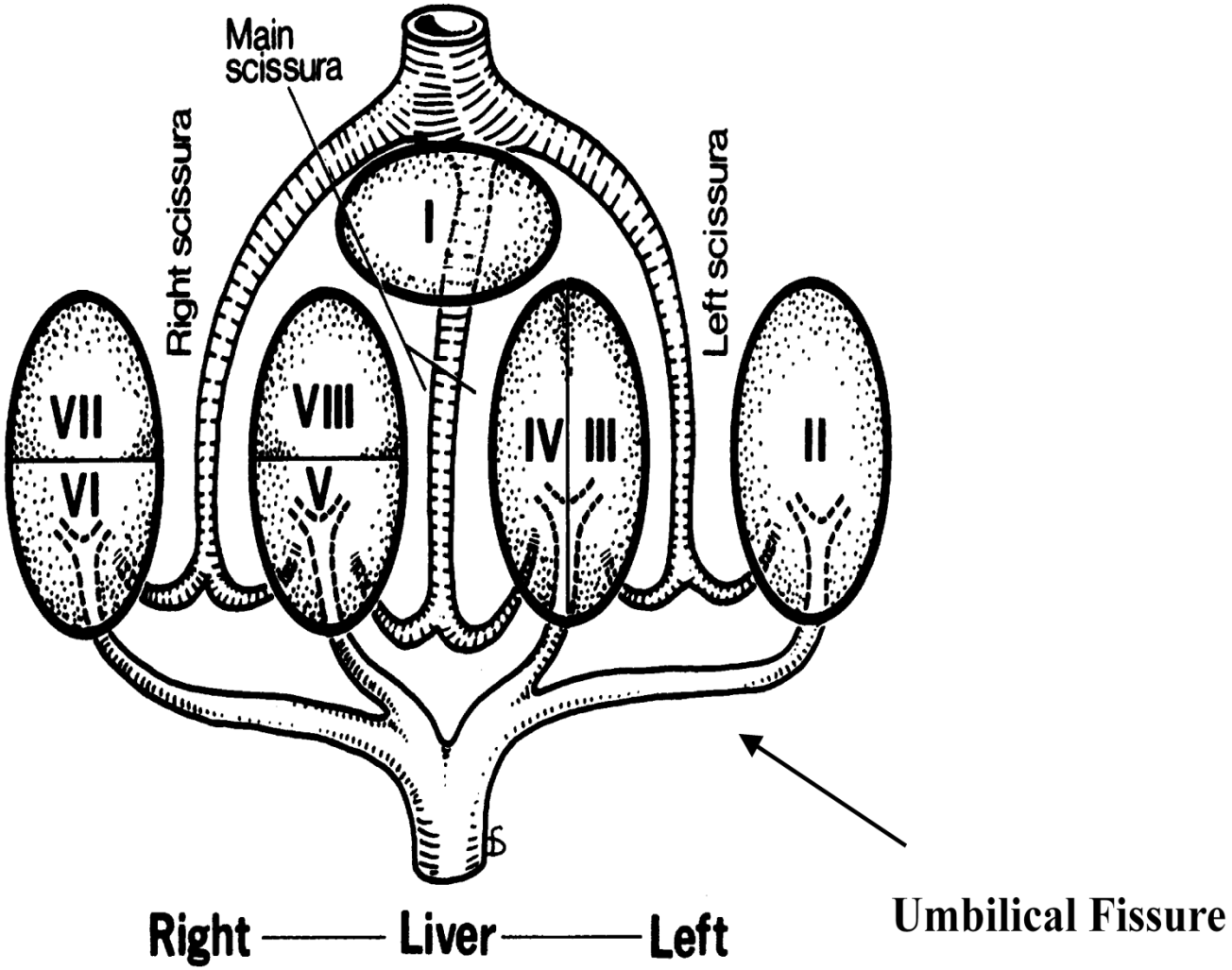
Porto Allegre Brasil 2016



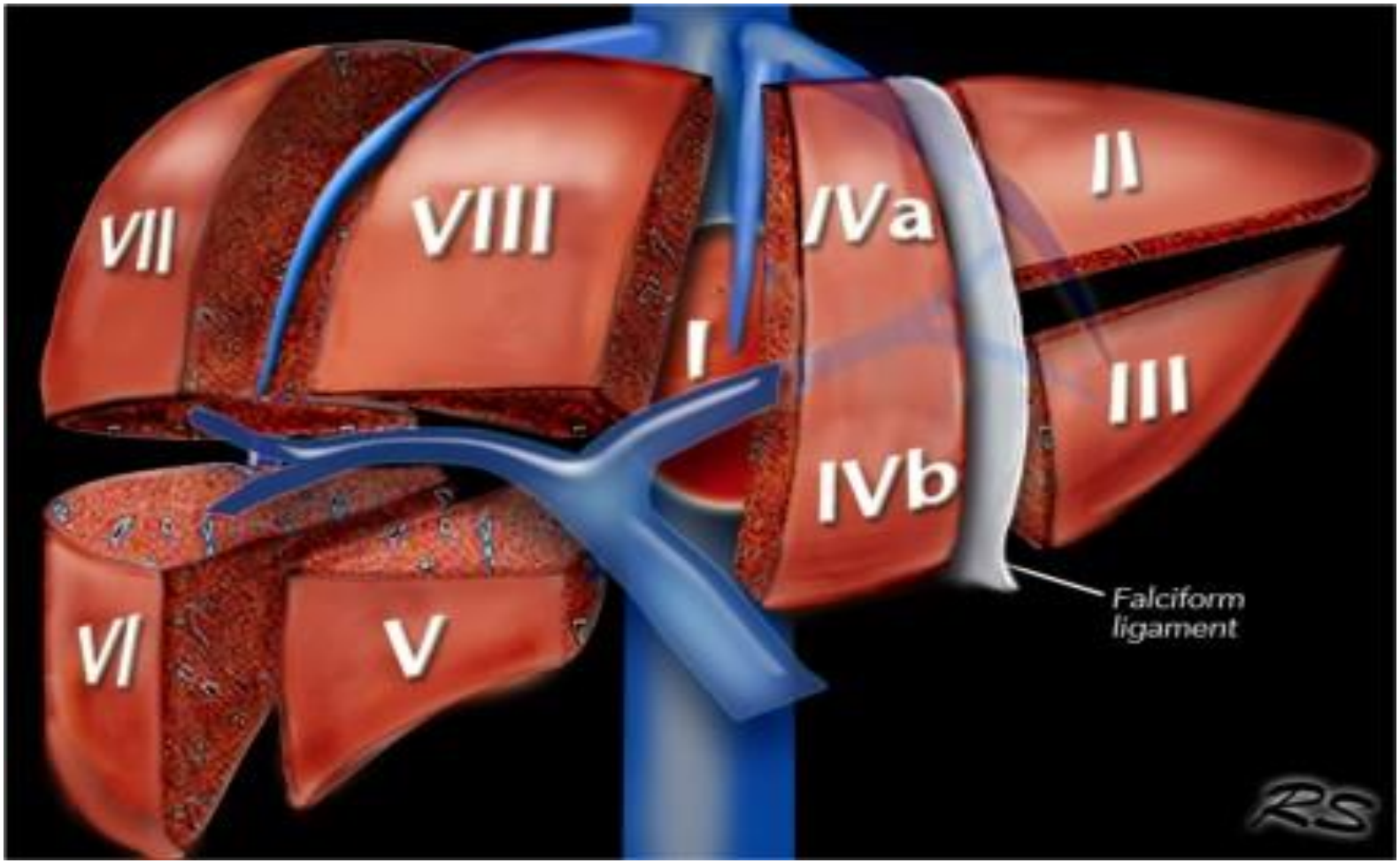
Bismuth's classification. H. Bismuth brought together the Couinaud's cadaveric system *in situ* and the system of Goldsmith and Woodburn *in vivo*

He distinguished three planes (scissurae), hosting the hepatic veins and a transverse plane passing through the right and left portal branches. Additionally, H. Bismuth described the caudate lobe as a separate segment I.

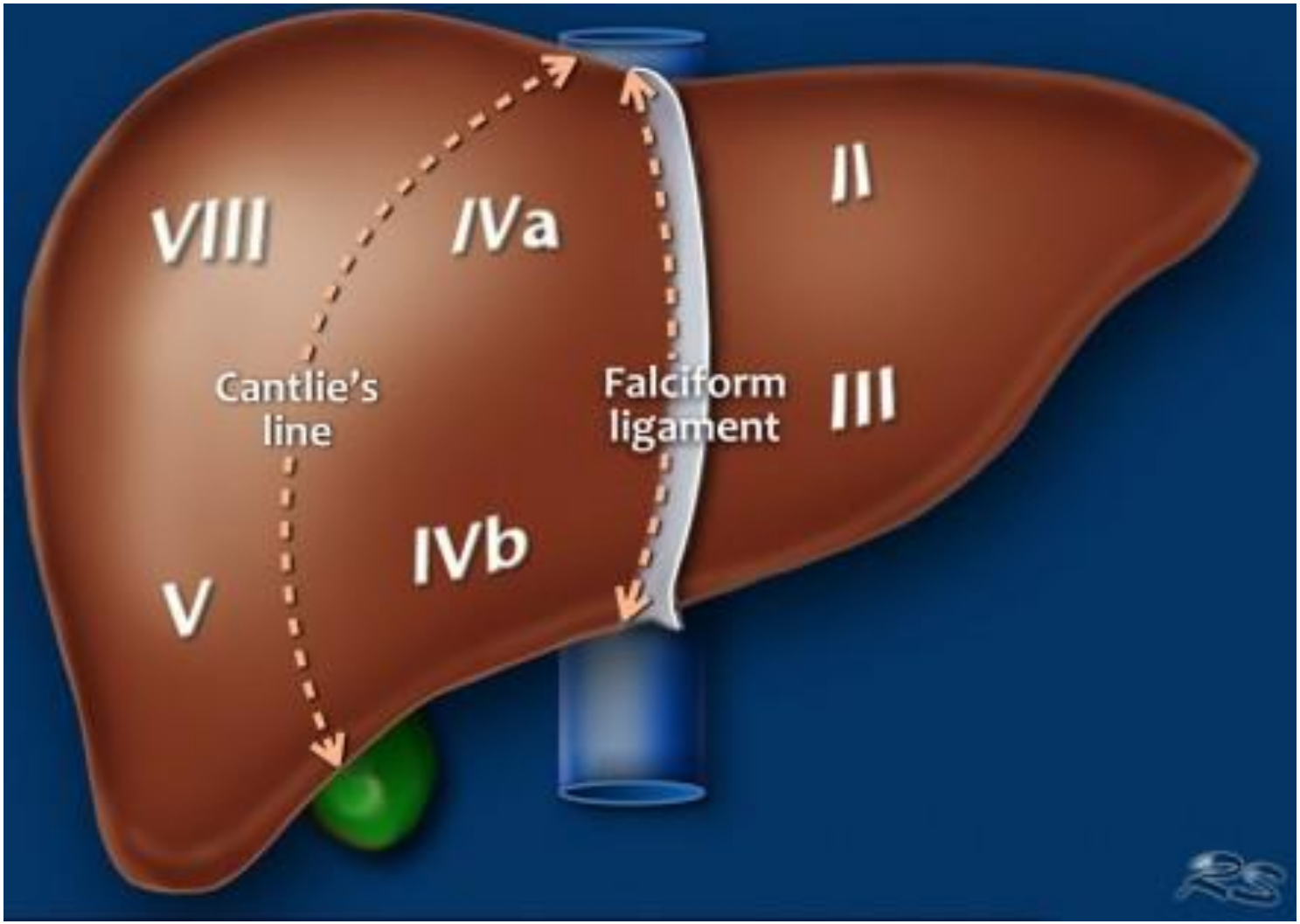
Anatomy according to Bismuth



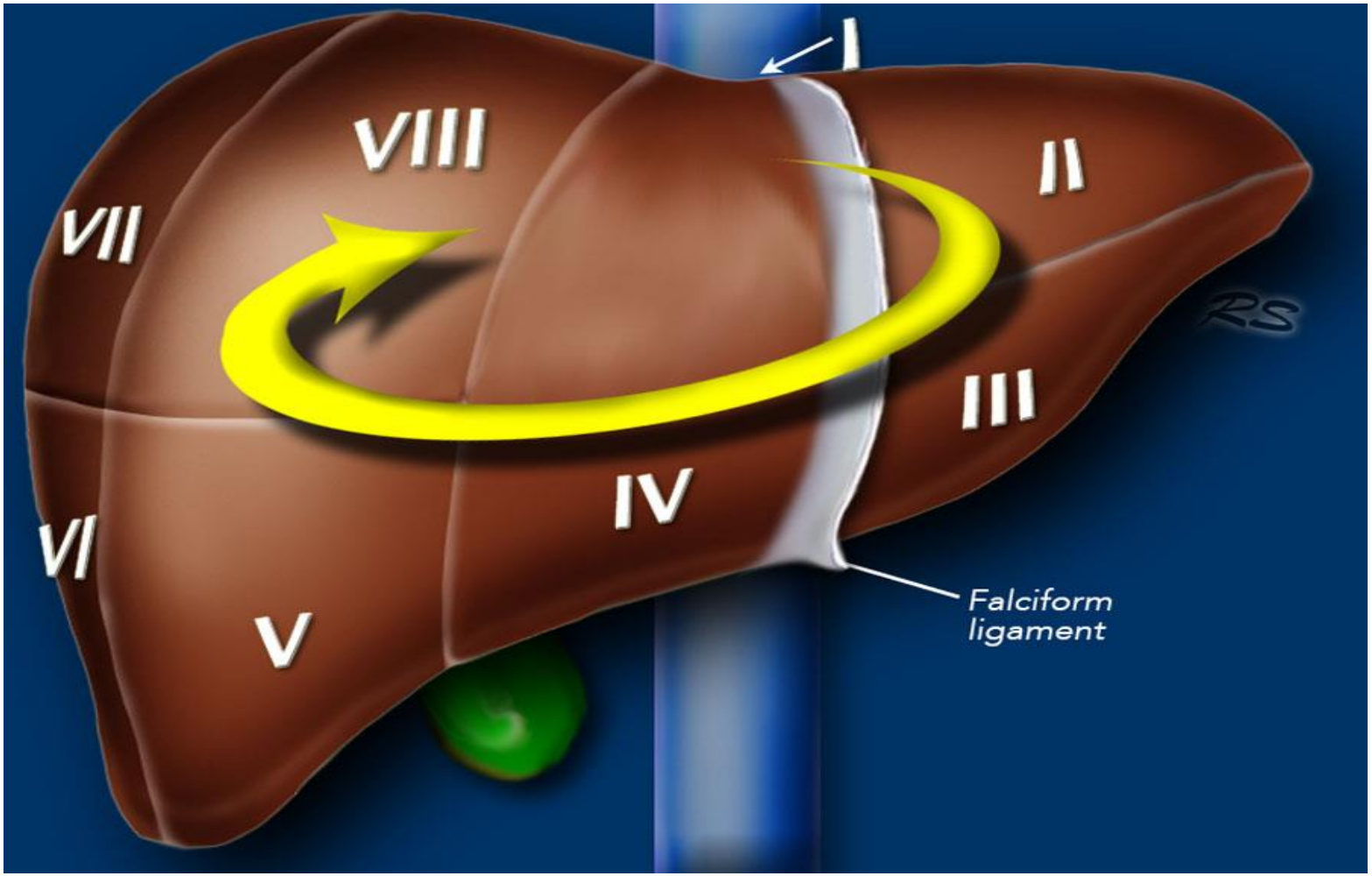
Anatomy 1



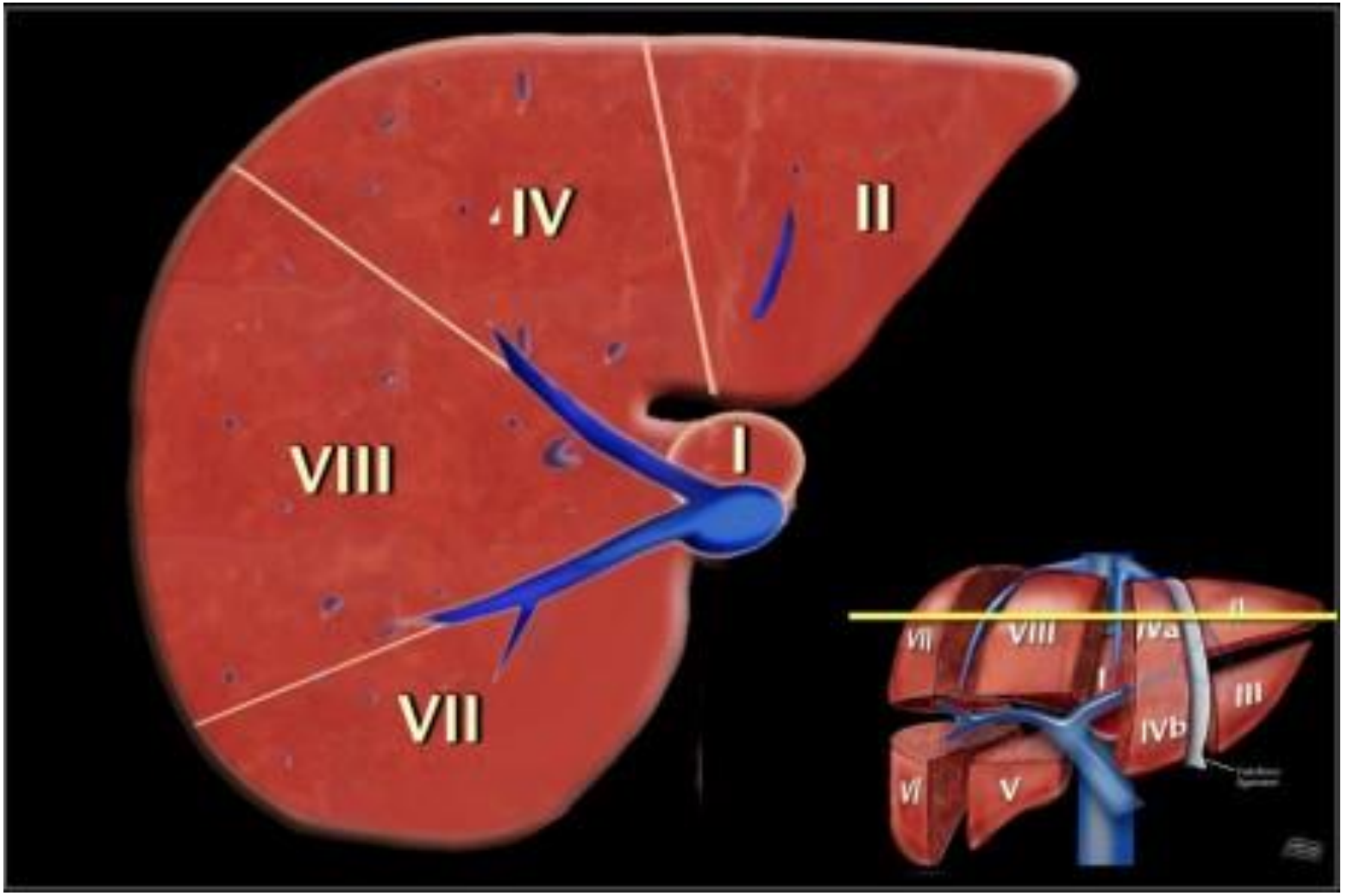
Anatomy 2



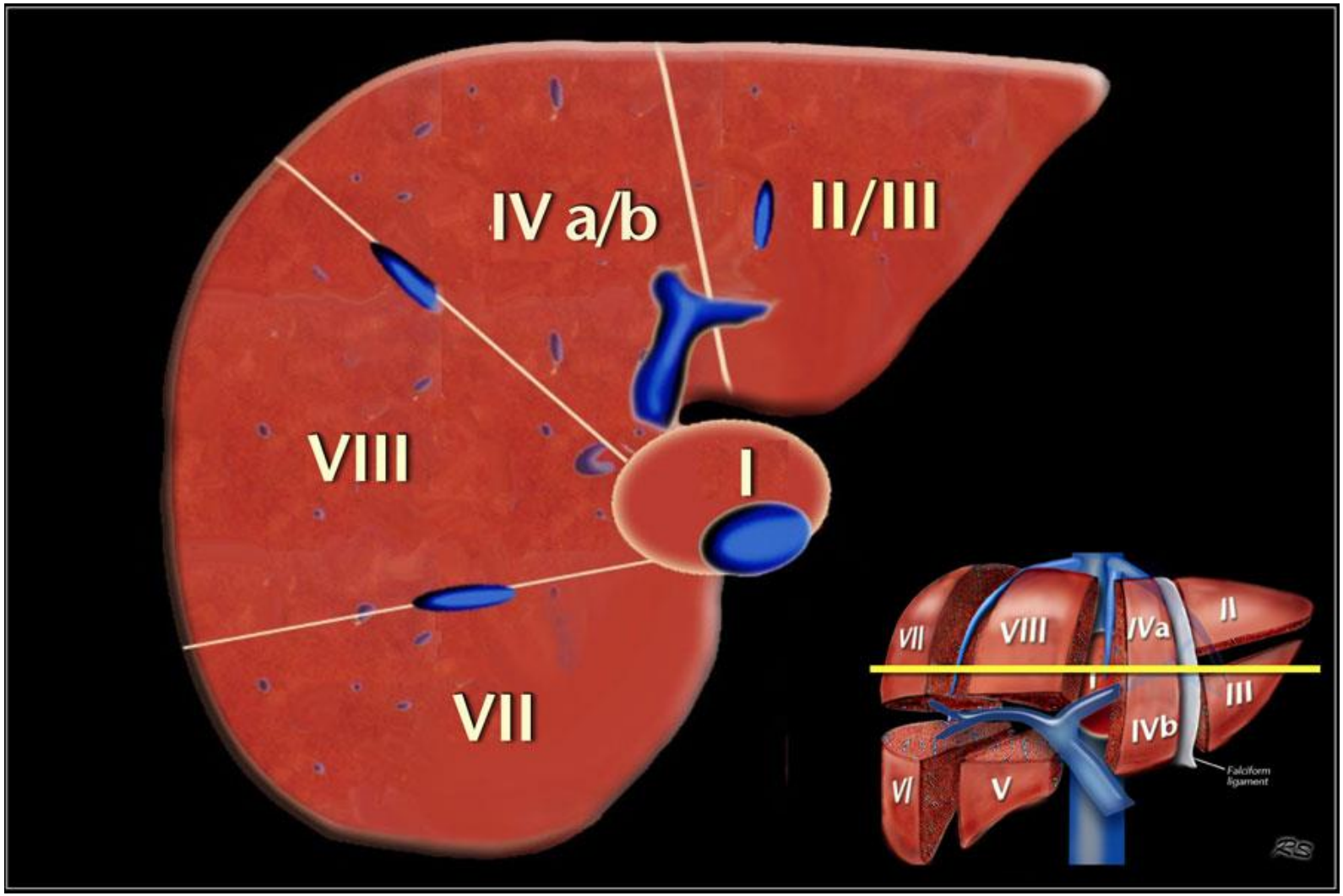
Anatomy 3



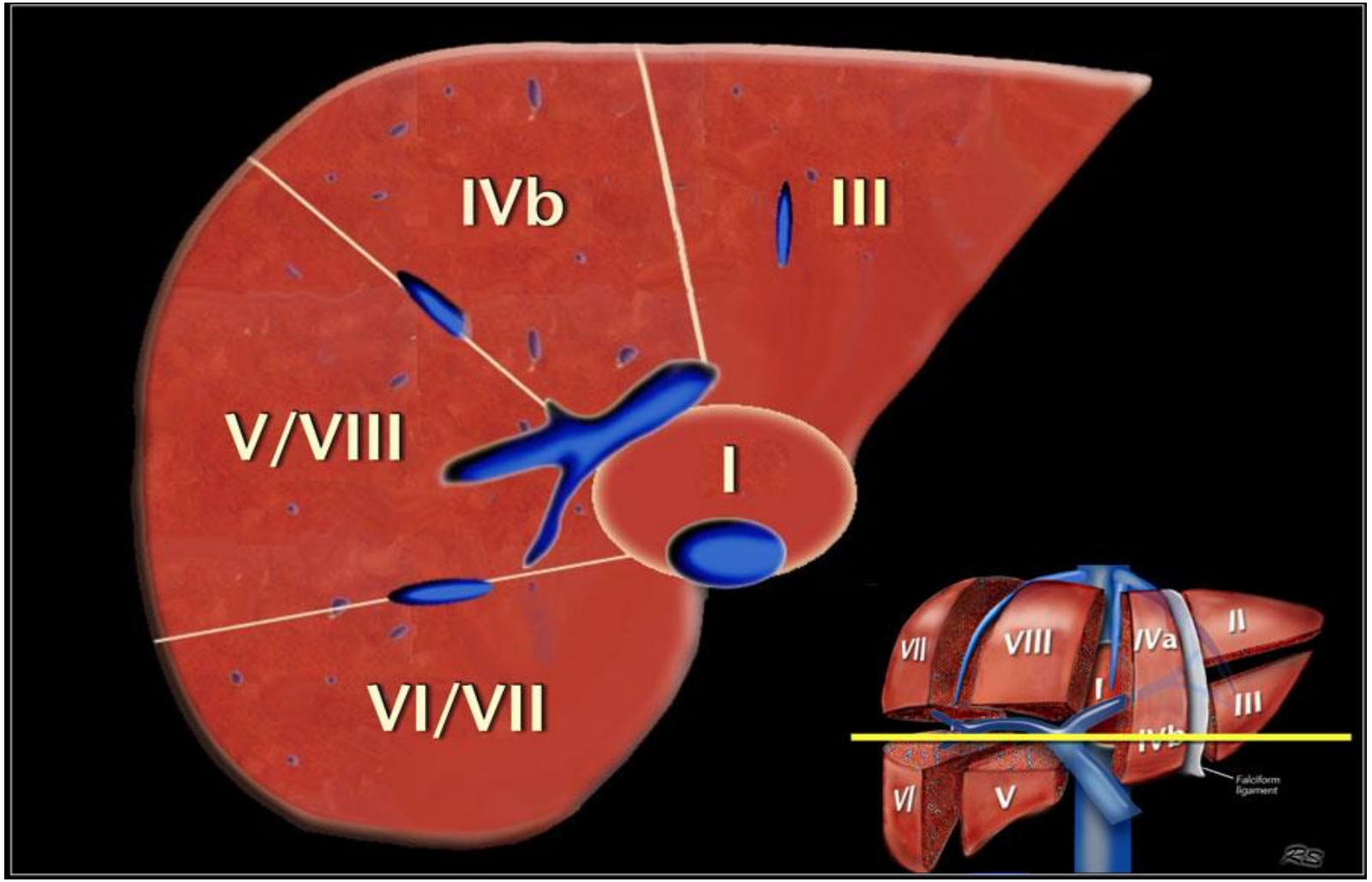
Anatomy 4



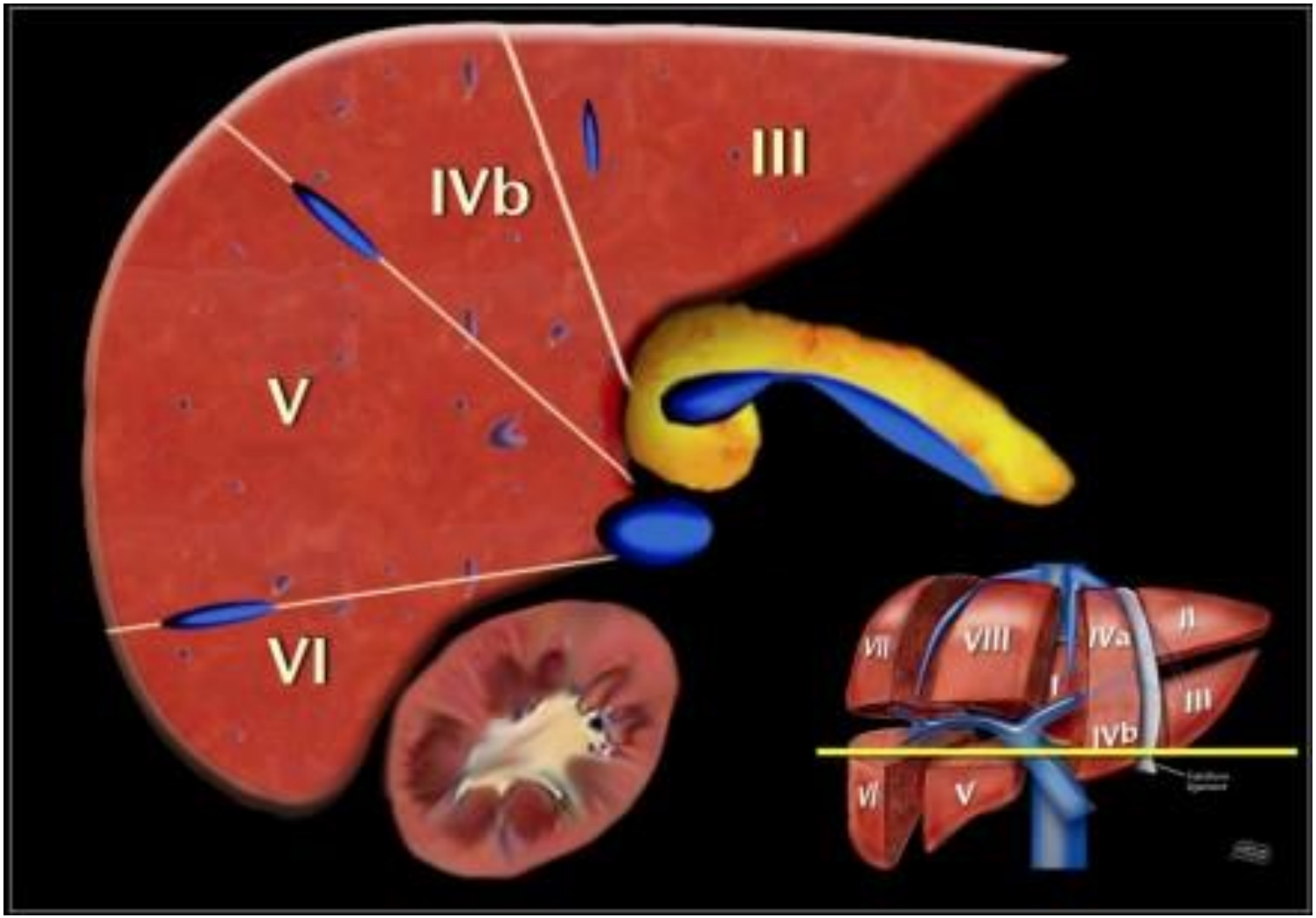
Anatomy 5


IV a/b
II/III
VIII
I
VII
VII
VIII
IVa
II
III
IVb
VI
V
Falciform ligament

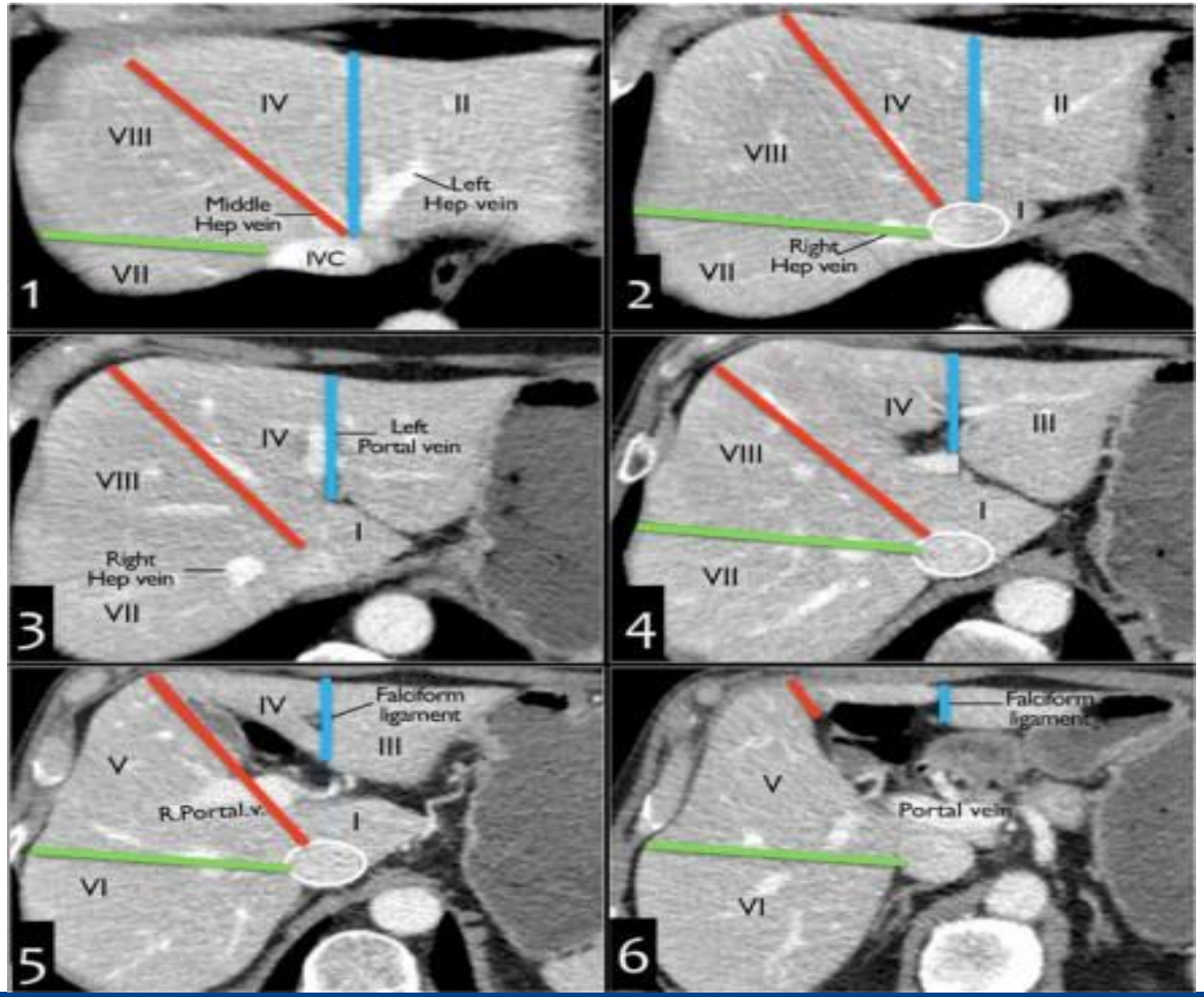
Anatomy 6


IVb
III
V/VIII
I
VI/VII
VII
VIII
IVa
II
III
I
IVb
VI
V
Falciform ligament

Anatomy 7



Anatomy 9


1
VIII
IV
II
Middle Hep vein
Left Hep vein
IVC
VII
2
VIII
IV
II
I
Right Hep vein
VII
3
VIII
IV
Left Portal vein
I
Right Hep vein
VII
4
VIII
IV
III
I
VII
5
V
IV
Falciform ligament
III
R.Portal.v.
I
VI
6
V
Falciform ligament
Portal vein
VI

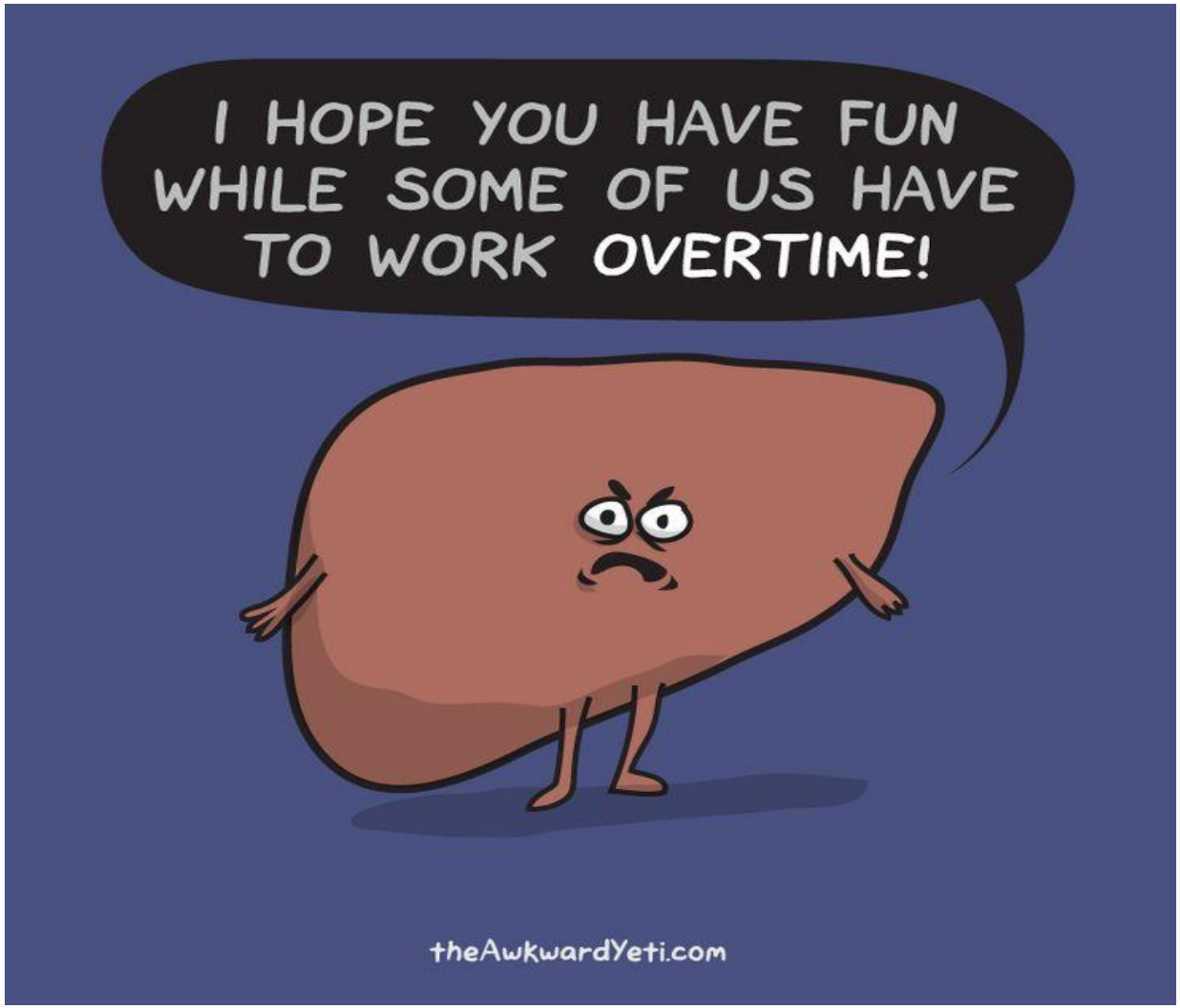
VIDEO???

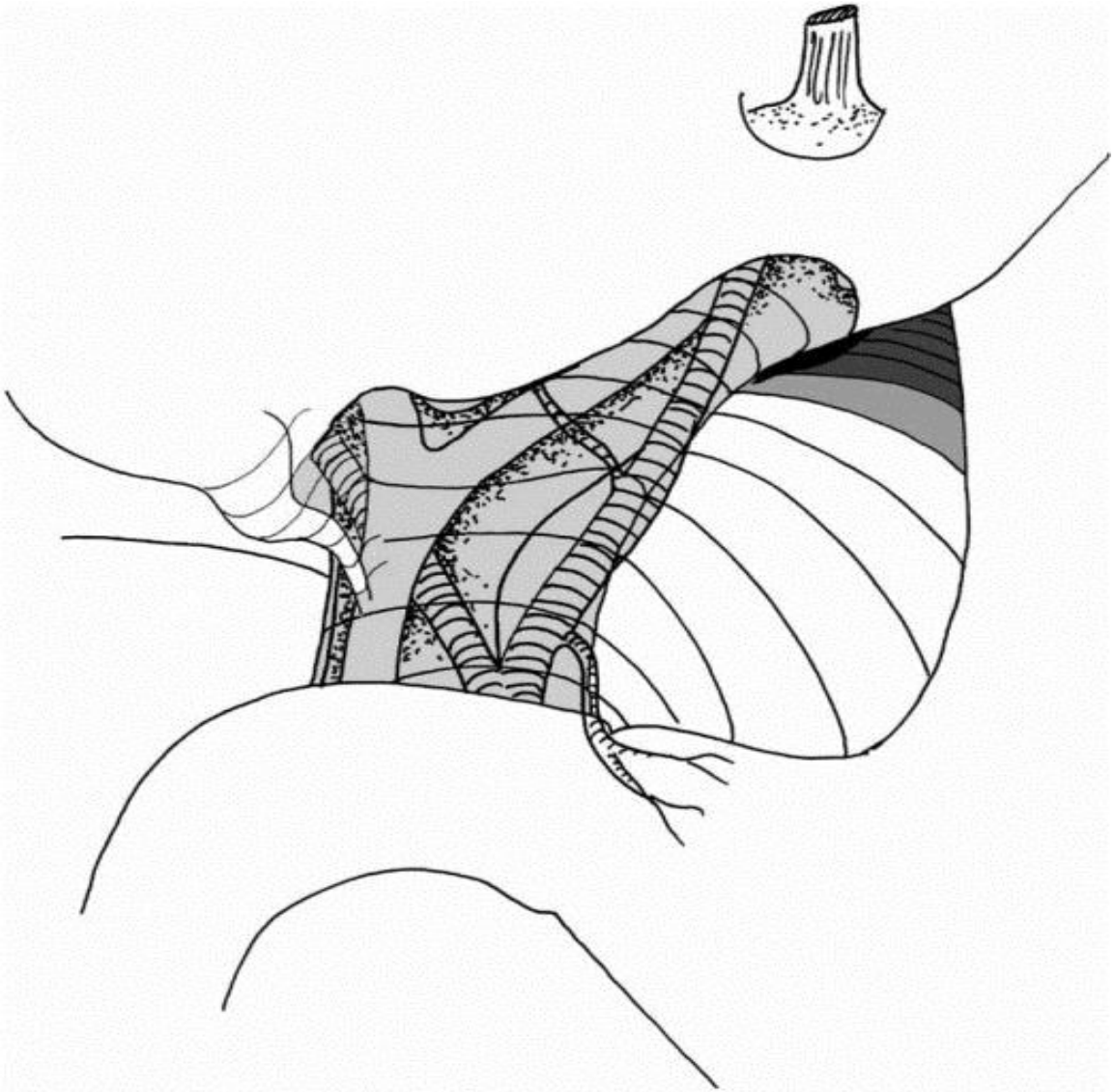
anatomy video.m4v

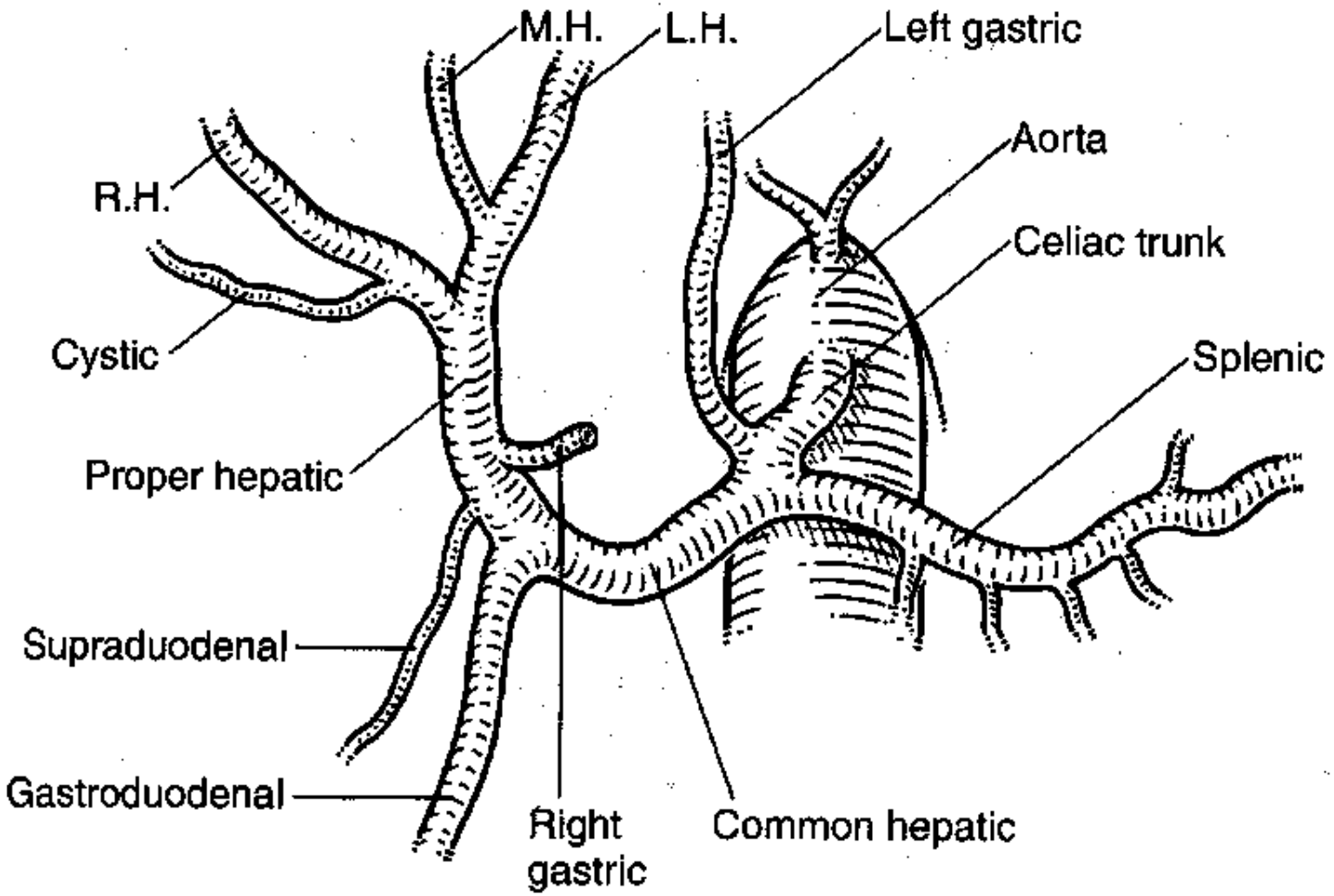
Cirrhosis

Anatomy 10

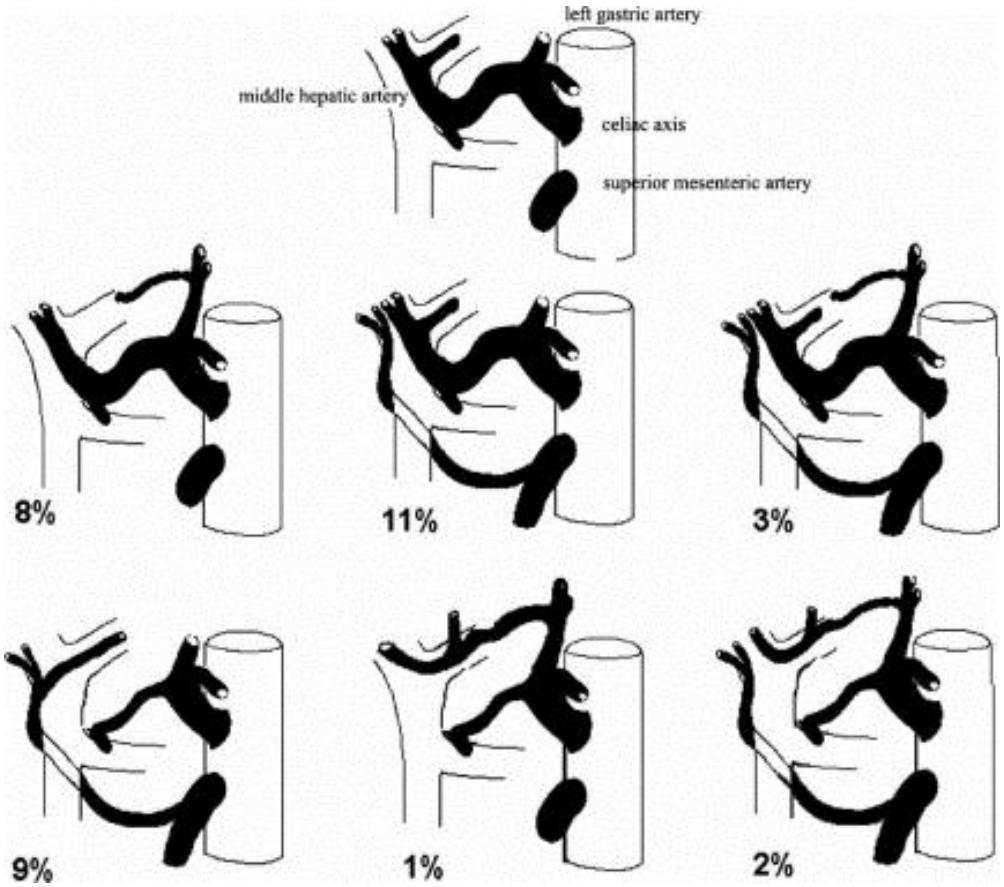
No comment

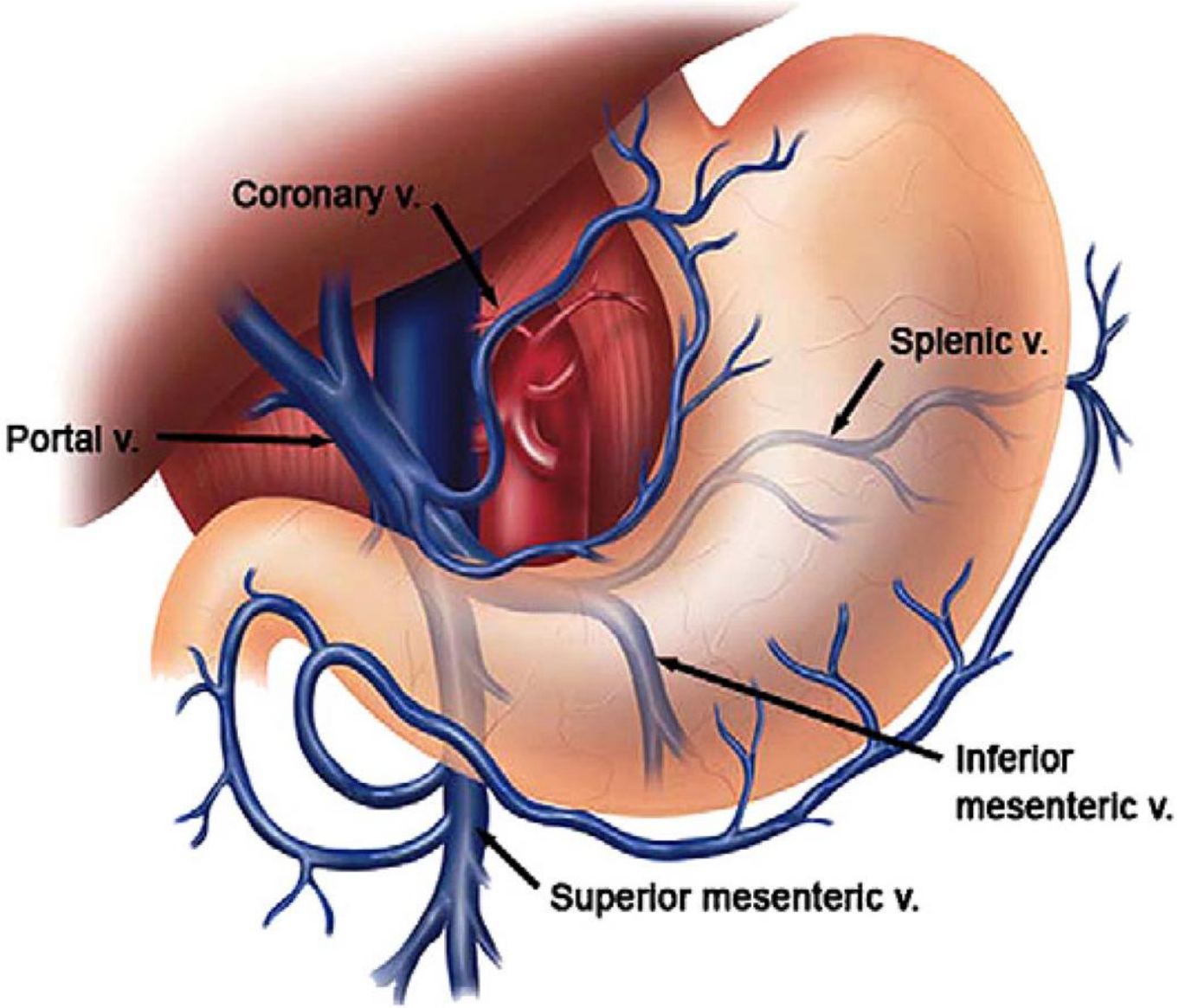

I HOPE YOU HAVE FUN WHILE SOME OF US HAVE TO WORK OVERTIME!
theAwkwardYeti.com



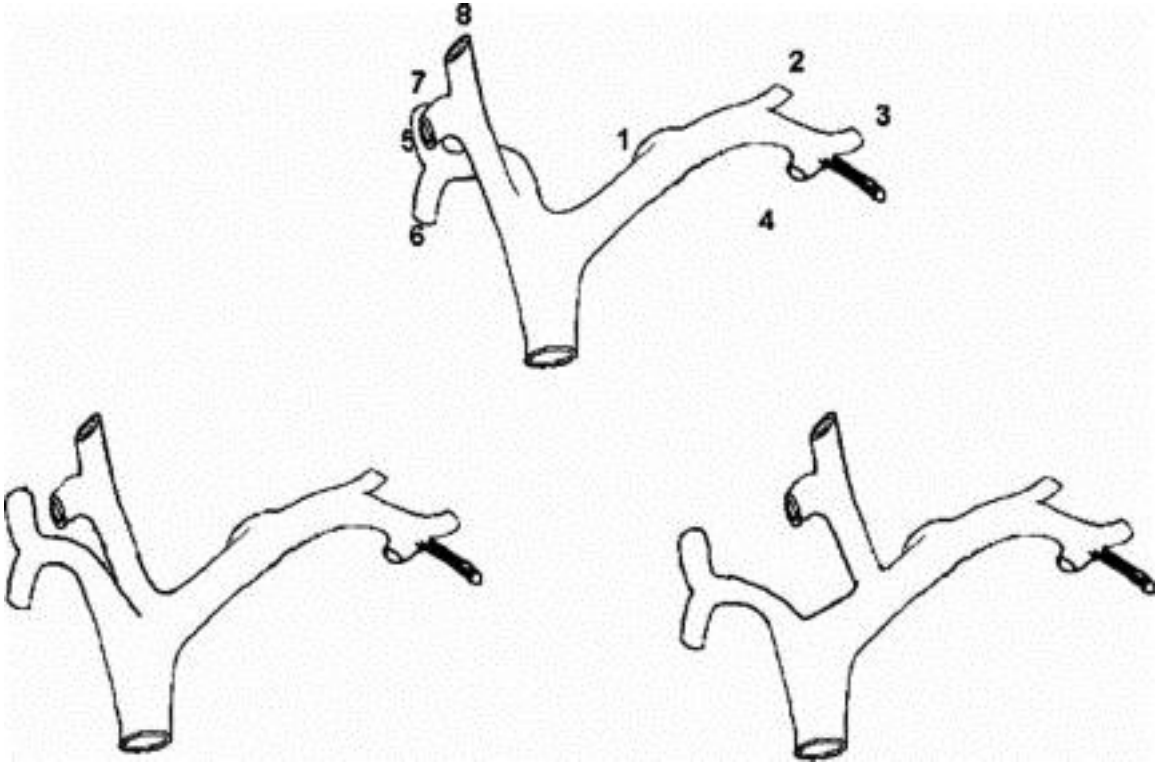

M.H.
L.H.
Left gastric
Aorta
R.H.
Celiac trunk
Cystic
Splenic
Proper hepatic
Supraduodenal
Gastroduodenal
Right gastric
Common hepatic

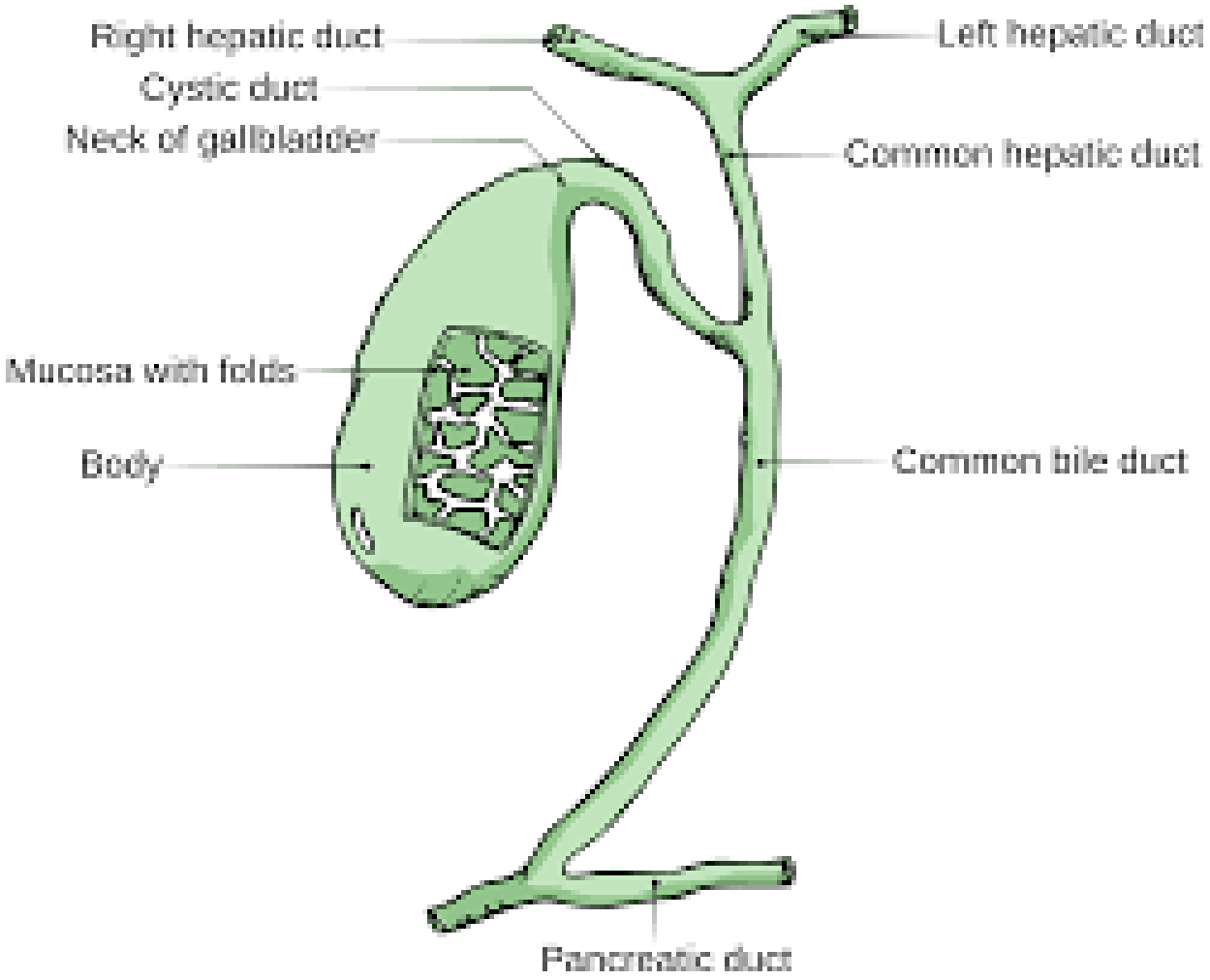
Arterial anatomy



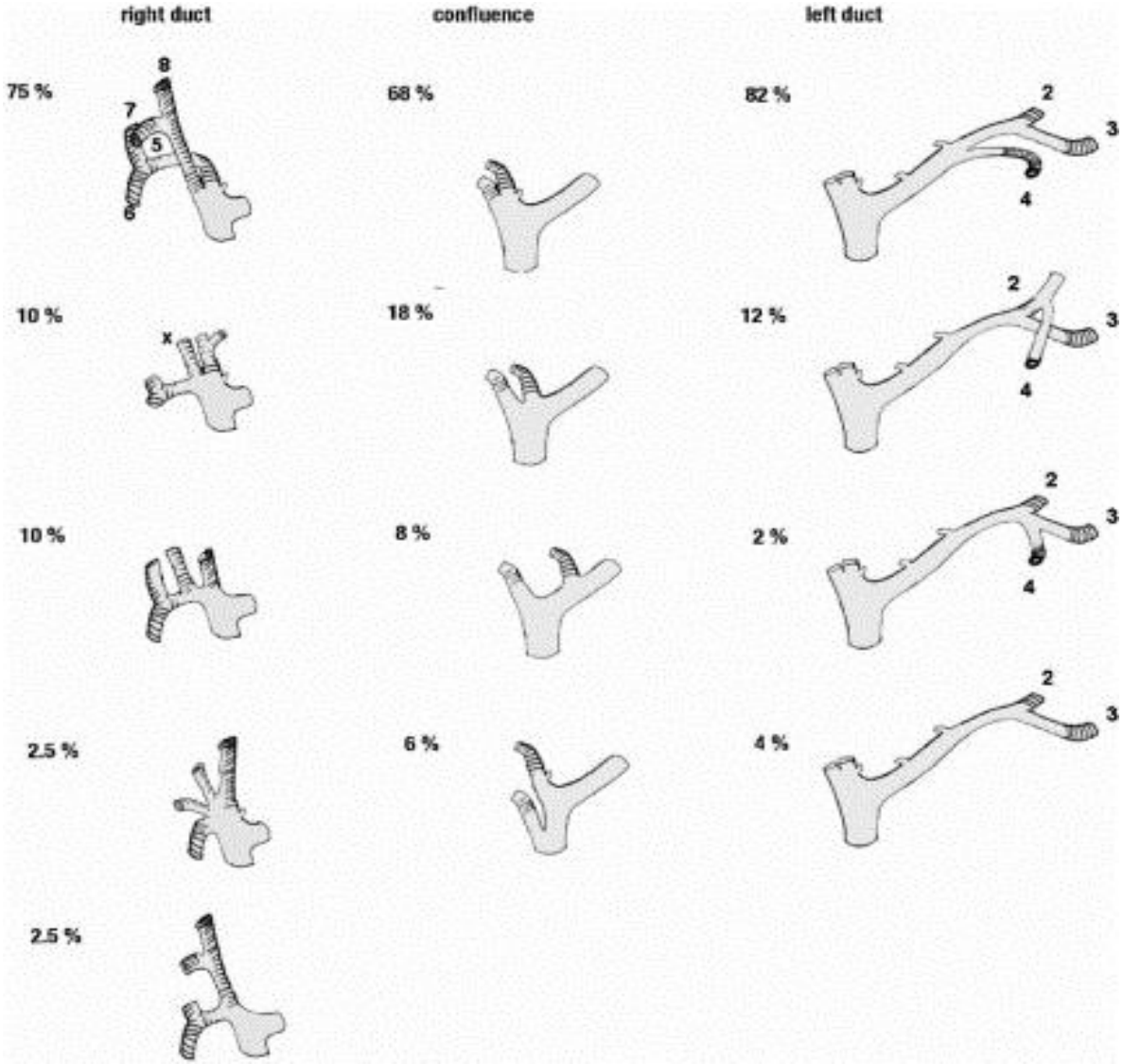

Coronary v.
Splenic v.
Portal v.
Inferior
mesenteric v.
Superior mesenteric v.

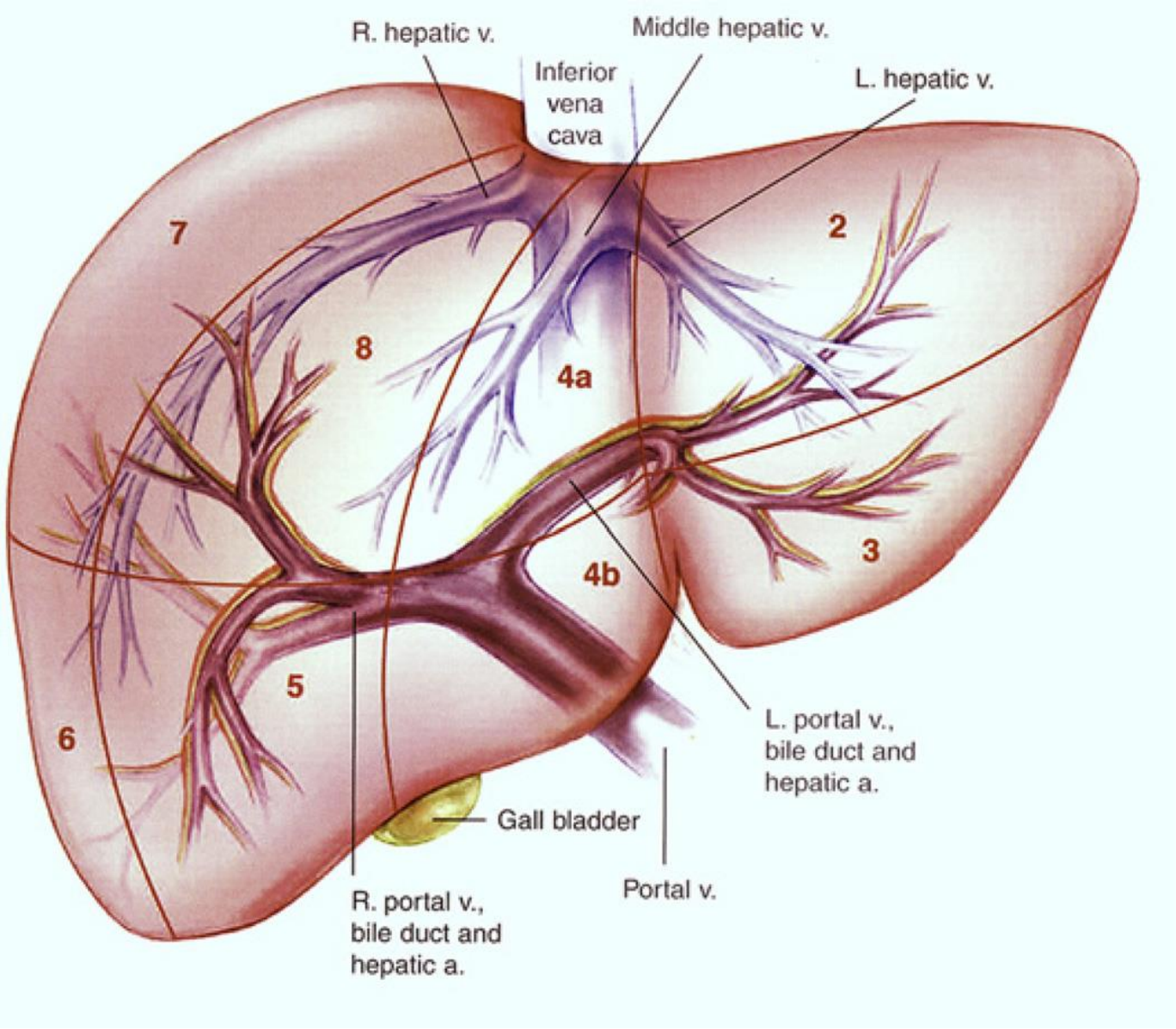
Portal Anatomy

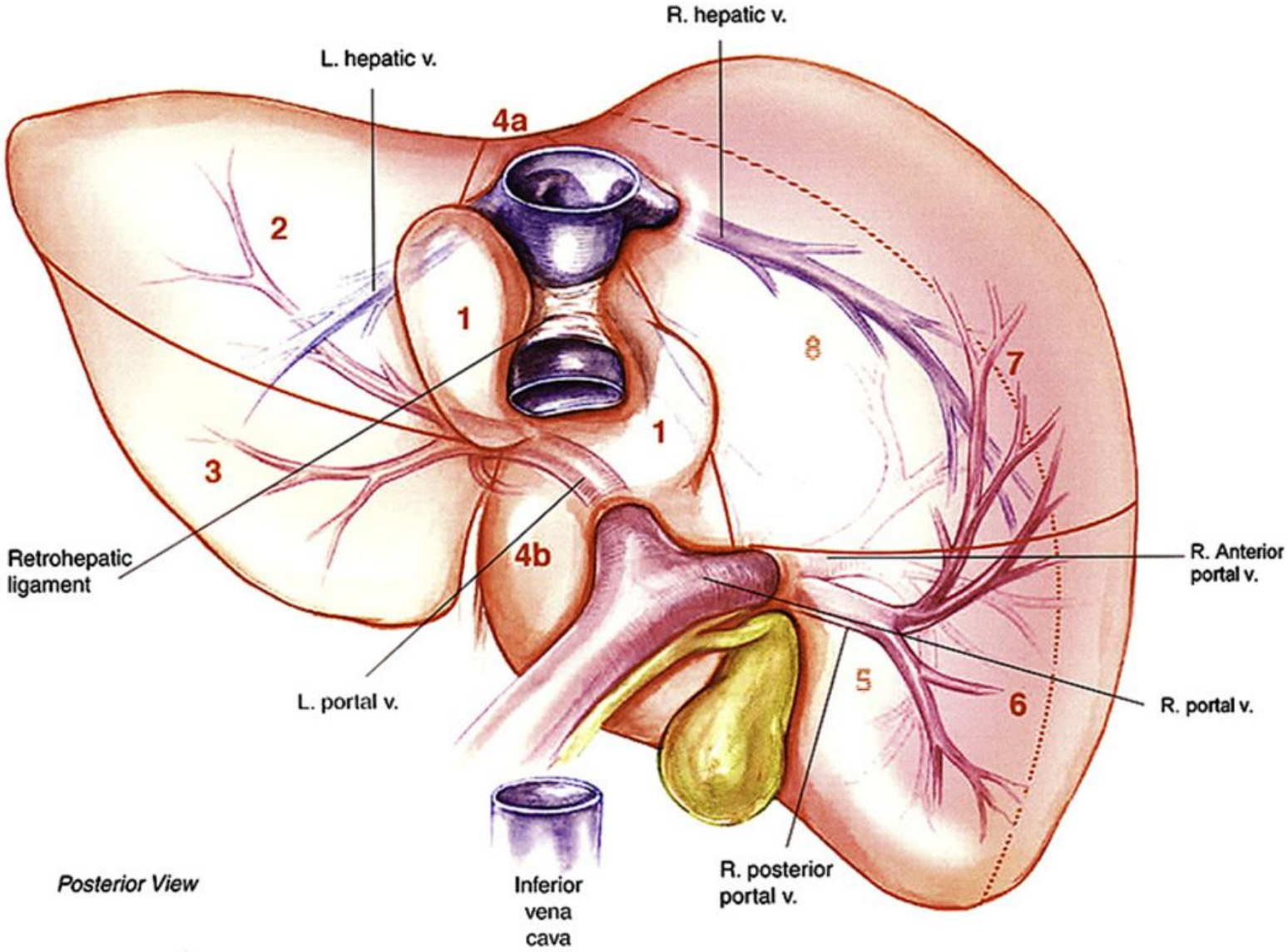



Right hepatic duct
Cystic duct
Neck of gallbladder
Mucosa with folds
Body
Left hepatic duct
Common hepatic duct
Common bile duct
Pancreatic duct

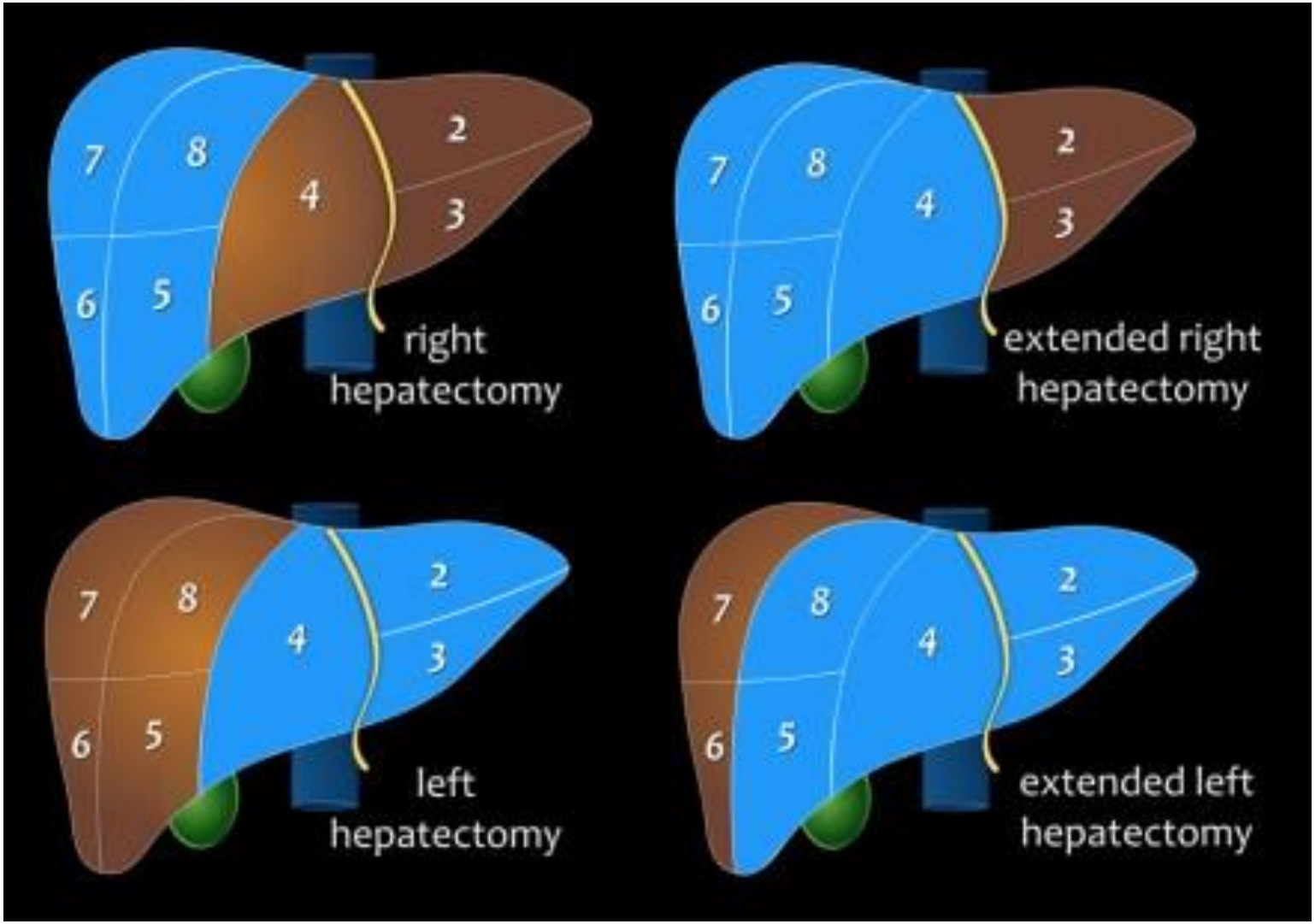
Biliary Anatomy



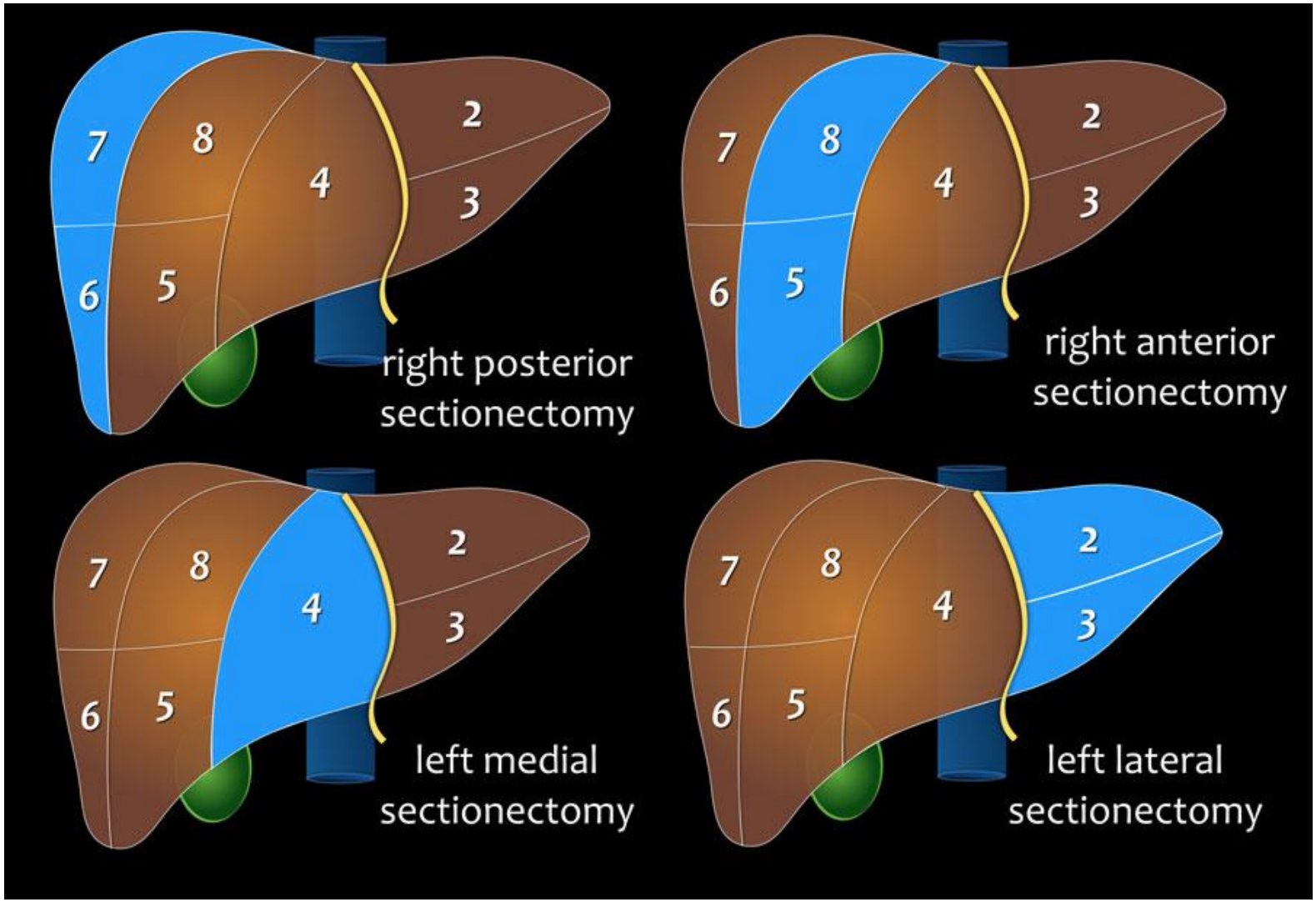

R. hepatic v.
Middle hepatic v.
Inferior vena cava
L. hepatic v.
7
2
8
4a
4b
3
5
6
L. portal v., bile duct and hepatic a.
Gall bladder
Portal v.
R. portal v., bile duct and hepatic a.


R. hepatic v.
L. hepatic v.
4a
2
1
8
7
1
3
4b
Retrohepatic ligament
R. Anterior portal v.
L. portal v.
5
6
R. portal v.
Posterior View
Inferior vena cava
R. posterior portal v.

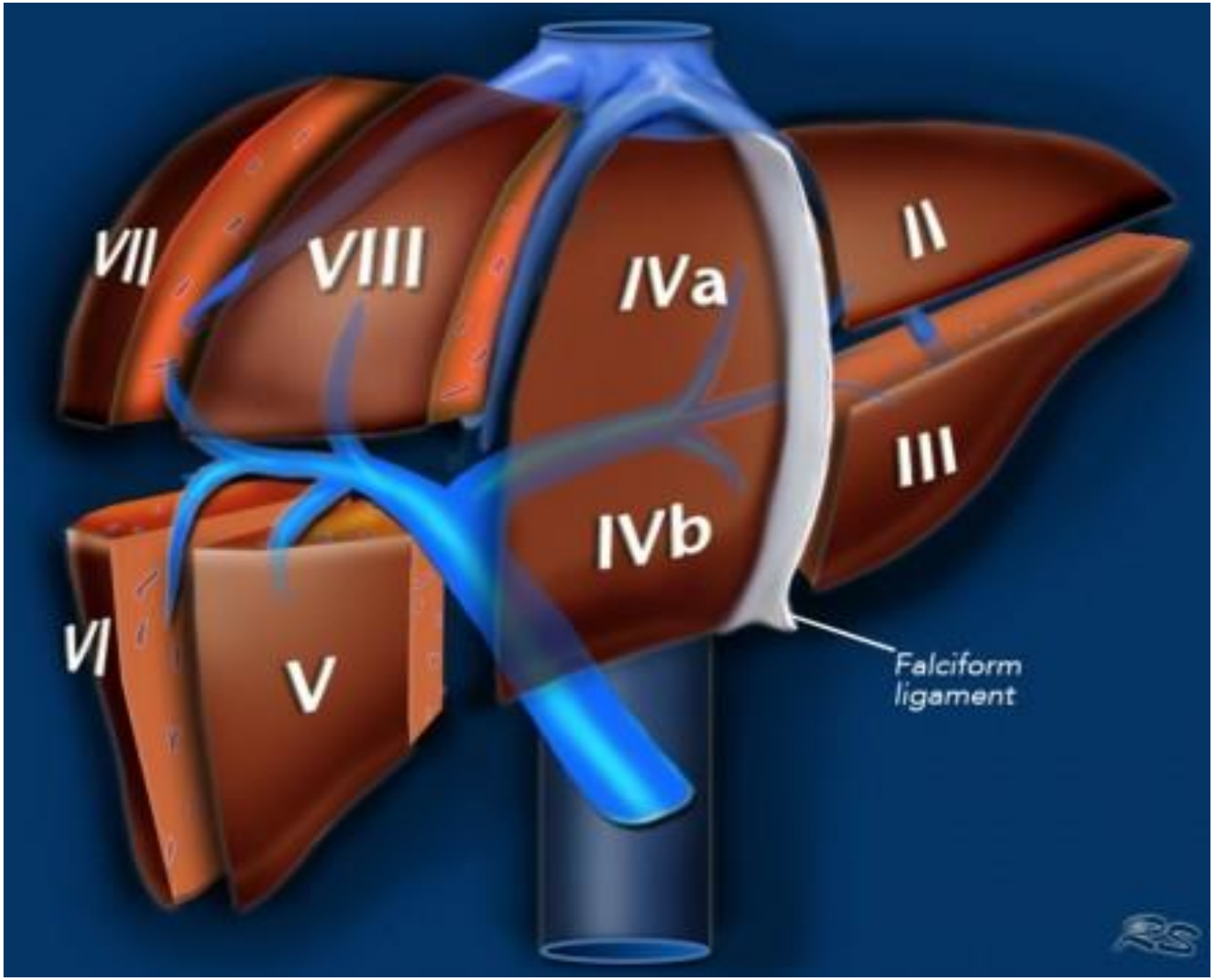
Anatomy 11


7
8
4
2
3
6
5
right
hepatectomy
7
8
4
2
3
6
5
extended right
hepatectomy
7
8
4
2
3
6
5
left
hepatectomy
7
8
4
2
3
6
5
extended left
hepatectomy

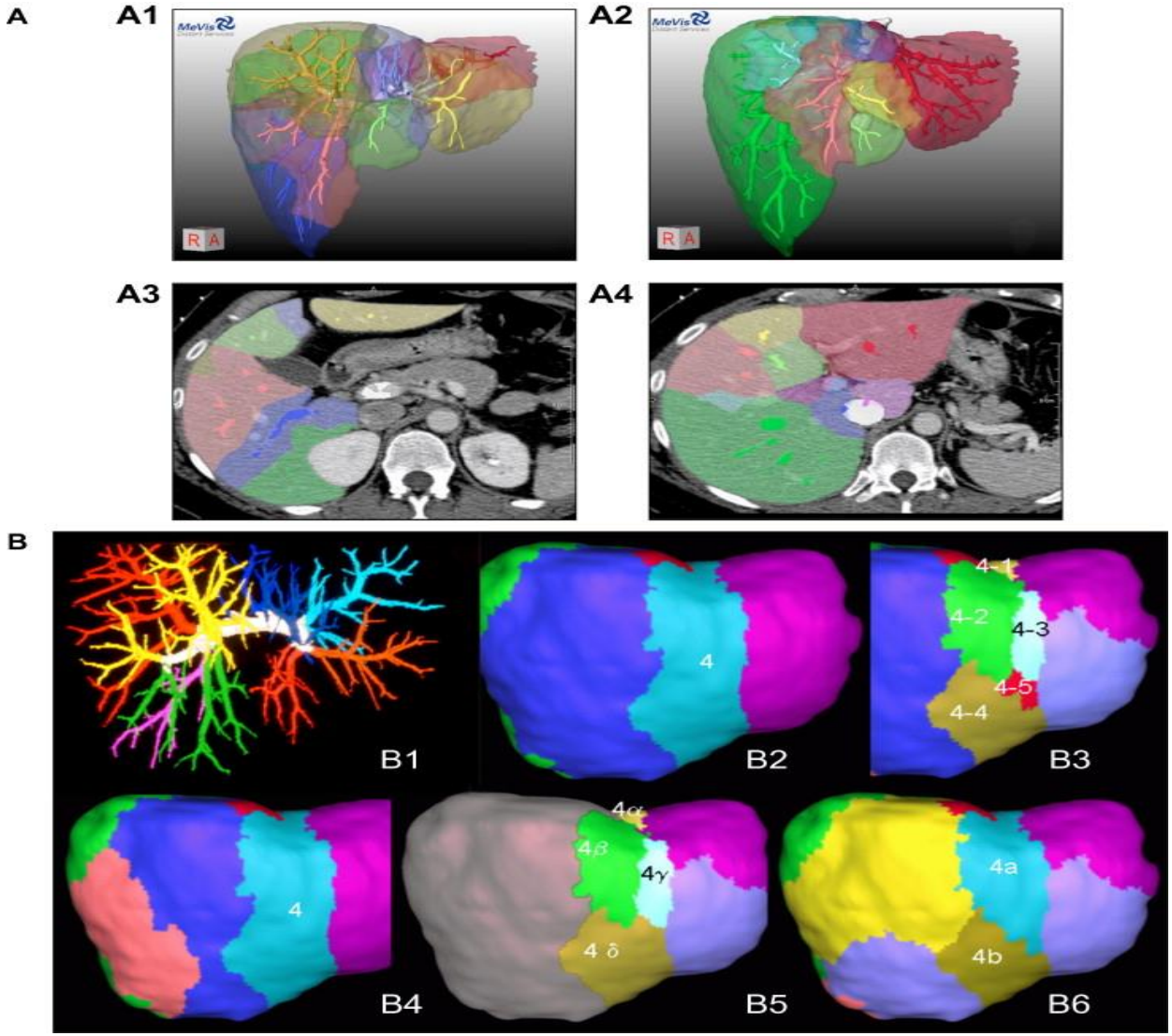
Anatomy 12


7
8
4
2
3
6
5
right posterior sectionectomy
7
8
4
2
3
6
5
right anterior sectionectomy
7
8
4
2
3
6
5
left medial sectionectomy
7
8
4
2
3
6
5
left lateral sectionectomy

Anatomy 13



Anatomy 14



Key Points

- The anatomy of each liver can be represented at three levels of complexity, according to the uses that the description has to serve
- The first - conventional - level corresponds to Couinaud's 8-segments scheme and is a very useful referential framework for the localization of focal lesions. It allows a common language between clinicians of different specialties and it is based in fact on the three hepatic veins and on the level of the portal bifurcation rather than on the portal anatomy
- The second - surgical - level corresponds to the actual (and not the theoretical or schematic) branching of the hepatic vessels. Imaging and surgical techniques are now available to identify and follow this real anatomy during modern liver surgery, allowing anatomically tailored territorial liver resections, but this requires independence from the Couinaud representation
- The third - academic - level is for the anatomist: a 1-2-20 concept for the number of zero-, first- , and second-order branches respectively, can take into account Couinaud's as well as other segmentations, and does justice to the beautiful complexity of the hepatic vascular tree

Majno et all j Hepatol 2014

You're getting tired of this? I'm the one who's had to eat liver 735,239 days in a row, and I can't even find a decent wine to go with it!