

Clinical Anatomy of the Portal System in the Context of Portal Hypertension

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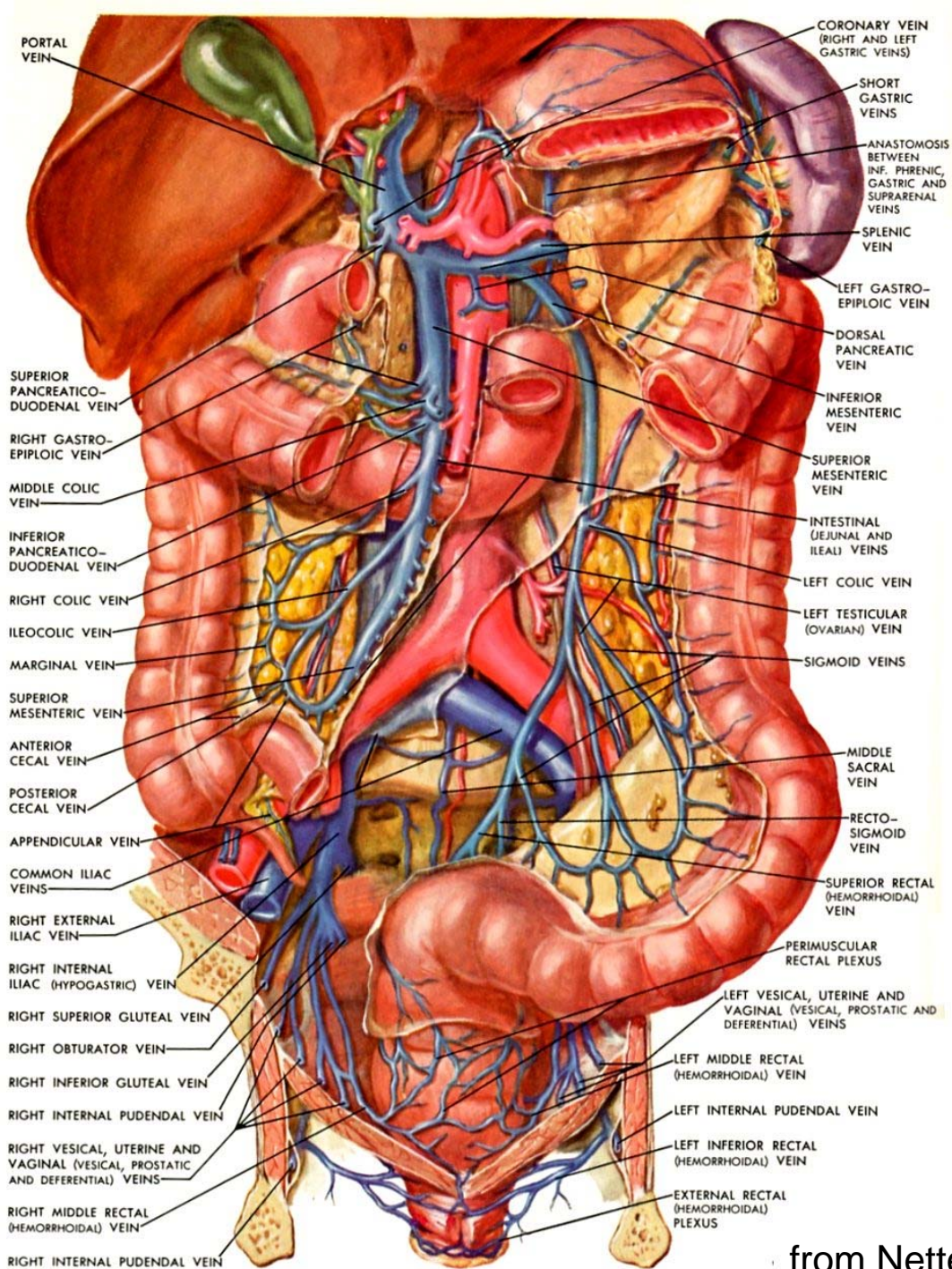
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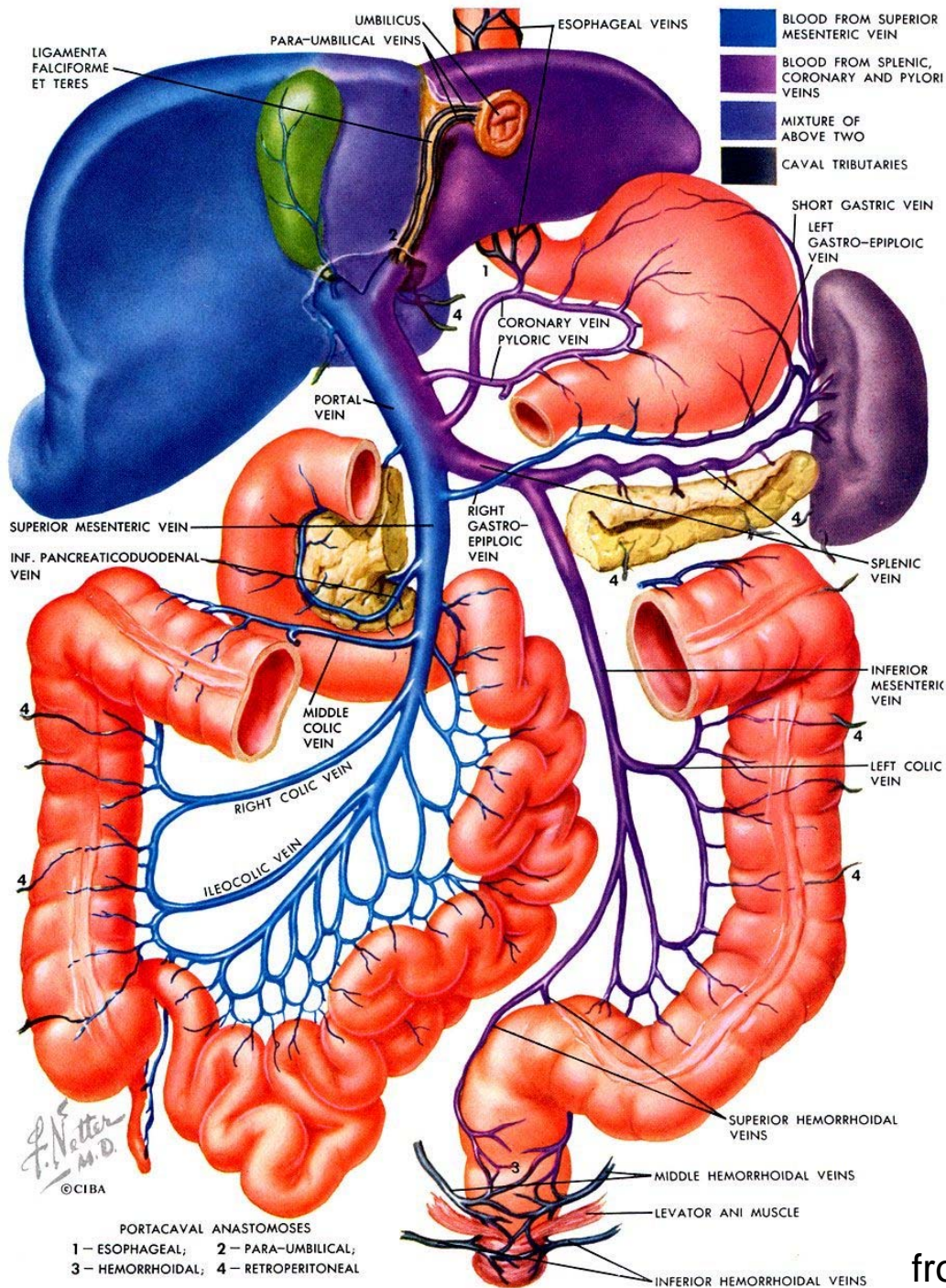
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Portal System

- Conducts venous return from gut and associated organs to the liver
- Much of the system is retroperitoneal but some tributaries are within mesentery

Portal System (extrahepatic tributaries)



Portal vein

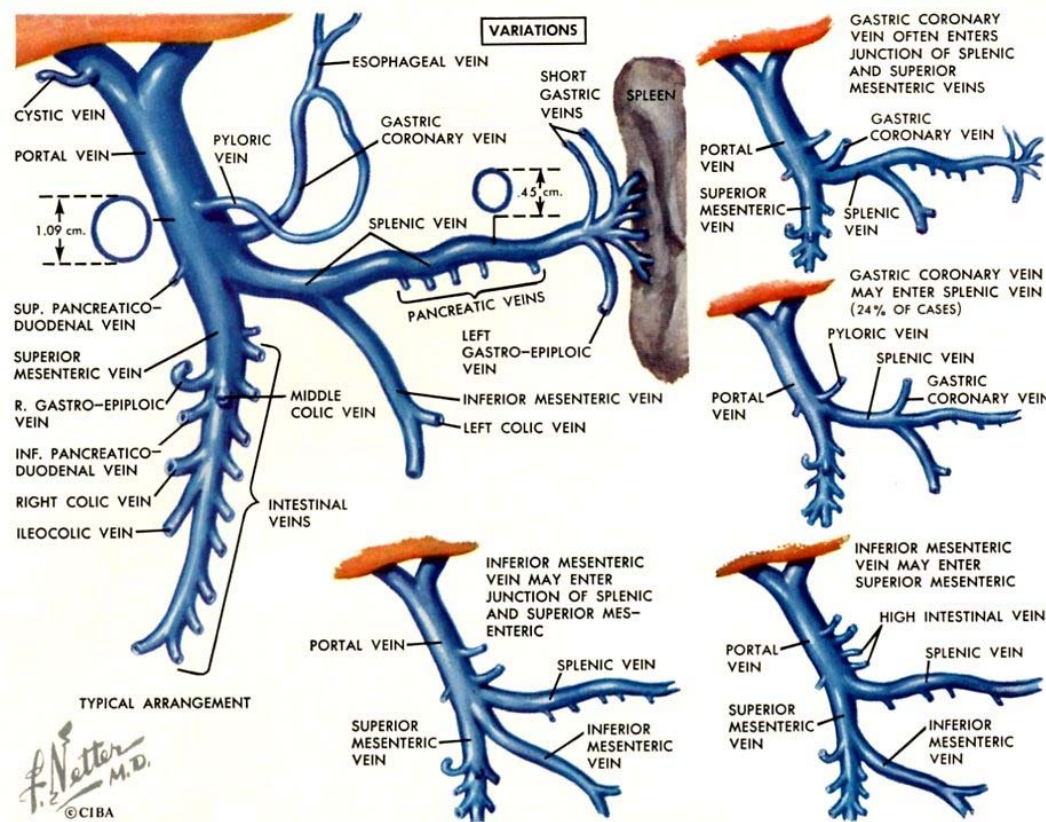
- Superior mesenteric V.
 - Intestinal veins
 - Ileocolic vein
 - Right colic vein
 - Middle colic vein
 - Inferior pancreaticoduodenal
 - Right gastroepiploic vein
- Splenic vein
 - Inferior mesenteric vein
 - Left colic vein
 - Sigmoid veins
 - Superior hemorrhoidal veins
 - Pancreatic veins
 - Left gastroepiploic vein
 - Short gastric veins
- Coronary vein
- Cystic vein
- Paraumbilical veins

from Netter 1957

Portal System

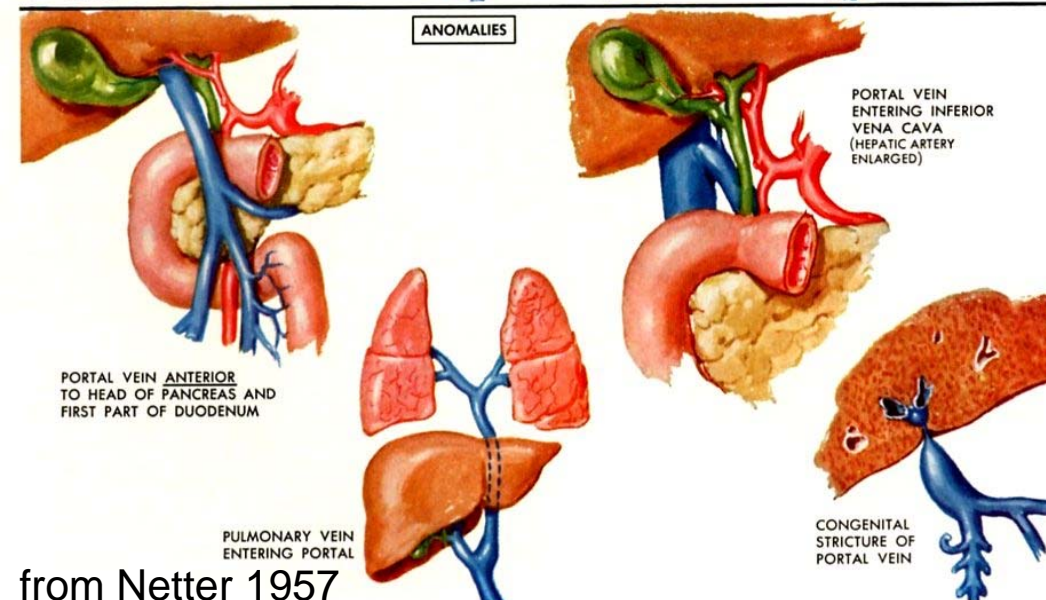
variations

- Variations are relatively rare
- Length of main portal stem : 55-80 mm
- Diameter: 11 mm, more in cirrhosis
- Main variations involve connections of gastric coronary vein and IMV

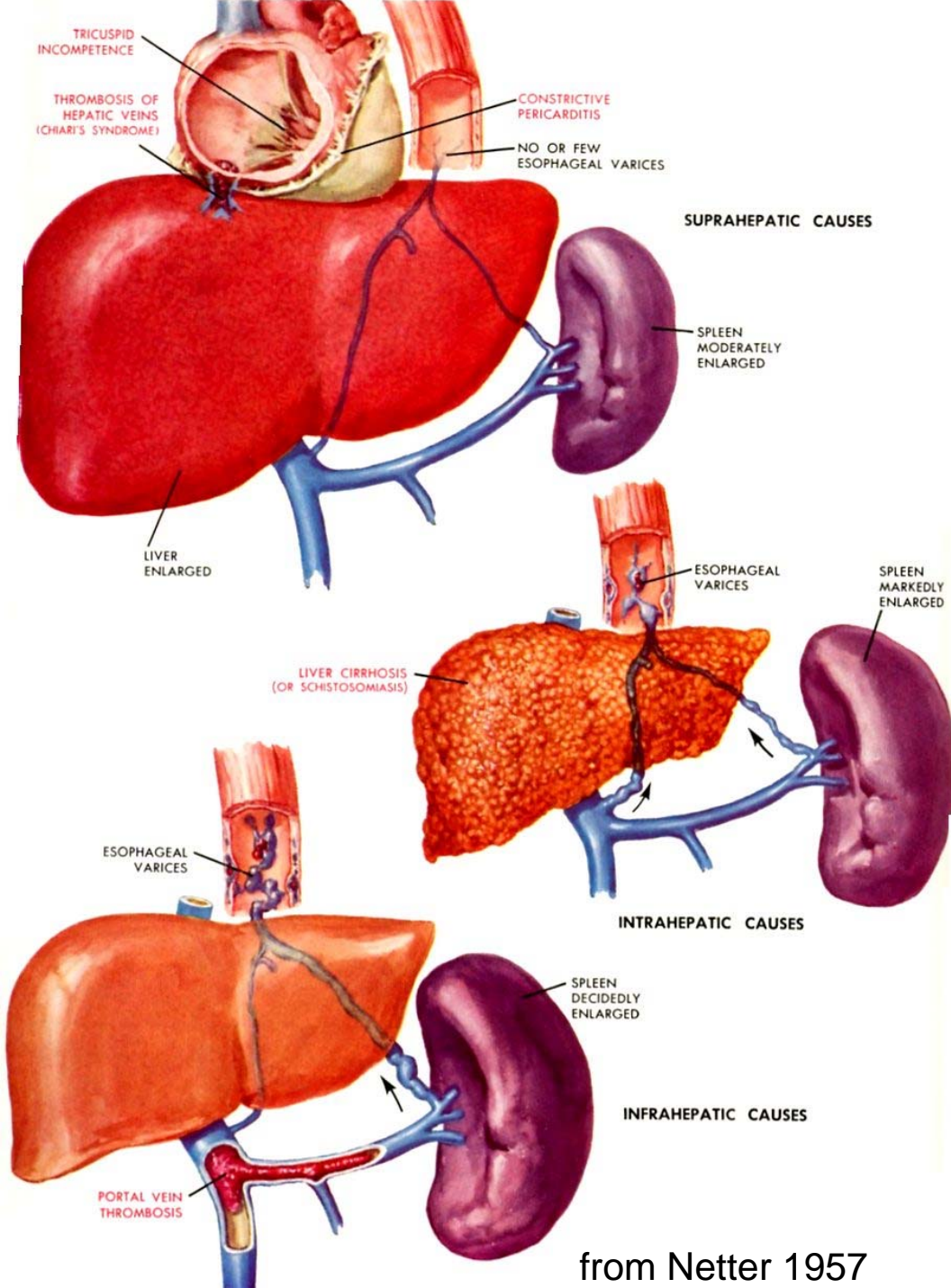


anomalies

- Anomalies are rare
- Anterior position of portal vein relative to pancreas and duodenum
- Portal vein bypassing liver and draining into IVC



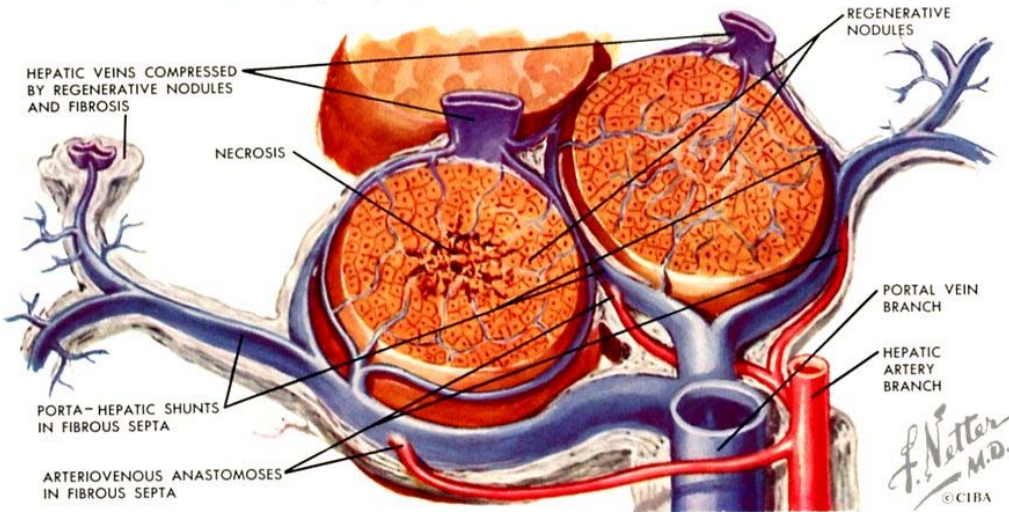
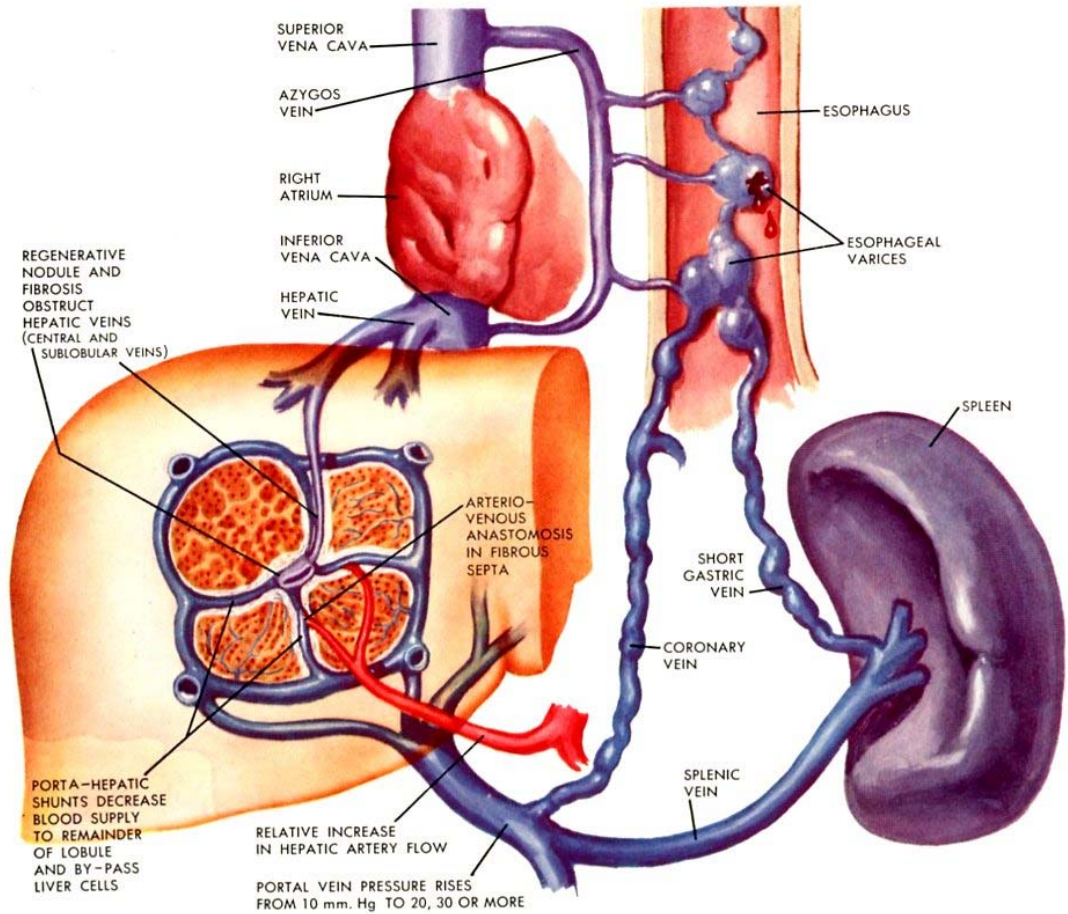
Portal Hypertension Etiology



- Classification systems
 - Presinusoidal, sinusoidal, postsinusoid.
 - Extrahepatic vs. intrahepatic
 - Suprahepatic, intrahepatic, infrahepatic
- Suprahepatic (outflow obstruction)
 - Right-side heart failure, constrictive pericarditis, Budd-Chiari syndrome
 - Often portal hypertension is matched by systemic (caval) hypertensions
- Intrahepatic (90% of cases)
 - Cirrhosis most common but others too
 - Typical pathologic anatomical findings
- Infrahepatic
 - Obstruction of extrahepatic portal system
 - Portal (or splenic) v. thrombosis
 - Cavernomatous transformation of portal vein
 - Tumor, infection, compression
 - Typical pathologic anatomical findings

from Netter 1957

Vascular Changes in Cirrhosis Leading to Portal Hypertension



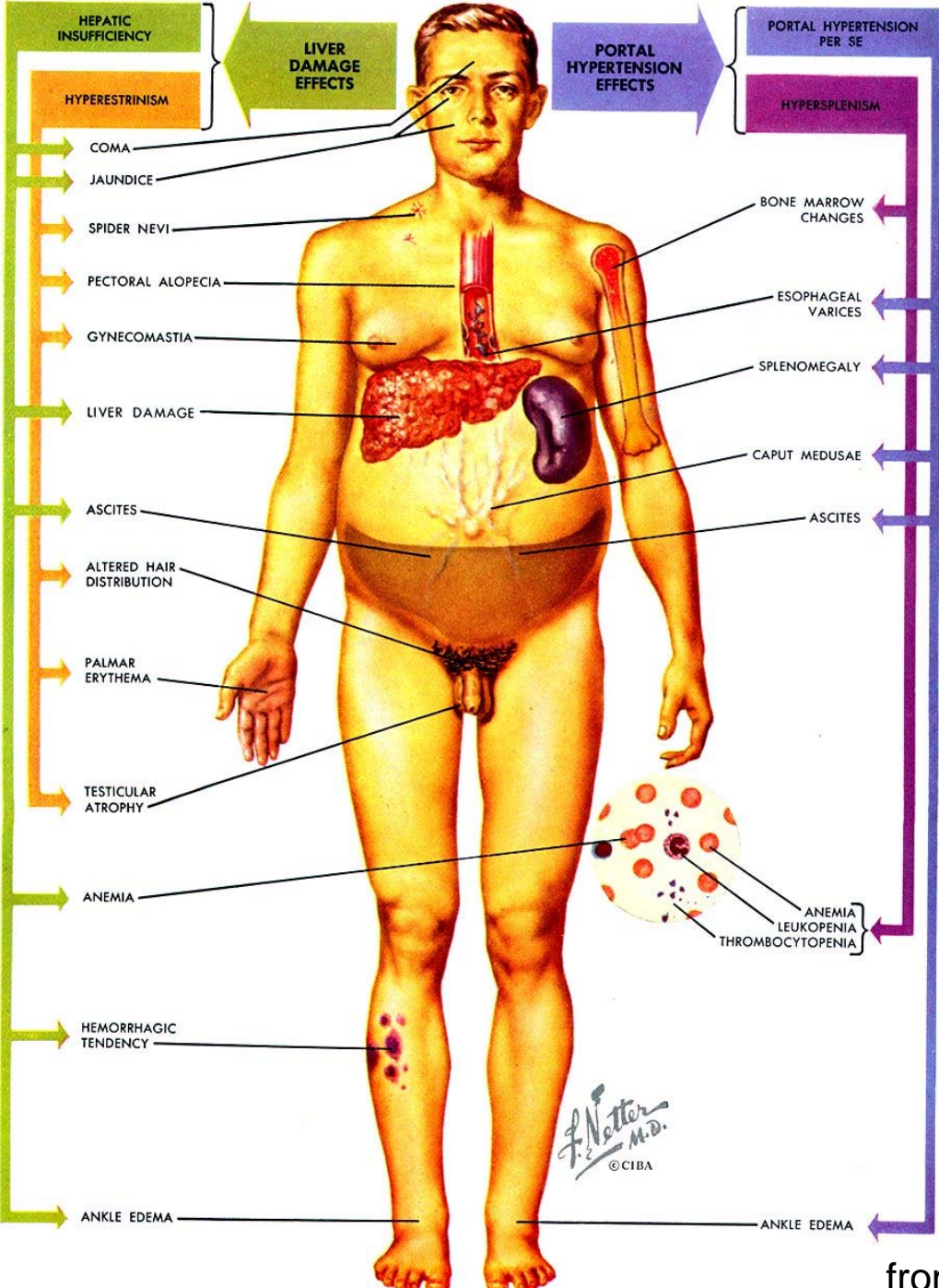
- Compression of hepatic veins
- Regen. nodules and connective tissue septa compress veins
- Decreased outflow, increased upstream portal pressure
- Formation of portahepatic AVAs
- Direct anastomoses between hepatic a. branches and portal vein tributaries
- Increased flow into portal system via AVAs increases portal hypertension

from Netter 1957



Pathological Anatomy Associated with Portal Hypertension

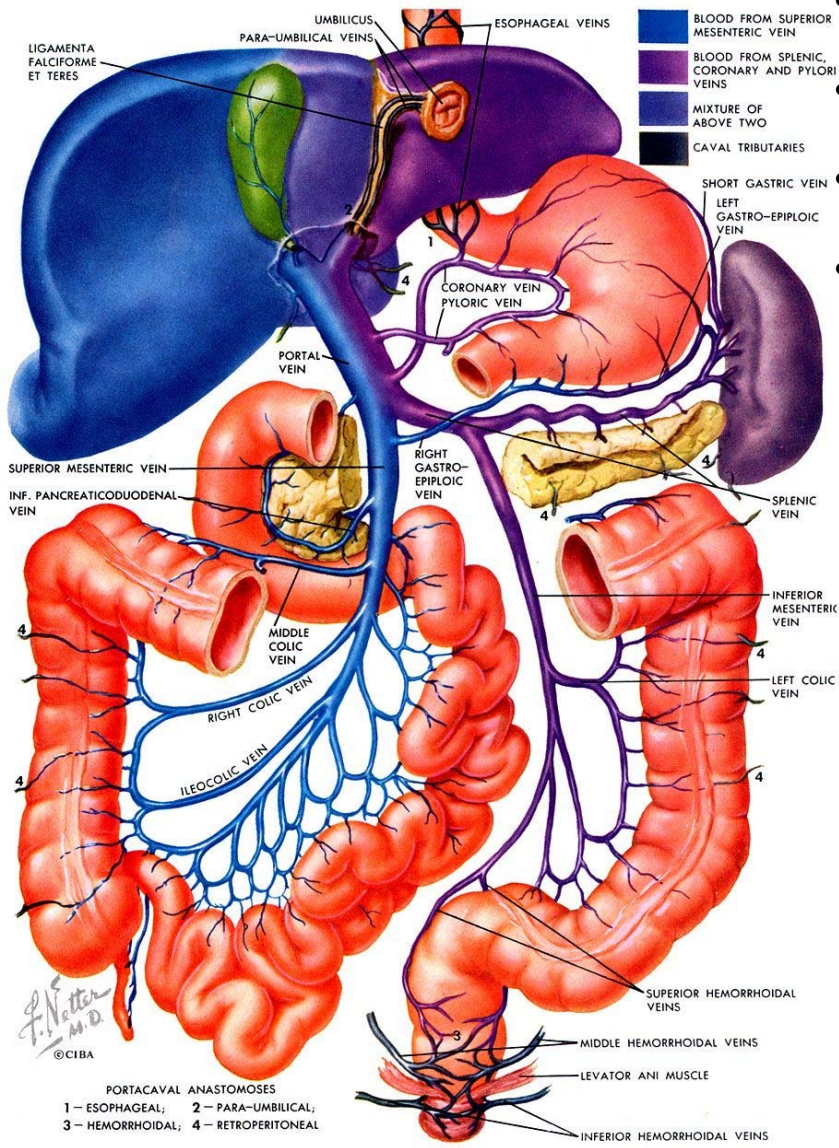
- Esophageal varices
- Splenomegaly
- Caput medusae
- Ascites



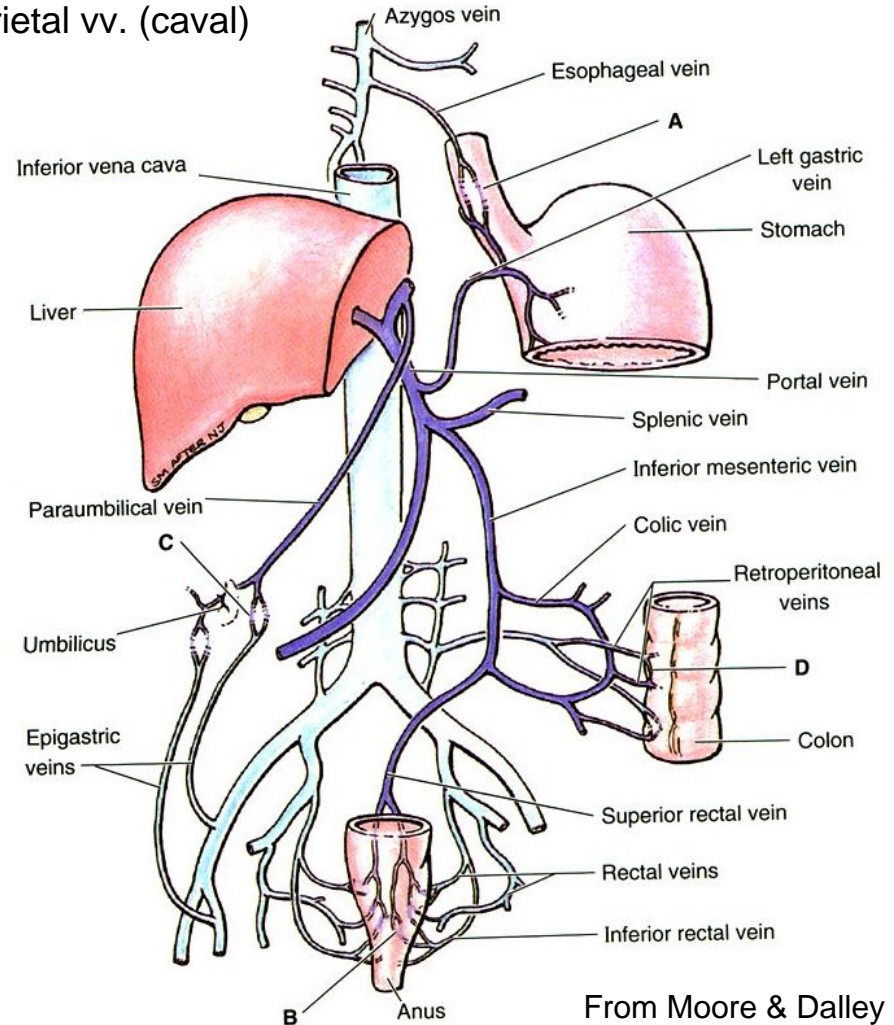
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Portacaval Anastomoses

- Esophageal anastomosis: azygos (caval) — coronary or short gastric (portal)
- Paraumbilical anastomosis: paraumbilical vv. (portal) — epigastric vv. (caval)
- Rectal anastomosis: sup. hemorrhoidal (portal) — inf. & middle hemorrhoidal vv. (caval)
- Retroperitoneal anastomosis: visceral vv. of Retzius (portal) — parietal vv. (caval)



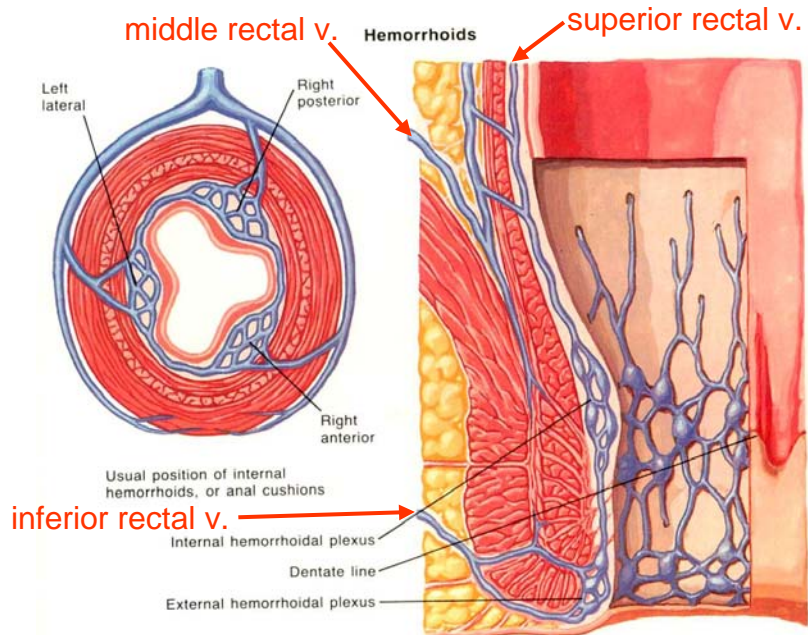
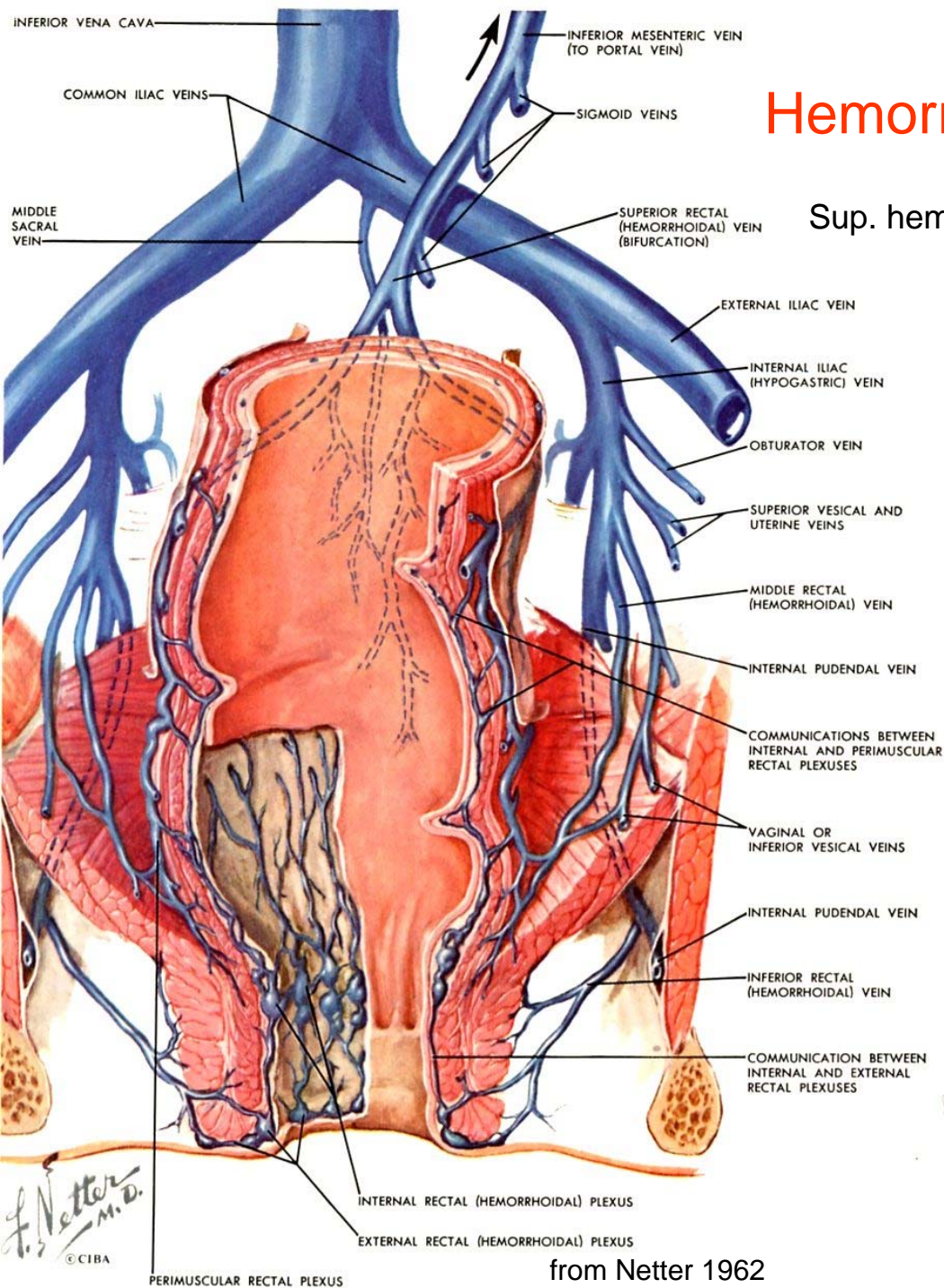
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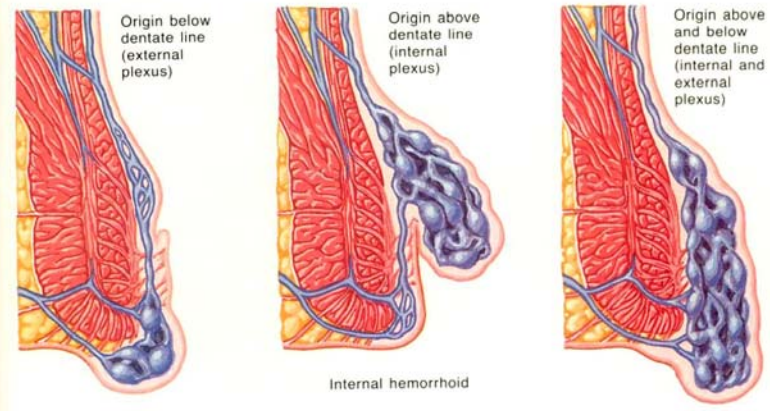
From Moore & Dalley 2006

Rectal Anastomosis: Hemorrhoids in Portal Hypertension?

Sup. hemorrh. vv. (portal) — inf. & mid. hemorrh. vv. (caval)



Types of hemorrhoids

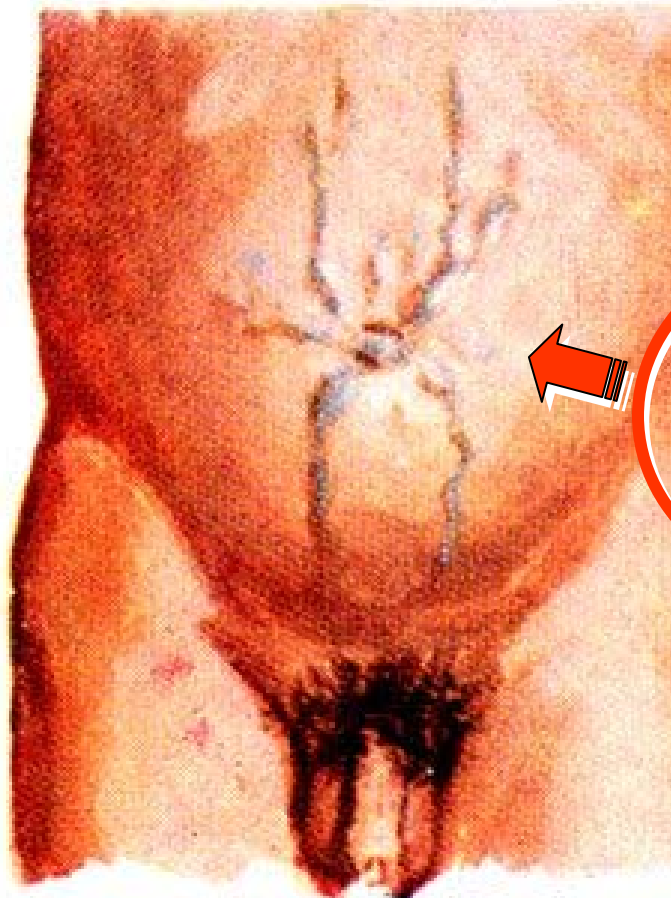


from Netter 1962

From Fry & Kodner (1985) CIBA

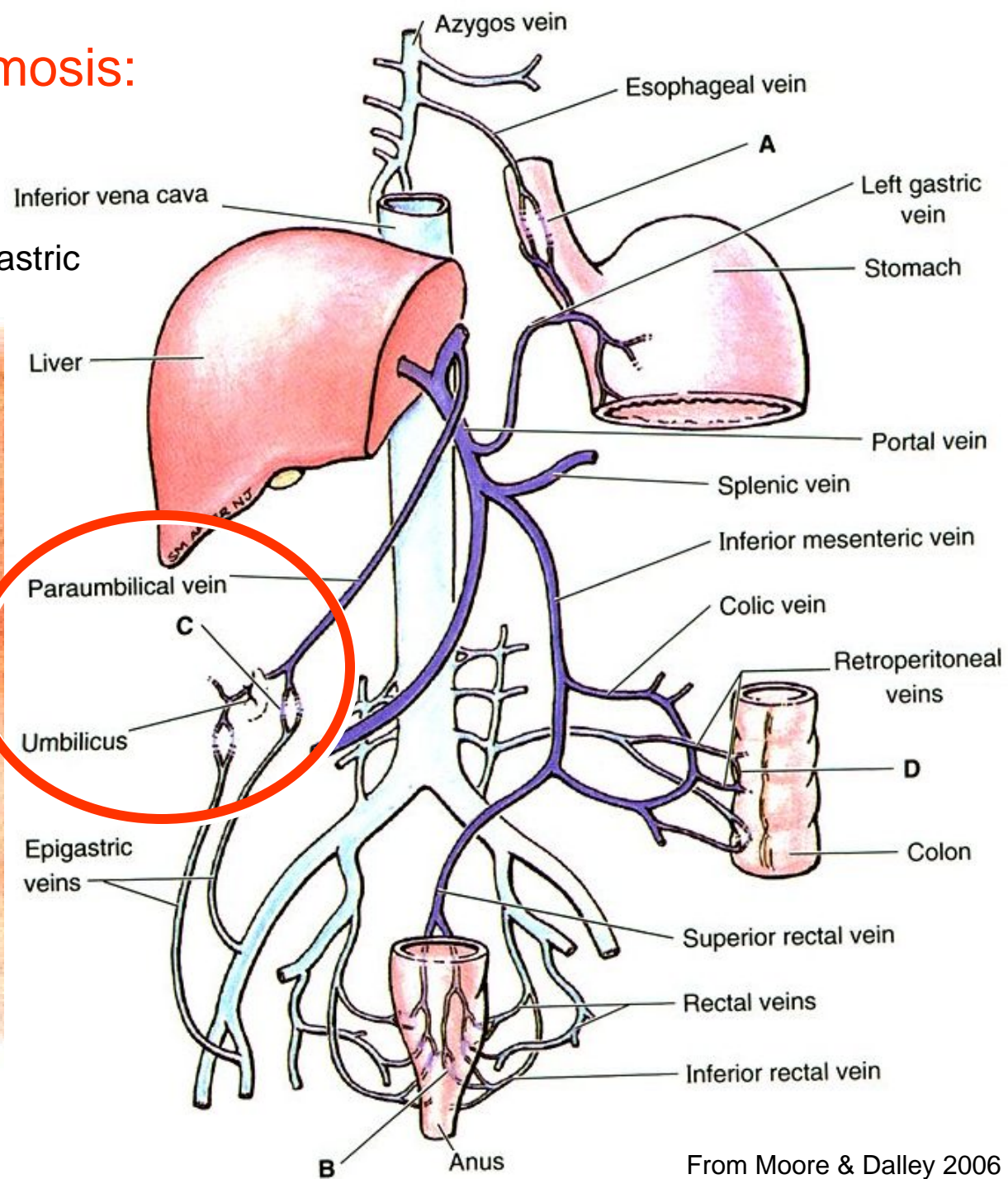
Paraumbilical Anastomosis: Caput medusae

Paraumbilical vv. (portal) —
Superficial, superior, & inferior epigastric
vv. (caval)



CAPUT MEDUSAE

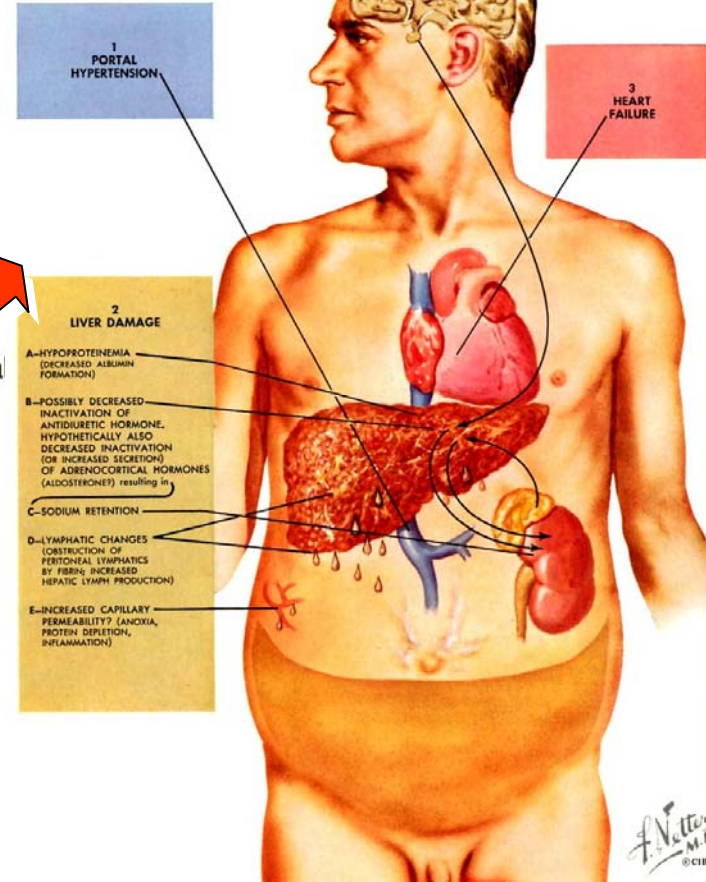
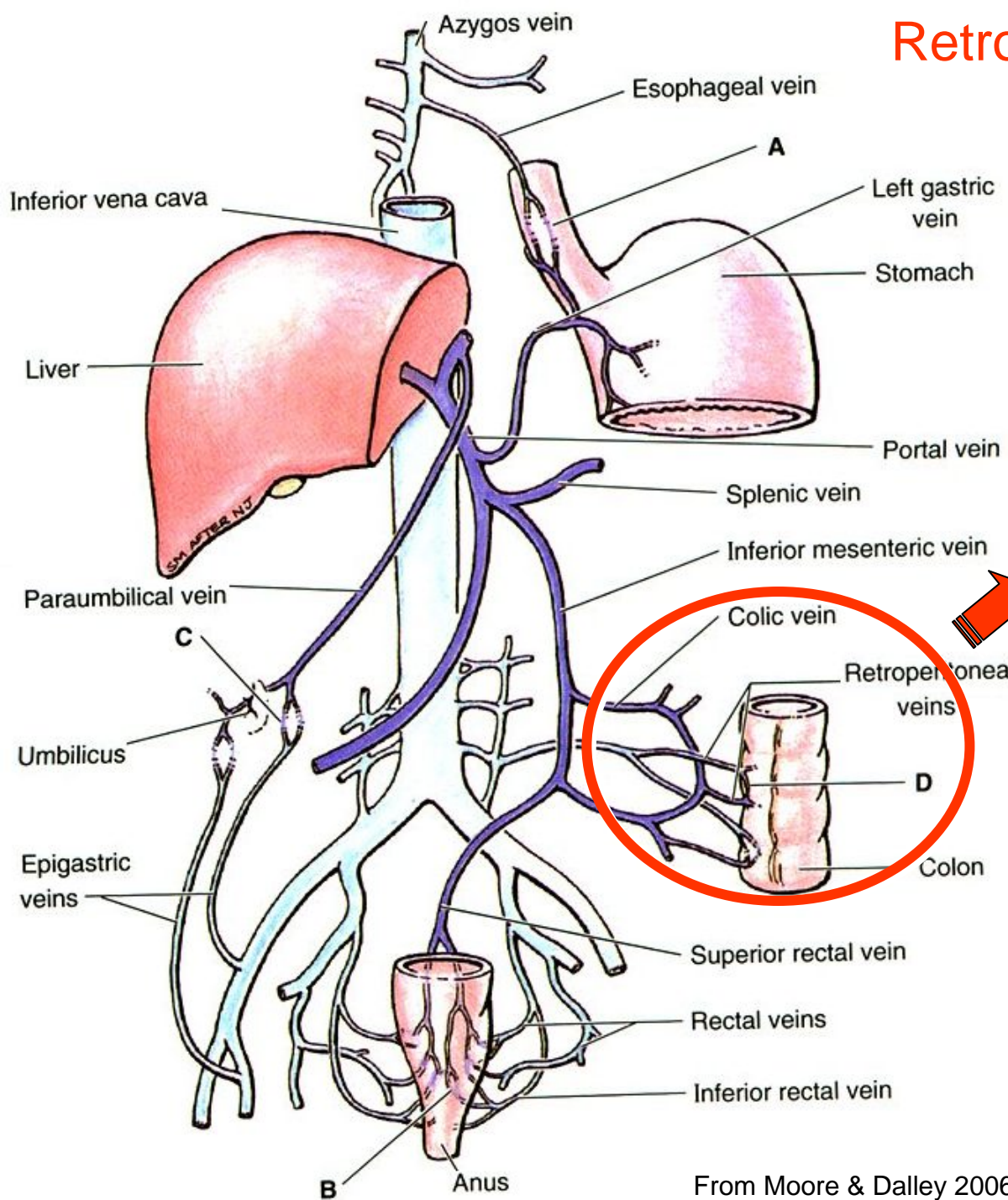
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From Moore & Dalley 2006

Retroperitoneal Anastomosis: Ascites

Visceral vv. of Retzius (portal) —
Retroperitoneal parietal vv. (caval)



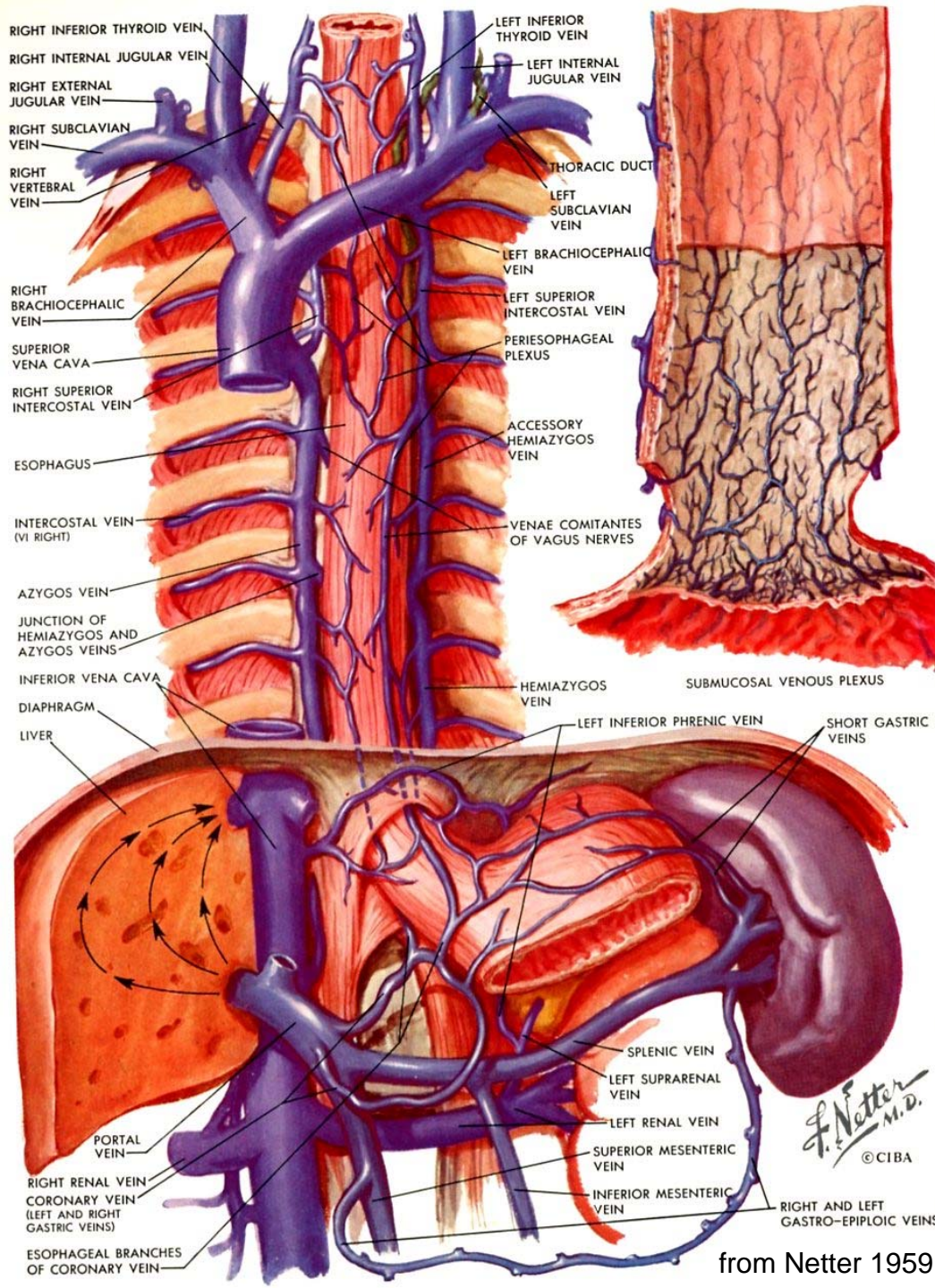
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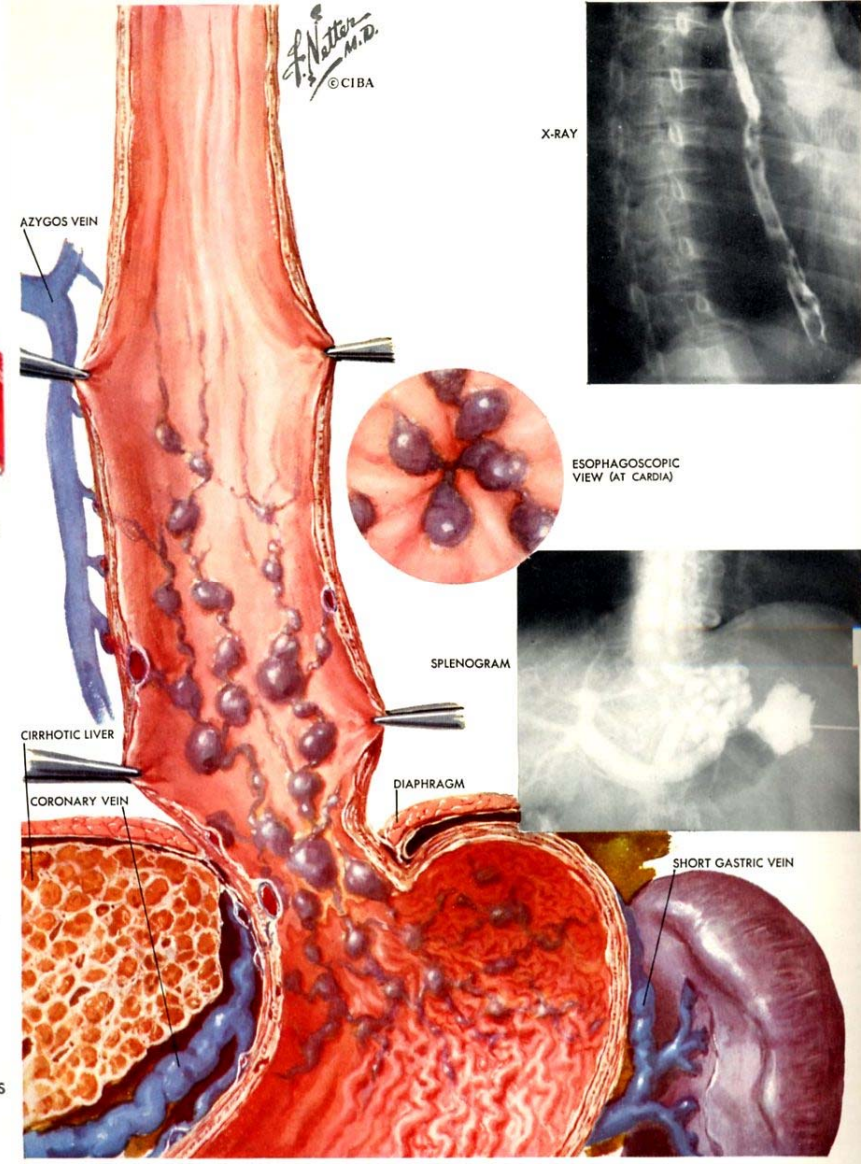
Esophagogastric Anastomosis:

Varices

Azygos (caval) — Coronary or short gastric (portal)



from Netter 1959



References

- Fry, R. D. and I. J. Kodner. 1985. Anorectal disorders. *CIBA Clinical Symposia* 37(6):1-32.
- Moore, K. L. and A. F. Dalley. 2006. *Clinically Oriented Anatomy, 5th Ed.* Lippincott, Williams & Wilkins, Baltimore.
- Netter, F. H. 1957. The CIBA Collection of Medical Illustrations, Volume 3: Digestive System, Part III. CIBA-Geigy, Summit.
- Netter, F. H. 1959. The CIBA Collection of Medical Illustrations, Volume 3: Digestive System, Part I. CIBA-Geigy, Summit.
- Netter, F. H. 1962. The CIBA Collection of Medical Illustrations, Volume 3: Digestive System, Part II. CIBA-Geigy, Summit.