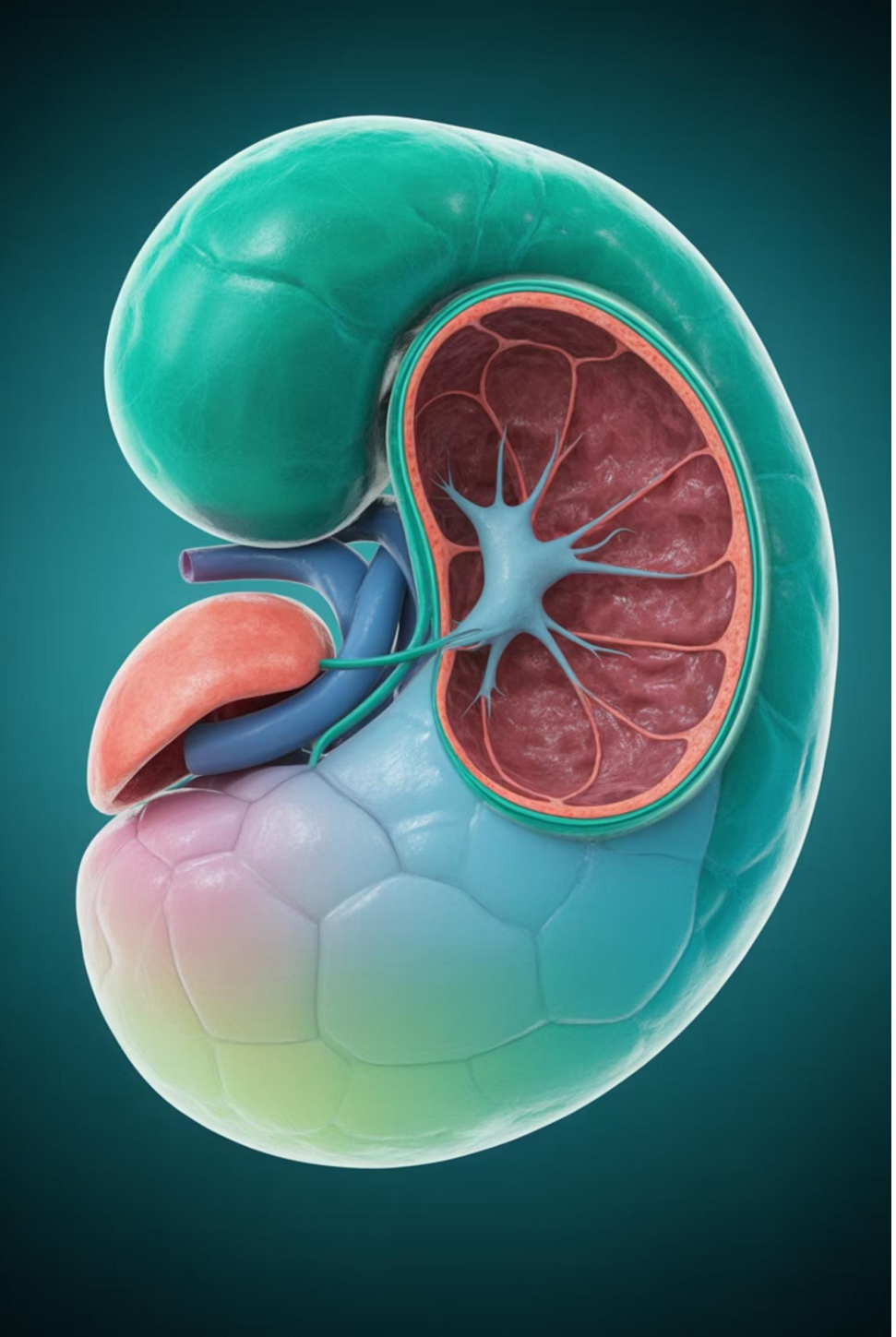


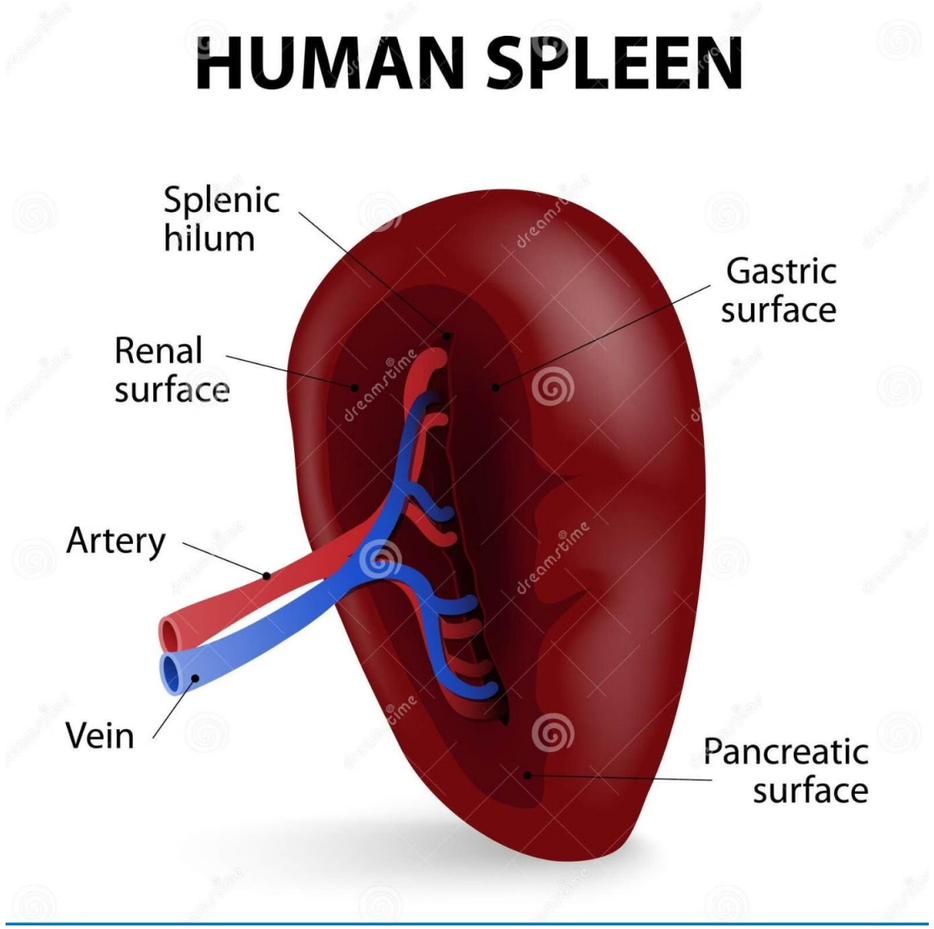
Anatomy and Function of the Spleen

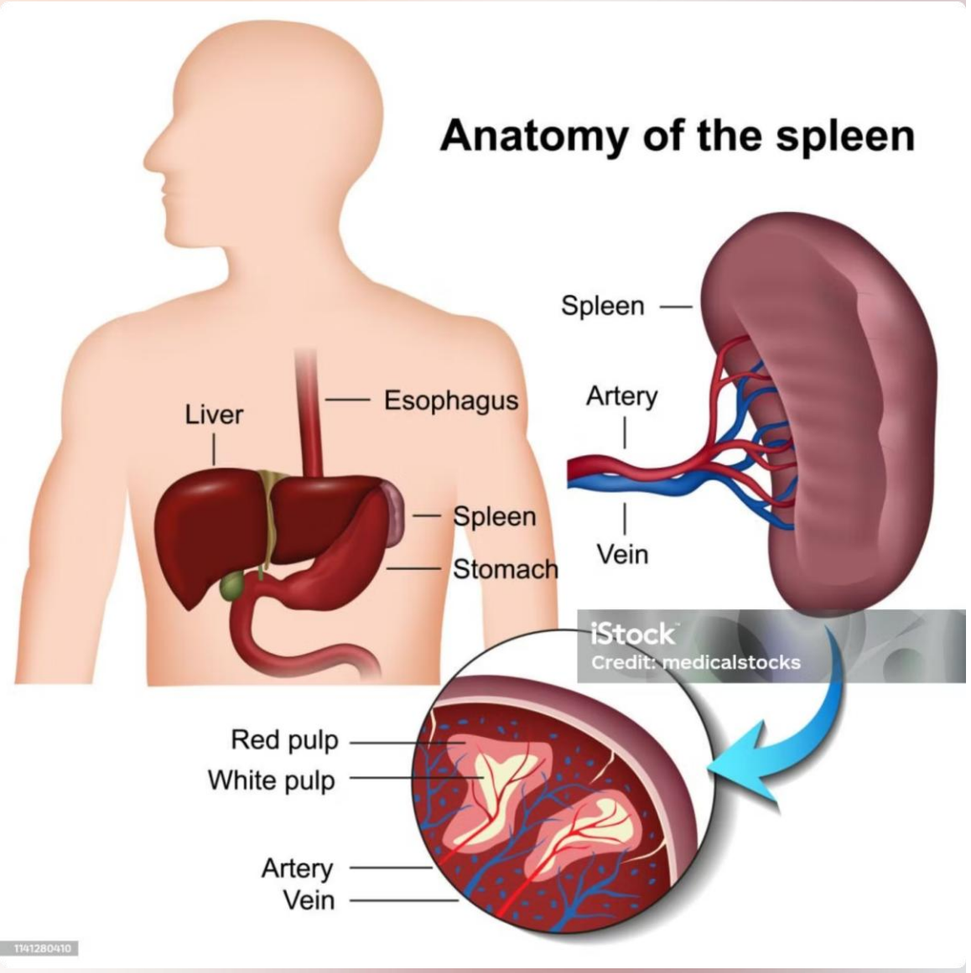
Normal Splenic Anatomy

Physical Characteristics

The adult spleen, measuring up to 10 × 7 × 3 cm and weighing 75–250 grams, is the body's largest lymphoid tissue, crucial for immune function and blood filtration.

Its soft, friable nature makes it vulnerable to traumatic injury. A characteristic inferolateral border notch is palpable during pathological enlargement.





Anatomical Location and Relations

Position

Located in left hypochondrium, between gastric fundus and left hemidiaphragm, protected by ribs 9–11.

Hilum

Sits in angle between stomach and kidney, in direct contact with pancreatic tail.

Peritoneal Attachments

Connected to surrounding organs via gastrosplenic and splenorenal ligaments.

Arterial Blood Supply

Splenic arterial anatomy is critical for surgical planning and trauma management.

01

Origin

Splenic artery from coeliac axis, often with hepatic artery.

02

Course

Courses along **pancreatic body/tail**, giving pancreatic branches.

03

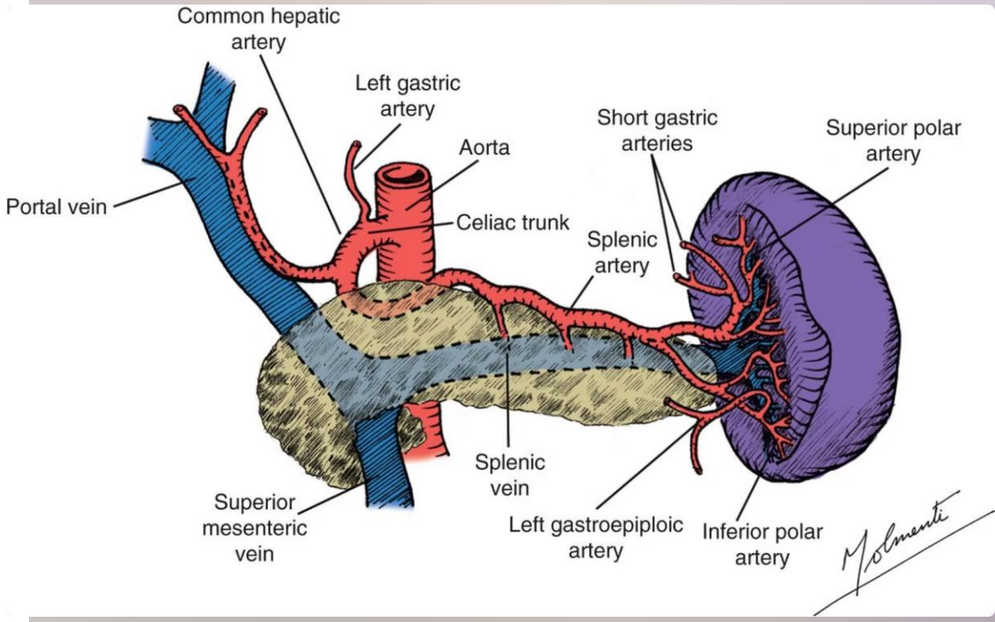
Gastric Branches

Short gastric and left gastroepiploic branches within gastrosplenic ligament.

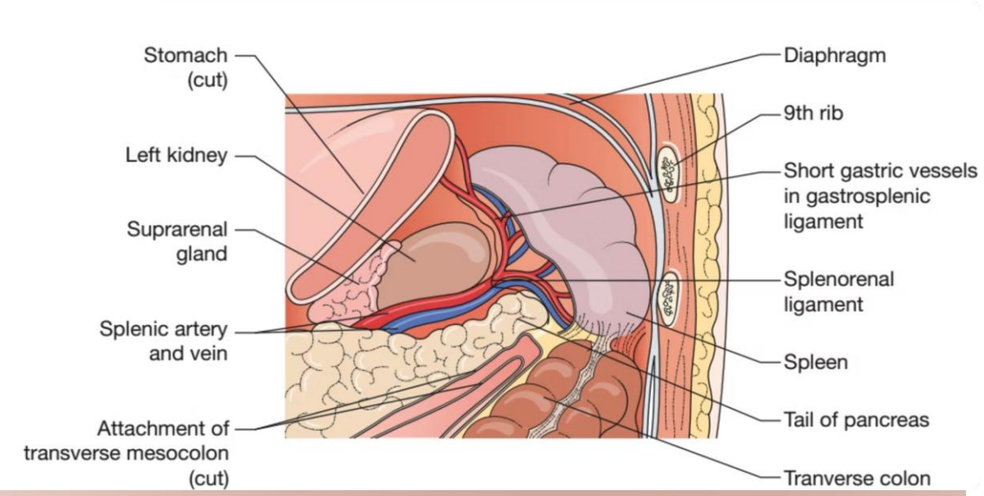
04

Terminal Division

Divides into **superior and inferior branches**, segmentally supplying the hilum.



Venous Drainage and Internal Architecture



Splenic Vein

The **splenic vein** originates from hilar tributaries, courses behind the pancreas, and receives pancreatic branches.

At the pancreatic neck, it joins the superior mesenteric vein to form the **portal vein**, a crucial component of the portal venous system.

Internal Structure

The splenic pulp is covered by a serous coat and fibroelastic capsule. At the hilum, the capsule forms **vascular sheaths** around vessels.

The pulp divides into white pulp (lymphoid tissue) and red pulp (vascular sinusoids/cords), each with distinct functions.

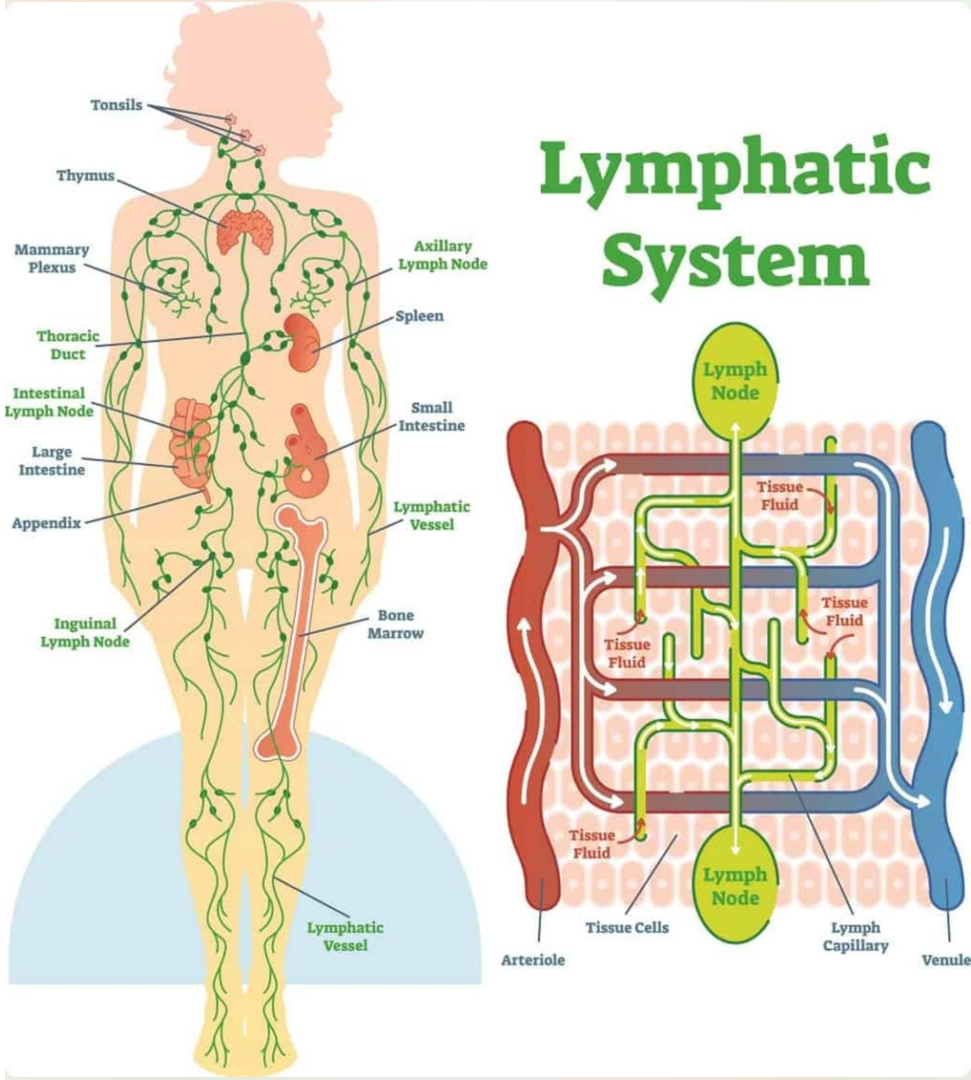
Lymphatic Drainage and Innervation

Lymphatic System

Efferent lymphatic vessels originate in the **white pulp**, draining through retropancreatic nodes to coeliac nodes. This pathway is clinically significant in lymphoproliferative disorders and metastatic disease.

Nerve Supply

Sympathetic nerve fibers from the coeliac plexus innervate splenic arterial branches, regulating vascular tone and splenic contraction. There is no significant parasympathetic innervation; pain sensation is transmitted via sympathetic pathways.



Essential Functions of the Spleen

Immune Function

Contains approximately **25% of the body's T lymphocytes** and **10–15% of B lymphocytes**. Major site for antibody production and immune surveillance, especially against encapsulated bacteria.

Blood Filtration

Macrophages remove cellular debris, aged red blood cells, bacteria, and particulate matter from blood flowing through splenic sinusoids.

Pitting Function

Unique removal of particulate inclusions (e.g., Howell-Jolly bodies) from red blood cells without destruction; returning repaired cells to circulation (**pitting**).

Blood Reservoir

Stores approximately **30% of the body's platelet mass** and sequesters red blood cells, releasing them during physiological stress or hemorrhage.

Cytopoiesis

Proliferation of T and B lymphocytes and macrophages. Extramedullary hematopoiesis may occur in **myeloproliferative disorders, thalassemias, and chronic hemolytic anemias**.

Common Splenic Disorders

Splenic Infarction

Occurs in patients with **massively enlarged spleens** (myeloproliferative syndromes) due to vascular occlusion and ischemic necrosis.

Clinical presentation: Left upper quadrant pain, fever, friction rub.

Splenic Rupture

Consider with **blunt abdominal trauma** to the left upper quadrant; can be immediate or delayed.

Clinical features: Hypotension, left shoulder pain (Kehr's sign), peritoneal signs, falling hemoglobin.

Splenic Abscess

Caused by infected splenic emboli or associated with typhoid, osteomyelitis, otitis media, and puerperal sepsis.

Treatment: Antibiotics, often percutaneous drainage or splenectomy.

Indications for Splenectomy

Splenectomy may be performed for traumatic, oncological, hematological, or portal hypertension-related indications.

1

Trauma

- **Accidental:** High-grade splenic injuries (Grade IV-V)
- **Operative:** Iatrogenic injury during surgery

2

Oncological

- **En bloc resection:** For gastric, pancreatic, or renal tumors
- **Diagnostic:** Lymphoproliferative disorder staging (rare)
- **Therapeutic:** Splenic tumors or lymphomas

3

Hematological

- **Hereditary spherocytosis:** Severe cases
- **Immune thrombocytopenic purpura (ITP):** Refractory to medical therapy
- **Hypersplenism:** Causing cytopenias

4

Portal Hypertension

- **Variceal surgery:** Or portosystemic shunt procedures
- **Massive splenomegaly:** With symptomatic hypersplenism

Preoperative Preparation

Correction of Coagulopathy

For coagulopathy, transfuse:

Blood products for anemia

Fresh-frozen plasma for clotting factor deficiencies

Cryoprecipitate for fibrinogen replacement

Platelets for thrombocytopenia

Coagulation profiles pre-operatively should be near normal. Platelets must be available for thrombocytopenic patients perioperatively.

Infection Prophylaxis

Administer perioperative antibiotic prophylaxis appropriate to the procedure.

Post-splenectomy sepsis is life-threatening; specific preventive measures, including vaccination, are crucial.

Critical Splenectomy Considerations

Preoperative Immunization

Administer vaccines **≥2 weeks pre-surgery** (or 2 weeks post-surgery if emergency):

- **Pneumococcal vaccine** (PCV13, PPSV23)
- **Haemophilus influenzae type B** (HiB)
- **Meningococcal vaccine** (serogroups A, C, W, Y, B)
- Annual **influenza vaccination**

Long-term Antibiotic Prophylaxis

Lifelong daily prophylactic antibiotics recommended for:

- Children & young adults
- Immunocompromised patients
- History of invasive pneumococcal disease

Regimen: Penicillin V 250-500mg BID or amoxicillin 250mg daily

Post-Splenectomy Infection Risk

Overwhelming post-splenectomy infection (OPSI) is a critical danger:

- Lifetime risk: **~5%**
- Mortality: **50-70%**
- Common organisms: *S. pneumoniae*, *H. influenzae*, *N. meningitidi*
- Can occur years/decades post-splenectomy

Splenic Conservation

Splenic preservation should always be considered:

- Partial splenectomy for localized pathology
- Splenorrhaphy for traumatic injuries
- Non-operative management for stable trauma
- Angioembolization for ongoing bleeding

Small residual splenic tissue offers significant OPSI protection

Key Takeaways: The Spleen

Anatomical mastery

Spleen's anatomy (location, relations, vascular supply) is essential for examination, imaging, and surgical planning.

Multifunctional organ

Spleen's immune, filtering, and hematopoietic functions are vital for host defense and blood homeostasis.

Preservation when possible

Due to serious post-splenectomy infection risks, splenic conservation techniques are crucial when clinically appropriate.

OPSI prevention protocol

When splenectomy is unavoidable, rigorous vaccination, prophylactic antibiotics, and patient education are mandatory to prevent life-threatening infection.