

ALBUMIN AND PORTAL HYPERTENSION: A HEMODYNAMIC PERSPECTIVE

Optimizing Circulatory Dynamics and Vascular Tone in Cirrhosis

A focused clinical brief on integrating albumin therapy to address hemodynamic changes, circulatory dysfunction, and plasma volume derangements in portal hypertension.

LEARNING OBJECTIVES

- **Hemodynamic Changes:** Understand the hemodynamic changes driving portal hypertension in cirrhosis.^{1,2}
- **Circulatory Dysfunction & Vascular Tone:** Explain how albumin influences circulatory dysfunction and vascular tone.^{3,4}
- **Plasma Volume Expansion:** Recognize albumin's role in reducing plasma volume derangements.^{3,4}
- **Effective Arterial Blood Volume:** Apply albumin use to improve effective arterial blood volume.^{1,3,4}

HEMODYNAMIC DRIVERS OF PORTAL HYPERTENSION

Portal hypertension in cirrhosis arises from structural intrahepatic resistance combined with progressive systemic hemodynamic alterations.^{1,2}

- Splanchnic vasodilation develops secondary to increased endogenous vasodilators, leading to pooling of blood in the splanchnic circulation.^{2,3}
- A marked decrease in effective arterial blood volume (EABV) triggers compensatory neurohumoral activation, including the renin-angiotensin-aldosterone system (RAAS) and sympathetic nervous system.^{3,4}
- Hyperdynamic circulation occurs with increased cardiac output and arterial hypotension, worsening fluid retention and ascites formation.^{1,2}

ALBUMIN'S ROLE IN CIRCULATORY DYNAMICS & VASCULAR TONE

Beyond acting as a standard volume expander, albumin exerts specific oncotic and non-oncotic properties that modulate systemic vascular function in patients with cirrhosis.^{3,4}

Oncotic Expansion & Volume Support

- Albumin increases intravascular oncotic pressure, drawing fluid into the vascular space to expand effective arterial blood volume.^{3,4}
- Restoration of EABV suppresses arterial hypotension and reduces neurohumoral vasoconstrictor activation.^{3,4}

Vascular Tone & Endothelial Function

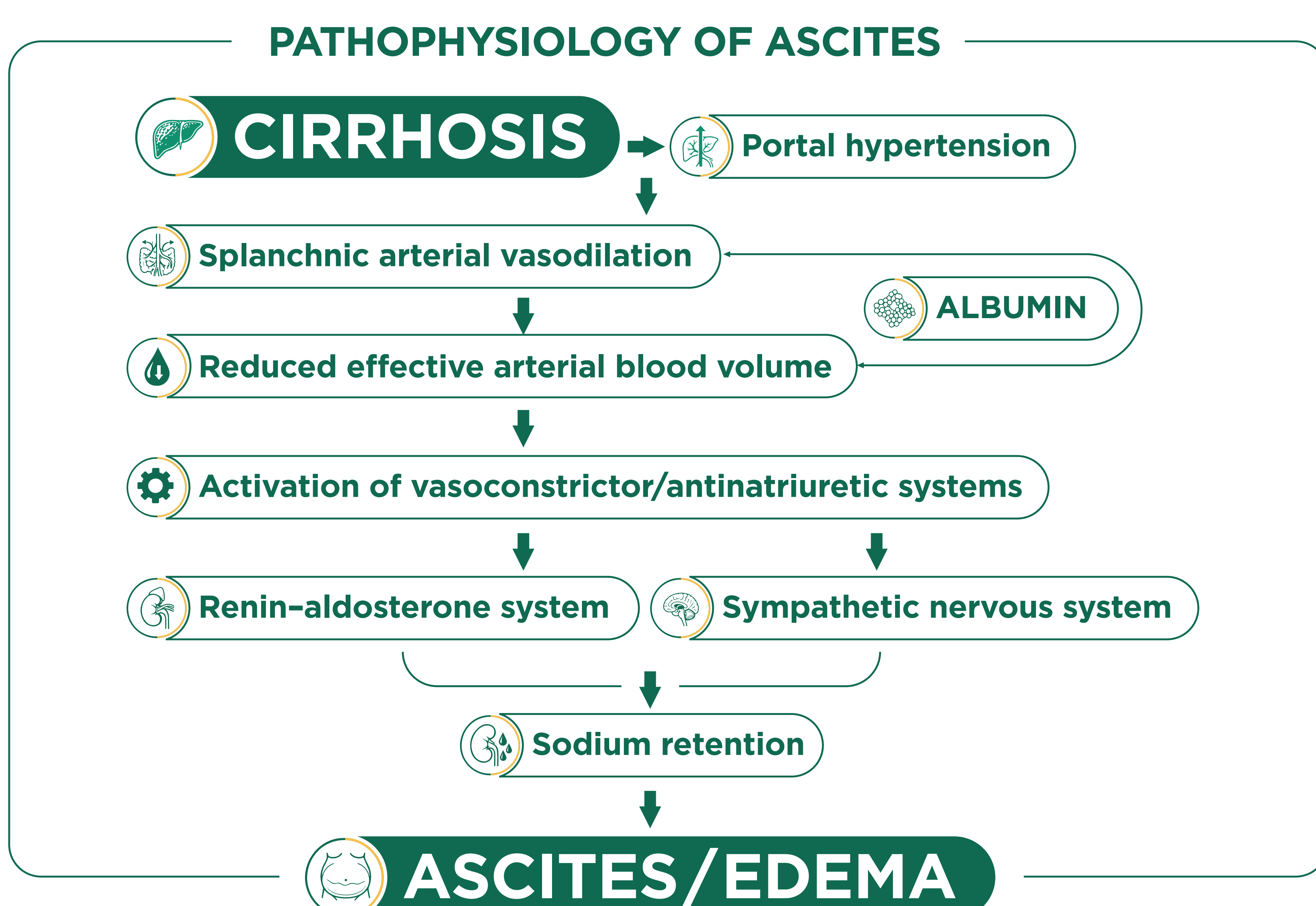
- Albumin restores vascular tone by binding systemic vasodilators and pro-inflammatory mediators that impair arterial contractility.^{3,4}
- It improves systemic hemodynamics by counteracting arterial vasodilation and stabilizing endothelial barrier integrity.^{3,4}

CLINICAL APPLICATIONS IN MANAGING EABV & PLASMA DERANGEMENTS

Addressing plasma volume derangements with albumin is a cornerstone strategy in preventing and managing decompensation episodes in cirrhosis.^{1,2}

- **Ascites & Large-Volume Paracentesis:** Albumin administration following paracentesis prevents paracentesis-induced circulatory dysfunction (PICD), stabilizing hemodynamics and plasma volume.^{1,2}
- **Spontaneous Bacterial Peritonitis (SBP):** Combining albumin with antibiotic therapy mitigates severe circulatory failure and lowers the risk of acute kidney injury.^{1,3,4,5}
- **Hepatorenal Syndrome (HRS-AKI):** Albumin combined with vasoconstrictors (terlipressin or norepinephrine) improves renal perfusion by expanding EABV and reducing splanchnic pooling.^{1,3,4,5}

Summary: Schematic representation of the proposed pathogenesis of ascites and edema formation in cirrhosis.



CLINICAL PEARL

Portal hypertension is not merely a localized liver pressure issue, but a systemic hemodynamic disorder. Effective arterial volume expansion with albumin addresses both splanchnic arterial vasodilation and neurohumoral hyperactivity.¹⁻⁴

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*The cases presented are hypothetical in nature and for illustrative purposes only. The management strategies discussed are evidence-based and aligned with established clinical guidelines and scientific literature.

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References:

1. European Association for the Study of the Liver (EASL). Guidelines on Decompensated Cirrhosis, 2018–2023 updates. 2. Bernardi M, Maggioni C, Zaccherini G. Albumin in cirrhosis: role in systemic hemodynamics and inflammation. Hepatology. 3. Jalan R, Bernardi M. Effective albumin concentration and cirrhosis mortality: From concept to reality. J Hepatol. 2013;59:918–920. 4. Ginès P, Krag A, Abades JG, Solà E, Fabrellas N, Kamath PS. Management of portal hypertension and ascites in cirrhosis. Gastroenterology. 5. Solà E, Ginès P. Renal and circulatory dysfunction in cirrhosis: Current management and future perspectives. J Hepatol. 2010;53:1135–1145.

AKI: Acute Kidney Injury | **EABV:** Effective Arterial Blood Volume | **EASL:** | European Association for the Study of the Liver | **HRS:** Hepatorenal Syndrome | **HRS-AKI:** Hepatorenal Syndrome–Acute Kidney Injury | **PICD:** Paracentesis-Induced Circulatory Dysfunction | **RAAS:** Renin–Angiotensin–Aldosterone System | **SBP:** Spontaneous Bacterial Peritonitis