

Adapted from UHC Guidelines for the Use of Albumin, Nonprotein Colloid, and Crystalloid Solutions, May 2000.

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Hemorrhagic Shock

- ◆ Crystalloids should be considered the initial resuscitation fluid of choice.
- ◆ Nonprotein colloids may be considered over crystalloids when crystalloids (4 L) have failed to produce a response within 2 hours for adult patients.
- ◆ When nonprotein colloids are contraindicated*, albumin 5 percent may be used.
- ◆ Patients who experience shock symptoms while under-going hemodialysis are included in this guideline.

出血性休克

- ◆ 晶体溶液可以作为首选药物用于扩张血容量。
- ◆ 成人患者输入4L晶体液后2小时无效，可考虑非蛋白胶体液。
- ◆ 当对非蛋白胶体液有禁忌，可以考虑使用5%白蛋白。
- ◆ 在进行血液透析过程中出现休克表现，也符合如上处理原则。

Nonhemorrhagic (Maldistributive) Shock

- ◆ Crystalloids should be considered first-line therapy for nonhemorrhagic shock. Clinical trials have not shown colloids to be more effective in treating sepsis.
- ◆ In the presence of capillary leak with pulmonary and/or severe peripheral edema, the administration of up to 4 L of crystalloids in adults before using colloids is appropriate.
- ◆ If nonprotein colloids are contraindicated*, albumin may be given.
- ◆ Nonprotein colloids and albumin should be used with caution in patients with systemic sepsis.

非出血性（分布异常性）休克

- ◆ 对于非出血性休克，晶体溶液可作为一线治疗药物。临床研究尚未证实胶体溶液用于治疗败血症更有效。
- ◆ 发生毛细血管渗漏伴肺水肿或严重外周水肿时，使用胶体溶液之前，成人患者应先给予4L晶体溶液。
- ◆ 如果非蛋白胶体溶液存在禁忌，给予白蛋白。
- ◆ 对于败血症的患者，应慎用非蛋白胶体和白蛋白。

Thermal Injury

- ◆ Fluid resuscitation should be initiated with crystalloid solutions.
- ◆ If crystalloid resuscitation exceeds 4 L in adults 18 to 26 hours postburn, and burns cover more than 30 percent of the patient's body surface area, nonprotein colloids may be added.
- ◆ If nonprotein colloids are contraindicated*, albumin may be used

烧伤

- ◆ 晶体溶液可作最初扩张血容量之用。
- ◆ 成人患者烧伤后18-26小时内使用的晶体溶液已超过4L，烧伤面积大于体表面积的30%，加用非胶体溶液。
- ◆ 如果非蛋白胶体溶液存在禁忌，给予白蛋白。

Cerebral Perfusion Pressure (CPP)

- ◆ Crystalloid administration should be the first choice of treatment in maintaining CPP for treatment of vasospasm associated with subarachnoid hemorrhage, cerebral ischemia, or head trauma. Patients with elevated hematocrits should first receive crystalloids to expand intravascular volume. Mannitol should be used to reduce intracranial hypertension.
- ◆ If cerebral edema is a concern, albumin should be used in concentrated form (25 percent) as a colloid to maintain CPP.
- ◆ If the hematocrit is less than 30, use packed red blood cells to increase the intravascular volume and maintain CPP. If volume therapy alone is ineffective, vasopressors may be needed

脑灌注压 (CPP)

- ◆ 对于蛛网膜下腔出血、缺血性中风和头部创伤引起的血管痉挛，应首选晶体溶液维持 CPP。红细胞比容偏高的患者应首先用晶体溶液来扩张血容量。可应用甘露醇降低颅内压。
- ◆ 如果存在脑水肿的危险，应使用高浓度白蛋白（25%）胶体液维持 CPP。
- ◆ 如果红细胞比容低于 30，使用浓集红细胞扩张血容量和维持 CPP。如扩容治疗无效，应使用血管收缩药。

Nutritional Intervention

- ◆ Albumin should not be used as a supplemental source of protein calories in patients requiring nutritional intervention.
- ◆ Patients who cannot tolerate enteral feeding may benefit from the administration of nonprotein colloids if all of the following conditions are met:
 1. Serum albumin less than 2.0 g/dL
 2. Functioning gastrointestinal tract
 3. Failed short-chain peptide formulas

营养干预

- ◆ 对于需要营养干预的患者，白蛋白不能作为蛋白质的补充来源。
- ◆ 对于不能耐受肠道喂食的患者，如符合下列各条件，使用非蛋白胶体则可能获益：
 1. 血清白蛋白浓度低于 2.0g/dl
 2. 严重腹泻 (>2L/d)
 3. 使用短肽治疗无效

Cardiac Surgery

- ◆ Crystalloids should be the fluid of choice as the priming solution for cardiopulmonary bypass pumps.
- ◆ The use of nonprotein colloids in addition to crystalloids may be preferable in cases in which it is extremely important to avoid pulmonary shunting.
- ◆ For postoperative volume expansion, crystalloids should be considered first-line therapy, followed by nonprotein colloids, and finally albumin.

心脏手术

- ◆ 晶体溶液应作为体外循环泵的首选溶液。
- ◆ 亟须避免发生肺间质积液时，联合使用非蛋白胶体和晶体溶液效果更好。

- ◆ 术后扩充血容量，首选晶体溶液，其次为非蛋白胶体，最后是白蛋白。

Hyperbilirubinemia of the Newborn

- ◆ Albumin should not be administered in conjunction with phototherapy.
- ◆ Albumin may be a useful adjuvant to exchange transfusions when administered concurrently with blood transfusion but it should not be used before transfusion.
- ◆ Crystalloids and nonprotein colloids do not have bilirubin binding properties and should not be considered as alternatives to albumin.

新生儿高胆红素血症

- ◆ 白蛋白不能与光疗同时使用。
- ◆ 输血时给予白蛋白，可作为换血疗法的辅助治疗，但输血之前不能使用。
- ◆ 晶体溶液和非蛋白胶体不能胆红素结合，因此不能作为白蛋白的替代品。

Cirrhosis and Paracentesis

- ◆ Diet modification (2 g sodium restriction/day) in conjunction with diuretic therapy should be first-line therapy in adult patients who have cirrhosis with ascites.
- ◆ When these fail or are not tolerated and large-volume paracentesis (greater than 5 L) is needed, albumin (25 percent: 6 to 8 g/L removed) or nonprotein colloids should be considered the solution of choice.
- ◆ Crystalloids should be considered as adjunctive therapy in patients with cirrhosis when less than 3 L are removed and repletion of intravascular volume is of concern.
- ◆ Using albumin alone to treat ascites without large-volume paracentesis or to treat patients with noncirrhotic postsinusoidal portal hypertension should be avoided.

肝硬化和穿刺术

- ◆ 肝硬化腹水的成人患者，首选饮食调节（每日限钠 2 g）联合利尿治疗。
- ◆ 当上述治疗失败或不能耐受，或大量(> 5 L)腹水需行穿刺术时，可给予白蛋白(25%：每抽取 1 升腹水补充 6-8 g 白蛋白)或非蛋白胶体溶液。
- ◆ 抽取腹水量< 3L 并且需要扩充血容量的肝硬化患者，晶体溶液可作为联合治疗。
- ◆ 避免单独使用白蛋白治疗未进行穿刺的肝腹水患者或非肝硬化性窦后性门静脉高压的患者。

Nephrotic Syndrome

- ◆ Diuretic therapy alone is the treatment of choice.
- ◆ If diuretic therapy fails, then short-term use of 25 percent albumin in conjunction with diuretic therapy is appropriate for patients with acute severe peripheral or pulmonary edema who have failed diuretic therapy.

肾病综合征

- ◆ 单独应用利尿治疗。
- ◆ 急性严重性外周水肿或肺水肿的患者利尿治疗失败时，可短期应用 25% 的白蛋白联合利尿治疗。

Kidney and Liver Transplantation

- ◆ The effectiveness of albumin and nonprotein colloids during and after renal transplantation surgery has not been conclusively demonstrated.

- ◆ Because of excessive blood loss, volume expanders such as crystalloids, blood products, nonprotein colloids, and albumin may be required intraoperatively for liver transplants.
- ◆ Albumin and nonprotein colloids may be useful for postoperative liver transplant patients to control ascites and severe pulmonary and peripheral edema.
- ◆ Albumin may be used if the following conditions are met:
 1. Serum albumin less than 2.5 g/dL
 2. Pulmonary capillary wedge pressure less than 12 mm Hg
 3. Hematocrit greater than 30 percent

肾脏和肝脏移植

- ◆ 肾脏移植术中及术后使用白蛋白和非蛋白胶体溶液的有效性尚未证实。
- ◆ 肝脏移植患者，由于术中失血过多，术中可能需要使用晶体溶液、血液制品、非蛋白胶体和白蛋白等扩容剂。
- ◆ 肝脏移植术后患者使用白蛋白和非蛋白胶体，可有效控制腹水、肺水肿和外周水肿。
- ◆ 当符合下列条件，可使用白蛋白：
 1. 血清白蛋白浓度低于 2.5 g/dl
 2. 肺毛细血管楔压低于 12 mmHg
 3. 红细胞比容高于 30%。

Plasmapheresis

- ◆ The use of albumin in conjunction with large volume plasma exchange (greater than 20 mL/kg in one session, or greater than 20 mL/kg/week in repeated sessions) is appropriate.
- ◆ Nonprotein colloids and crystalloids may be substituted for some of the albumin in therapeutic plasmapheresis procedures and should be considered cost-effective exchange mediums.

血浆置换

- ◆ 大量血浆置换（单次 >20 ml/kg 或 >20 ml/kg/周）时可联合使用白蛋白。
- ◆ 治疗性血浆置换时，非蛋白胶体和晶体溶液作为经济有效的置换介质，可以替代白蛋白。

Other Uses Considered Appropriate on the Basis of Limited Medical Evidence and Results of the Consensus Exercise

1. Erythrocyte Sedimenting Agent
 - a. Granulocytapheresis (nonprotein colloids): As a sedimenting solution for the collection of granulocytes and for acute cytoreduction in leukemia with symptomatic hyperleukocytosis.
 - b. Stem cell separation (nonprotein colloids) for major ABO-incompatible bone marrow transplantation.
2. Cryopreservation
 - a. Cryopreservation solutions for solid-organ transplant (albumin or nonprotein colloids).
 - b. Stem cell cryopreservation (nonprotein colloids): As part of preservation solutions for frozen storage of hematopoietic stem cells.
3. Pretreatment of Dacron grafts before surgery and to decrease bacterial adherence.
4. Acute normovolemic hemodilution in surgery (nonprotein colloid only appropriate).

根据有限的医学证据和专家共识，其它合理应用

1. 红细胞沉淀剂
 - a. 粒细胞净化疗法（非蛋白胶体）：粒细胞收集和有症状的白血病急性减瘤的沉淀剂。
 - b. ABO 不相容性骨髓移植的干细胞分离（非蛋白胶体）。
2. 冷冻保存
 - a. 固体器官移植的冷冻保存液（白蛋白或非蛋白胶体）。
 - b. 干细胞冷冻保存（非蛋白胶体）：造血干细胞冷冻保存液的一部分。
3. 术前涤纶血管移植物的预处理，减少细菌附着。
4. 外科手术中急性等容性血液稀释（仅非蛋白胶体适用）。

Other Uses Considered Inappropriate on the Basis of the Results of the Consensus

Exercise

1. Hypoalbuminemia
2. Impending hepatorenal syndrome
3. Increasing drug efficacy
4. Acute pancreatitis
5. Chronic pancreatitis
6. Volume expansion in neonates, unless expansion with 10 mL/kg of crystalloids was unsuccessful
7. Acute normovolemic hemodilution in surgery (albumin inappropriate)
8. Intradialytic blood pressure support
9. Ovarian hyperstimulation syndrome

根据专家共识，其它不合理应用

1. 低白蛋白血症
2. 潜在的肝肾综合征
3. 提高药物疗效
4. 急性胰腺炎
5. 慢性胰腺炎
6. 新生儿扩容治疗，除非 10 mL/kg 晶体溶液扩容失败
7. 外科手术中急性等容性血液稀释（白蛋白不适用）
8. 透析中血压支持
9. 卵巢过度刺激综合征

Crystalloid solutions: lactated Ringer's solution, 0.9% sodium chloride solution

Nonprotein colloid solutions :hetastarch, dextran, and other synthetic colloidal products

*Relative contraindications to the use of nonprotein colloids:

Previous hypersensitivity to the components of the solution

Underlying bleeding disorders

Risk of serious intracranial hemorrhage

Renal failure with either oliguria or anuria

晶体溶液：林格氏液，0.9%氯化钠溶液

非蛋白胶体溶液：羟乙基淀粉、右旋糖酐和其他合成胶体产品

*非蛋白胶体溶液的相关禁忌症：

- 对溶液成分有过敏史

- 潜在出血紊乱
- 严重颅内出血风险
- 少尿或无尿肾衰