

Critical Decisions

CD-ROM Sales Guide

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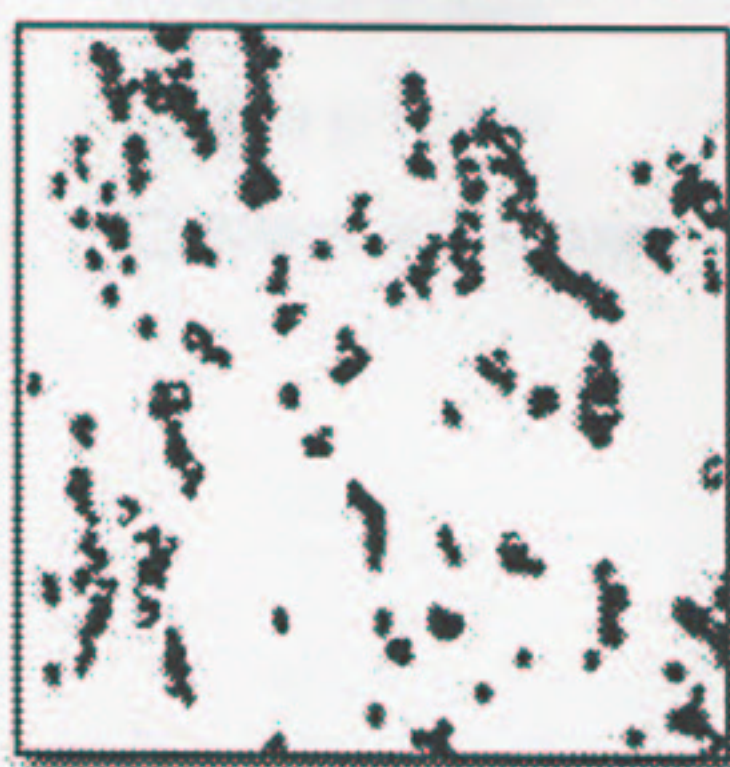
STORAGE CHANGES BLOOD

Storage Changes Blood

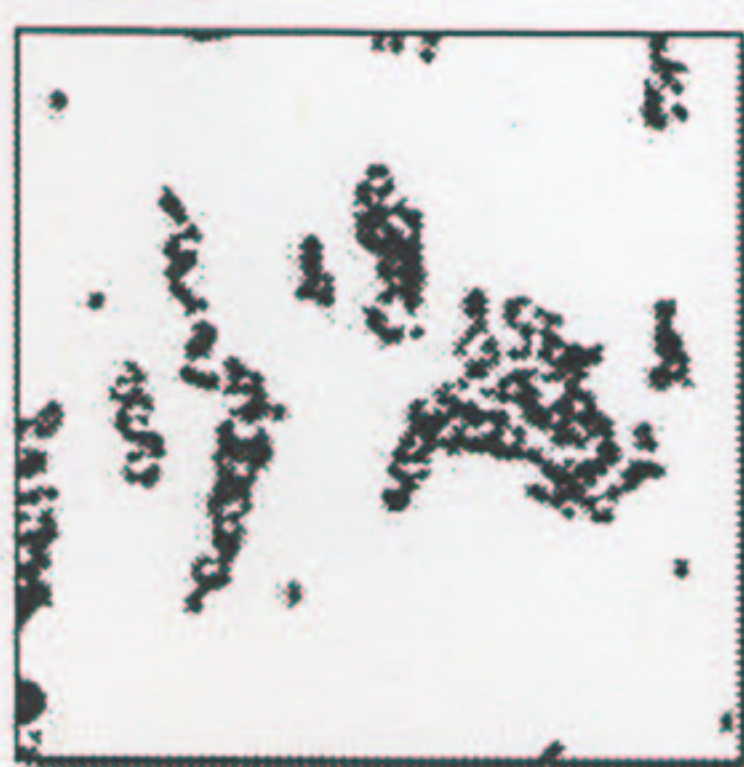
Additional Consequences of Blood Storage

- Storage of RBCs may significantly impair the viability of transfused red blood cells¹
- The transfusion of stored red blood cells may increase aggregability in vivo.²

Micrographs of RBC Aggregates²



Fresh blood



Blood stored 35 days

Reproduced with permission from: Hovav et al. Transfusion. 1999;39:277-281.

Use this interactive quiz to stimulate audience participation. Healthcare providers may be surprised to learn that the blood supply is older than they think.

These photographs show RBCs under a microscope. Note that the stored cells (right) aggregate (clump) together more closely, which can impair blood flow and lead to a variety of serious clinical consequences.

You can also use this screen as a lead-in to the next section, *Risks of Old Blood*. Point out that last in the presentation, that up to that blood stored for much less than 42 days (the maximum length allowed) is associated with significant changes and risks.

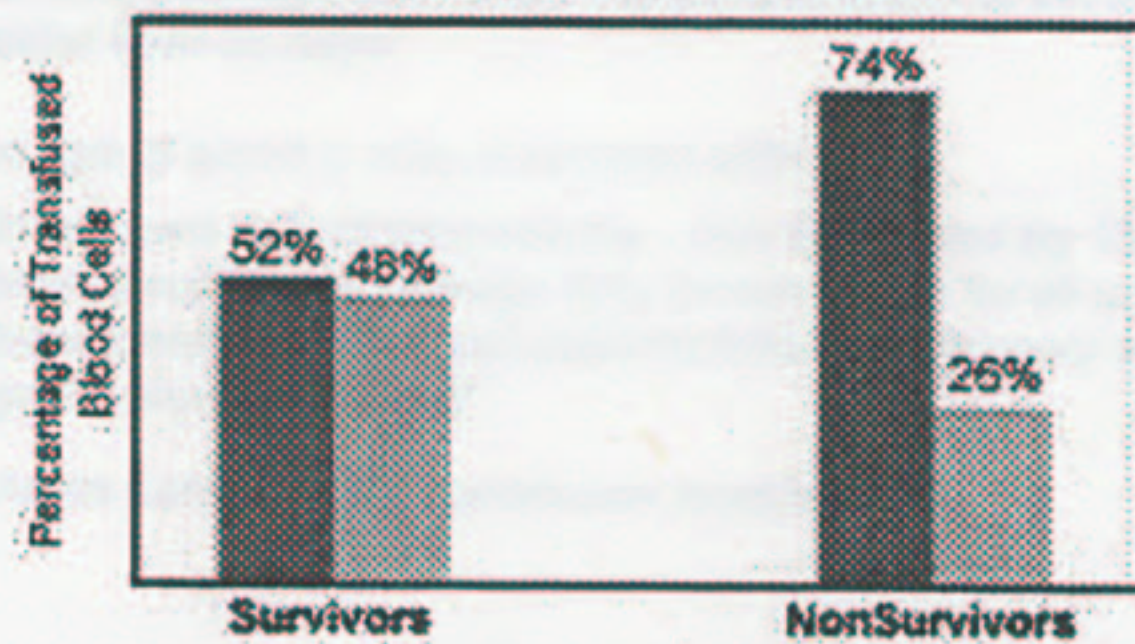
PRESENTATION TIP:

This questionnaire is not meant to gauge audience knowledge as much as to stimulate discussion. Be careful not to embarrass anyone who provides a wrong answer. After the correct answer is revealed, remind the audience that healthcare providers are usually surprised by this statistic. You may also suggest that a physician check the date on the bags being hung if they're interested in knowing the age of the blood.

Old Blood and Mortality

The Age of Red Blood Cells Transfused Is Associated With Mortality

"Aged" blood (>16 days) is associated with increased mortality in ICU patients with severe sepsis¹



Proportion of packed red blood cell (PRBC) units of different age transfused to survivors and nonsurvivors during sepsis ($P < .0001$). n=number of PRBC units in each subgroup.¹

■ PRBC ≤ 16 days old
■ PRBC > 16 days old

Adapted from Purdy FR, Tweeddale MG, Merrick PM. Association of mortality with age of blood transfused in septic ICU patients. *Can J Anaesth*. 1997;44:1256-1261.

These bar charts show ICU patients with severe sepsis. Survivors received a significantly smaller proportion of "old" blood than nonsurvivors.

Point out that although the blood supply is now relatively safe from infectious diseases such as HIV, transfusions are far from risk free.

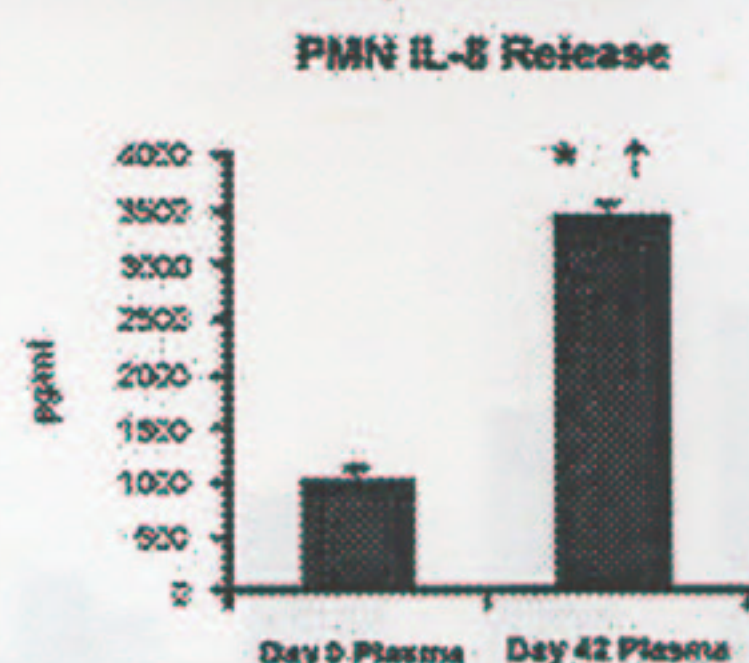
Explain that although the use of anti-pyretics has reduced the likelihood of fever associated with transfusion reactions, many patients continue to experience chills and discomfort severe enough to require additional medication.

Heddle et al found that the age of stored blood correlates with the rate of reactions. The authors believe these reactions may be "directly related to the stimulation and release of biologic mediators within the blood component during the storage period."

ADDITIONAL TRANSFUSION RISKS

Transfusion Risks Transfusion Risks (Continued)

- **The release of inflammatory cytokines.** Plasma from PRBCs stored for 42 days* selectively primes neutrophils (PMN) to release interleukin-8 (IL-8) and secretory phospholipase A₂, which may be one of the mechanisms responsible for the development of MOF¹



Healthy donor PMNs were incubated with 20% PRBC plasma in RPMI for 24 hours and the release of IL-8 was measured. Day 0 plasma did not stimulate IL-8 release, whereas plasma from Day 42 PRBC stimulated significant IL-8 release, *P<.05 from Day 0 and †P<.05 from RPMI.

*PRBCs stored for 42 days are considered transfusable under American Association of Blood Banks guidelines.

Transfusion Risks Transfusion Risks (Continued)

- **Transfusion-related acute lung injury (TRALI)¹**
- **More frequent opportunistic infections in HIV-infected patients²**
- **A higher incidence of serious bacterial infection and pneumonia in transfused patients undergoing hip fracture repair³**
- **Volume overload⁴**

PRESENTATION NOTES:

Inflammatory cytokines, such as interleukin-8 (IL-8) and secretory phospholipase A₂ (sPLA₂), are proteins that regulate the intensity and duration of the immune response to foreign invaders. An overabundance of cytokines will affect blood circulation and may injure healthy tissue, leading to MOF. **Neutrophils** are mature white blood cells that break down and eat bacteria, cellular debris, and solid particles. **Neutrophil priming** is a process in which neutrophils are prepared to respond to a stimulus.