Carter BloodCare
SPECIALTY SERVICES

Blood Matters

Nov/Dec 2020

News for Blood Bank Medical Directors, Physicians and the Lab

Blood Matters is a quarterly news *outlet with important medical information for you, our customers and colleagues, from Carter BloodCare. We hope you will share it with others interested in the work we do together.*

IN THIS ISSUE

HOT TOPICS

When is it Appropriate to Transfuse Rare Red Blood Cells?

William Crews, MD

A rare blood type is typically defined when a patient has become alloimmunized to a high prevalence antigen (a prevalence rate of 1:1000 persons), or alloimmunized to multiple common antigens where less than 1% of red cell donors can provide compatible blood. For example, an O negative patient has developed antibodies to E, K, Fya, Fyb, Jka, and S, requiring a donor who is group O and D-, E-, K-, Fy (a-b-), Jk (a-), and S-.

There may be times when a patient has undergone extended serological phenotyping, or molecular genotyping but has not made antibodies to every antigen for which they are negative. Some physicians may feel their patient should only receive red cells that are completely matched to the patient's phenotype in an effort to prevent alloimmunization. Another common request for rare RBCs is to have a unit available during surgery, planned cesarean section, or other invasive procedures, although transfusion may not be necessary. In these instances prophylactically transfusing a rare unit to prevent alloimmunization, or requesting a rare unit when the patient may not actually require transfusion is not the best use of a rare RBC unit since there may only be one available unit in our local inventory, or nationally, through the American Rare Donor Program, an international network of immunohematology reference laboratories that can provide and request rare RBC units for patients in their service area, of which Carter BloodCare is a member.

These examples may result in an alloimmunized patient who truly requires a rare RBC transfusion of being deprived of such a precious resource, jeopardizing their care.

If a rare RBC is frozen it expires 24-hours after thawing. If it is not determined the patient will definitely receive the transfusion prior to requesting the rare RBC, this precious resource will be wasted for not only this patient, but subsequent patients as well. The cost of a rare unit is around five times more expensive than a regular unit; this cost should be avoided when possible.

These are additional reasons why prophylactic transfusion of rare RBCs are not a best practice, and should be discouraged. Rare RBCs should only be requested and transfused when all other viable options have been exhausted, and the patient will definitely be transfused.

HOT TOPICS Continued

The following are alternatives that should be considered before transfusing rare RBCs:

1. Autologous Donation - If the patient does not require urgent transfusion and has a sufficient hemoglobin level, an autologous donation can be scheduled at a donation center. After the donation, the red cells will be processed, tested, labeled, and delivered to the hospital for transfusion in around 72 hours. If the patient is not transfused, the unit can be returned where it can be frozen for up to 10 years, should the patient need a transfusion during that time.
2. Family Donation - If the patient is unable to do an autologous donation, family members, especially siblings, can be counseled and phenotyped for compatibility for a possible donation to the patient.
3. Monocyte Monolayer Assay (MMA) - This is an in vitro test used to predict the potential clinical significance of red cell antibodies to high-frequency antigens. If the clinical significance of a patient's antibody is unknown, a MMA test will help determine if the patient can be safely challenged with a transfusion that has the corresponding red cell antigen.
4. Acute Normovolemic Hemodilution (ANH) - This procedure may be performed for patients who are undergoing surgery. ANH is the removal of one to three units of whole blood shortly after induction of anesthesia, with intravascular volume maintained using crystalloid or colloid replacement fluid. If the patient requires transfusion support during the procedure, the whole blood collected just prior to surgery can be returned to the patient as needed.

In summary, to preserve this precious resource for all, rare red cell units should be preserved for the patients with existing red cell antibodies, and only prepared for those patients in whom transfusion is known to be needed.

Reference:

Meny G., Flickinger C., Marcucci C. The American Rare Donor Program. Journal of Critical Care. 2013;28:110.e9-110e18

MEDICAL MINDS

What topics would you like to see in a future issue of Blood Matters?

Click **here** to submit your choice.

Prehospital Transfusion
Frances Compton, MD

There is growing interest in the use of prehospital blood transfusion in bleeding trauma patients. However, supporting data has, historically, been inconsistent and scarce. Two large retrospective studies found that prehospital civilian transfusion had contradictory results; improved 24 hour survival[1] versus no 24 hour survival advantage.[2] However, military combat studies have shown that prehospital transfusion with either RBCs and/or plasma does confer a survival benefit.[3] None of the above studies were randomized trials, and, therefore, have their limitations.

However, even 2 randomized civilian clinical trials resulted in differing conclusions on the topic. While the PAMPer study found that prehospital transfusion of thawed plasma resulted in a lower 30 day mortality in patients transported by air ambulance,[4] the COMBAT study did not show a similar survival benefit in patients transported by ground ambulance.[5] The difference between the 2 study results may, in some part, be due to the fact that the air ambulance travel time was double the ground ambulance travel time. Perhaps prehospital transfusion improves mortality rates only during longer travel times? A post hoc analysis of the 2 prospective randomized trials described above did find that there is a survival benefit when plasma is transfused for prehospital transport times greater than 20 minutes.[6]

While growing evidence shows that prehospital plasma (and possibly RBC) transfusion improves the survival of bleeding trauma patients, there are logistical challenges to this practice. Unfortunately, the universally compatible blood products (type O RBCs and type AB plasma) are in high demand. Type A plasma is being used more frequently for emergency transfusion in lieu of universal AB plasma, which is much more rare. Also, different types of blood products have different storage requirements and expiration times. It may be more feasible to use liquid (never frozen) plasma rather than traditional thawed plasma for prehospital transfusion as liquid plasma has a shelf life of 26 days (versus 5 days).[7] Of interest, one of the large retrospective civilian studies reported a very minimal blood product wastage rate of 1.9%, despite placing 942 blood products on emergency helicopters throughout the study period.[2] This is very promising, as wastage of blood products is paramount when deciding appropriate use and allocation of this limited resource.

At Carter BloodCare, we provide type O red blood cells and type A liquid plasma to air ambulances in the area. This correlates with the idea that patients who require longer travel times may benefit the most from prehospital blood transfusion. Furthermore, the use of liquid plasma allows for a much longer shelf life in order to prevent wastage of this valuable resource.

References:

1. Brown JB, Sperry JL, Fombona A, et al. Pre-Trauma Center Red Blood Cell Transfusion Is Associated with Improved Early Outcomes in Air Medical Trauma Patients. J Am Coll Surg. 2015; 220 (5): 797-808.

2. Holcomb JB, Donathan DP, Cotton BA et al. Prehospital transfusion of plasma and red blood cells in trauma patients. Prehosital Emergency Care. 2015; 19:1-9.

3. Shackelford SA, el Junco DJ, Powell-Dunford N, et al. Association of prehospital blood product transfusion during medical evacuation of combat casualties in Afghanistan with acute and 30-day survival. JAMA. 2017; 318 (16): 1581-1591.

4. Sperry JL, Guyette FX, Brown JB et al. Prehospital plasma during air medical transport in trauma patients at risk for hemorrhagic shock. The New England Journal of Medicine. 2018; 379: 315-26.

5. Moore HB, Moore EE, Chapman MP, et al. Plasma-first resuscitation to treat haemorrhagic shock during emergency ground transportation in an urban area: A randomised trial. Lancet. 2018; 392: 283–91.

6. Pusateri AE, Moore EE, Moore HB, et al. Association of prehospital plasma transfusion with survival in trauma patients with hemorrhagic shock when transport times are longer than 20 minutes: A post hoc analysis of the PAMPer and COMBAT clinical trials. JAMA Surgery. 2020; 155 (2).

7. Cannon JW. Prehospital damage-control resuscitation. The New England Journal of Medicine. 2018; 379 (4): 387-388.

CCP High/Low What Does it Mean?
Geeta Paranjape, MD

On August 23, 2020, FDA granted Emergency Use Authorization (EUA) to use convalescent plasma (CCP) as part of the treatment option for patients admitted to the hospital with COVID-19 infection.[1] Prior to the EUA, CCP was being used as an Investigational New Drug (IND) and in Mayo Clinic's Expanded Access Program (EAP). These studies proved the safety of using CCP in COVID-19 patients.

FDA had indicated that they would like to have a certain level (titer) of neutralizing antibodies to the virus in the CCP unit in order to show its efficacy. It is technically challenging to perform this assay and most clinical laboratories will not be able to perform these titers. In light of this, the FDA specified that the EUA CCP units must be tested for titer by a specific test (Ortho SARS CoV 2 IgG assay), with the option left open to add more tests if manufacturers submit relevant data to FDA. If the CCP units' titer results meet a certain threshold, they are to be labeled as "High titer", and, if below that, to be labeled "Low titer".[1]

While data regarding the efficacy of CCP is still limited, early trial results are becoming more available. Some comparative studies have shown that high titer CCP does improve patient survival,[2] while other studies question the utility of CCP.[3] No study has specifically compared the benefit of using high titer versus low titer CCP.

It is not yet known how long COVID-19 antibodies will last, and at what titer they will persist. The FDA has not asked or mandated that only high titer units be used for transfusion, recognizing that many CCP units may be low titer. Carter BloodCare's preliminary data regarding CCP antibody titers (in preparation for implementation of EUA) indicate that the majority of CCP units are low titer (~70%), and probably have been low titer since we started issuing CCP for patient use. Therefore, in the interest of meeting the needs of our community as we enter a new phase of the pandemic, we plan to continue the distribution both low and high titer CCP moving forward.

The original guidance issued on September 2nd, 2020 allowed blood collection agencies to utilize CCP labeled with Investigational New Drug (IND) until December 1st, 2020, but that deadline now has been extended to February 28th, 2021.[1] Since Carter BloodCare may be importing CCP from centers that have not implemented the titer testing, hospitals may receive CCP either with IND or EUA titer label until February 28th, 2021.

References:

1. Food and Drug Administration. Investigational COVID-19 Convalescent Plasma: Guidance for Industry. Issued November 16, 2020. https://www.fda.gov/media/136798/download

2. Salazar E, Christensen PA, Graviss EA, et al. Treatment of coronavirus disease 2019 patients with convalescent plasma reveals a signal of significantly decreased mortality. The American Journal of Pathology. Nov 2020; 190 (11): 2290-2303.

3. Gharbharan A, Jordans CCE, Geurtsvankessel C, et al. Convalescent Plasma for COVID-19. A randomized clinical trial. Pre-print posted July 3, 2020; (not peer-reviewed). https://www.medrxiv.org/content/10.1101/2020.07.01.20139857v1?utm_source=quora&utm_medium=referral

PHYSICIAN RESOURCES

Download updates

- Investigational COVID-19 Convalescent Plasma Guidance for Industry
- AABB Billing Guide for Blood Products and Related Services

A Reminiscence on My Career in Blood Banking (So Far)

Laurie J Sutor, MD, MBA

I have been in the blood banking world now since 1987 when my Transfusion Medicine faculty professor at UT Southwestern talked me into doing a "fellowship" mid-residency. He was going to be away dealing with the duties of being president of AABB and wanted someone back home minding the blood bank. I accepted the challenge because I was a little scared and awed by blood banking after only 6 weeks experience my first year as a resident. I didn't feel prepared to go out into the world taking blood bank call. Little did I know that year would completely change my career path. I found my niche and the rest is history. I chose to become a full-time blood bank professional and have now spent 33 years immersed in our fascinating field.

Many of my advisors at the time told me to avoid blood banking and pick another field as I was graduating from pathology residency. After all, artificial blood was on the horizon, and when it was fully developed, they said, I "would be out of a job!" We all know how that has turned out. Further, in the late eighties we were in the midst of a reign of HIV litigation in the blood banking world. (Remember, the HIV test for blood donors was put in place in March of 1985.) Insurance companies were dropping blood centers from coverage right and left. Who would want to have to be going to court to testify all the time? Surely, I would prefer to be a nice safe surgical pathologist?

But I ignored their sage advice and soldiered on into the donor room. My mom thinks it's odd that I have a career that leads me to have visited nearly every hospital and high school in the metroplex (the hospitals as clients, and the high schools as sites of blood drives with more donor reactions). So, what has happened in the last 30+ years? Some things have changed dramatically, but others have stayed virtually the same since I first set foot in the lab. Let's look at some examples of what has changed:

1) Automated testing in the immunohematology lab. We once thought automation was only for chemistry instruments, and couldn't really imagine a "walk-away" solution to replace tube testing for agglutination in the blood banking. But gel testing and other solid phase techniques have allowed the development of instruments to do just that. The advantages of this are decreases in errors, delayed reading of results, better documentation, and staff time savings.

2) Molecular red cell genotyping. This advance has not only become commonplace and really essential for some work-ups, but easy enough that many larger labs can implement it. In the donor center it has improved the way we look for rare donor units and increased the number of those units available for transfusion.

3) Computer systems. It was all paper when I started all those years ago. Now we have much safer and more efficient blood banks with computer advancements. We have computer labeling, electronic crossmatches, and bar code checks of transfusion recipients with their blood products, to name a few major developments. Donors can fill out their questionnaires before coming to the blood drive on their mobile devices, and the computer will block donation or release of the blood if the donor doesn't meet eligibility requirements.

4) Safer blood. I saw the test for hepatitis C antibodies get implemented in 1990 (for which work Harvey Alter just won the Nobel Prize this fall). "Non-A, non-B hepatitis" was one of the biggest scourges in blood banking, at one time infecting 1 in 10 transfusion recipients. It wasn't quite that bad at the time I started in the profession because HIV precautions had decreased the risk somewhat by excluding some high-risk behaviors in donors. ALT screening and anti-HBcore testing had eliminated others at risk. But it was still a huge breakthrough to get the anti-HCV EIA test approved and implemented in May of 1990. Since then, many other blood safety initiatives have come along. Today, the public confidence in the safety of the blood supply is high, and autologous and directed units of blood, which used to be quite in demand as blood safety measures, have nearly disappeared from our shelves.

And yet some things remain the same. A lot of red cell serology is the same. You can still pick up the 4th edition of Issitt's Applied Blood Group Serology, published in 1998, and find troves of useful information. In fact, they were selling reprints of it at last year's AABB meeting in San Antonio (autographed on the spot by Peter Issitt). We also make components from whole blood exactly the same as when I was a resident. This may change in the future, as automated component-making equipment is available in Europe and under development in the United States. But for now, most blood centers in the U.S. are doing it all manually, more art than science.

I look forward to a few more years yet in this great field, and more exciting changes to come.

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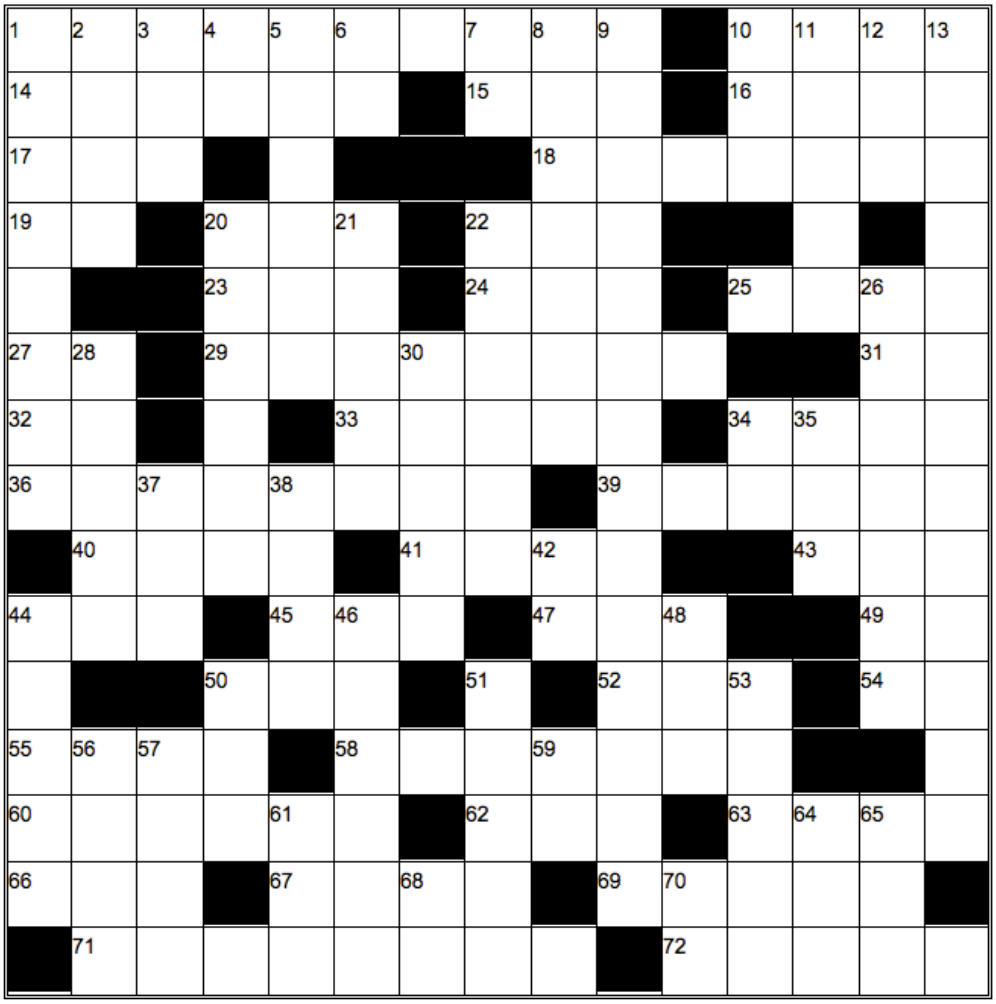
CROSSWORD PUZZLE - *Created by Dr. Laurie Sutor*



- Click **here** to download the answer key.

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CROSSWORD PUZZLE - *Created by Dr. Laurie Sutor*

Across

1. G-CSF
10. Western ____ for HIV testing
14. Obliterated
15. Sault ___ Marie, Mich.
16. He dueled with Hamilton
17. It represents one donor in a panel on a patient antibody workup
18. ABO incompatibility sets off the complement _____
19. Health care worker who can access central lines (abbr)
20. Fall behind
22. Author Anne Rice met her husband at and graduated from this local public school in 1959 (abbr)
23. Safety measure to reduce febrile transfusion reactions (abbr)
24. Languish about the house sick
25. What we once called “pre-owned” cars
27. A common skin test required for health care professionals (abbr)
29. Benny Goodman’s instrument
31. Blood group whose expression is related to one’s secretor status (abbr)
32. Cytokine release syndrome in CAR-T treatment is due mostly to ___-6 (abbr)
33. Feature of Dracula in cartoons
34. To examine by touching
36. _____ chamber – old way of manually counting WBCs for QC.
39. Massive transfusion is defined as the replacement of greater than one blood ____ in 24 hours
40. Old name for hepatitis C (abbr)
41. It comes out of a brainstorming session
43. Kylo ___: Star Wars villain first seen in “The Force Awakens”
44. Therapeutic transfusion product used for COVID-19 (abbr)
45. Airport code for Hilo, Hawaii
47. Anticoagulant used in Trima apheresis collections (abbr)
49. Neonate (abbr)
50. Volkswagen model, or old company that made platelet antibody kits
52. Lab test for inflammation (abbr)
54. “Eres ___ “: hit 1973 song by Mocedades
55. Award with a sports focus
58. Bernard- _____ disease of platelets
60. Wasp injuries
62. Amusement
63. Universal red cell donor, for short
66. Abbreviation on a business card in the past
67. ____ Coast Regional Blood Center
69. The region of the antecubital fossa
71. Company that makes the Prodigy cell processing device
72. Angled point of a medical needle

Down

1. Lab test for stored 2 down
2. Element in heme
3. Poiseuille’s ___ governing the flow of IV fluids in a catheter
4. Country Western singer with the hit “All My Exes Live in Texas” (init)
5. An FDA action for unsuitable blood products
6. Sales spot
7. Poet __ Eliot (init)
8. Symptom of an allergic transfusion reaction
9. Injection that will defer a donor for two weeks (2 wds)
10. Fawlty Towers network (abbr)
11. Traditional Hawaiian feasts with entertainment
12. Chicago O’Hare airport code
13. Head down, feet up position for fainting donors
20. ____ Wilbanks, disbarred lawyer in the novel “A Time to Kill”
21. _____ vs host disease
22. “It ____ cats and dogs yesterday” (idiom)
26. Something in the Periodic Table
28. Mel _____, voice of Bugs Bunny
30. C/T ___ is a quality monitor of transfusion services to detect inappropriate blood crossmatching
34. Unit for MCV and MPV values on a CBC (abbr)
35. One of the 7 continents, for short
37. Anion ____
38. Published notice of death, for short
42. Per item, for short
44. ____ compressions, part of CPR
46. The “T” of HCT/P per FDA regulations
48. Beats by ____, popular headphones
50. OB-____, physician specialty
51. ____ coat; whole blood component consisting of WBCs
53. Item placed in monitored refrigerator to track temperatures
56. Peripheral blood ___ cell transplant
57. Tiny “hairs” on some bacteria
59. Blood group associated with BCAM gene (abbr)
61. Liver function test (abbr)
64. Month that the Hindu festival of lights (Diwali) falls in 2020 (abbr)
65. Ovine female
68. Common site for tumor cell metastasis (abbr)
70. First Lady of Number 43 (Init)