Carter BloodCare
SPECIALTY SERVICES

Blood Matters

Nov/Dec 2019

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

An Update on Artificial Blood

Laurie J. Sutor, MD, MBA

The search for a viable alternative to banked human blood for transfusion has been ongoing for nearly 80 years. The ideal blood substitute would be cheaper, stored at room temperature, have a long shelf life, cause no adverse reactions, and be in plentiful supply. We would not have to worry about compatibility for blood types or transmission of infectious diseases. Unfortunately, this scenario remains a pipe dream despite millions of dollars spent over countless years of research.

Red cell substitutes have traditionally fallen into two types: hemoglobin solutions and perfluorochemicals. Hemoglobin solutions have enjoyed modestly more success and have gotten to phase III clinical trials in the U.S., but none have won FDA licensure and none are currently available for routine commercial use in this country.

Hemoglobin solutions could be made from human, animal or recombinant hemoglobin, but all have had various issues with toxicity, rapid clearing from the blood stream, and other adverse events. A 2008 meta-analysis by Natanson et al published in JAMA (299:2304-12) showed a significantly increased risk of death and myocardial infarction in patients getting hemoglobin solutions in an analysis of 16 clinical trials involving five different products. One of these products, Polyheme, made by Northfield Labs from human hemoglobin, had one of the more publicized later trials. Its 2006 clinical trial in trauma patients showed increased mortality in the group getting the red cell substitute. Following this disappointment, and a failed bid for FDA approval, Northfield Labs went out of business in 2009 after more than 20 years of effort on this product.

Another hemoglobin product, Hemopure, made from bovine hemoglobin, has been commercially available for human use in South Africa since 2006 for the treatment of surgical patients who are acutely anemic. It is also approved for commercial sale in Russia for anemia of any etiology. It is available in the U.S. only for investigational or expanded access/compassionate use. Oxyglobin, made by the same company (now called Hemoglobin Oxygen Therapeutics) is FDA and EU approved for veterinary use as a treatment for anemia in dogs. No other hemoglobin solutions are commercially available.

Work continues on the hemoglobin solutions, however, with additional studies planned, and hope persists that further work in cross-linking molecules and encapsulating the hemoglobin will help reduce the problems previously encountered.

The perfluorochemicals (PFCs) work by carrying oxygen in solution. The PFCs are inert and must be dissolved in plasma with an emulsifying agent. The amount of oxygen PFCs carry is proportional to the amount of oxygen to which they are exposed. These compounds have had less success and less attention over the years. Fluosol-DA was a first-generation PFC used in some Jehovah's Witness patients. It had to be stored frozen and then administered with high levels of oxygen. FDA approved it in 1989, but its production ended in 1994 due to lack of use. Oxygent was a second-generation perfluorochemical that proceeded through phase III trials but was never FDA licensed.

The blood substitutes could serve an excellent niche for patients who cannot get traditional blood transfusion, or for transfusions occurring in austere or remote environments, where storage has its challenges. Although the flurry of activity that occurred in the last half of the twentieth century by many companies has abated in this area, work will likely continue on this front.

MEDICAL MINDS

What topic do you want included in the next issue of Blood Matters?

A) Cord blood transplantation
B) Why you should volunteer to be a lab assessor/inspector
C) CLIA competency – what does the Lab Director need to know
D) Other

Click **here** to submit your choice. If you answered ***D (Other)***, remember to include your topic.

HOT TOPICS Continued

A Concise Overview of Automated Blood Bank Testing Systems

William Crews, MD

While automation in the core lab has been commonplace for decades, automation within the transfusion service has become readily available only recently. There has been an increase in FDA approved systems by multiple vendors that allow automation of ABO/Rh(D) typing, detection and identification of IgG antibodies to red blood cell antigens, DATs and compatibility testing. Some systems have automated capability for RBC phenotyping or antibody titers.

The demand for automation has increased due to expanding workloads and the shortage of clinical laboratory scientists. In the past, the big players in the blood bank automation market were Ortho Clinical Diagnostics and Immucor. Bio-Rad and Grifols have joined them with their new instruments, the Tango infinity and Erytra, respectively. There are similarities between each system, and they all come in scalable versions, so whether the blood bank is small, mid-sized, or large, the appropriate model can be selected without loss of functionality if the flagship model is not purchased. All four manufacturers have systems that are capable of full automation, where a specimen tube is loaded onto the instrument and results can be sent to the laboratory information system (LIS) without any human interaction. This is compared to a semi-automated system where a tech pipettes reagents into a microplate or gel card, and after all samples have been pipetted, the plate or card can be placed onto the instrument for incubation, centrifugation, and then interpretation of results. Once results have crossed over, they can be reviewed and either accepted or rejected.

Other than cost, other characteristics of the blood bank that may need to be considered to determine if automation will be a good fit, include patient population, staff schedules, and defining workload (batch vs continuous). Below is an overview of the systems:

	Ortho Vision Max	NEO Iris/ ECHO Lumena	TANGO infinity	IH-1000	Erytra/ Erytra Eflexis
Manufacturer	Ortho Clinical Diagnostics	Immucor	Bio-Rad	Bio-Rad	Grifols
Methodology	Gel	Solid Phase	Solid Phase	Gel	Gel
Full Automation	Yes	Yes	Yes	???	Yes
RBC Phenotyping	Yes Rh	Yes	No	Yes	Yes Rh + Kell
Ab Titering	Yes	Iris-Yes Echo-No	No	No	No

PHYSICIAN RESOURCES

Download updates.

- **Bacterial Risk Control Strategies for Blood Collection Establishments and Transfusion Services to Enhance the Safety and Availability of Platelets for Transfusion**
- **Final Rule: 2020 Hospital Outpatient Prospective Payment System**

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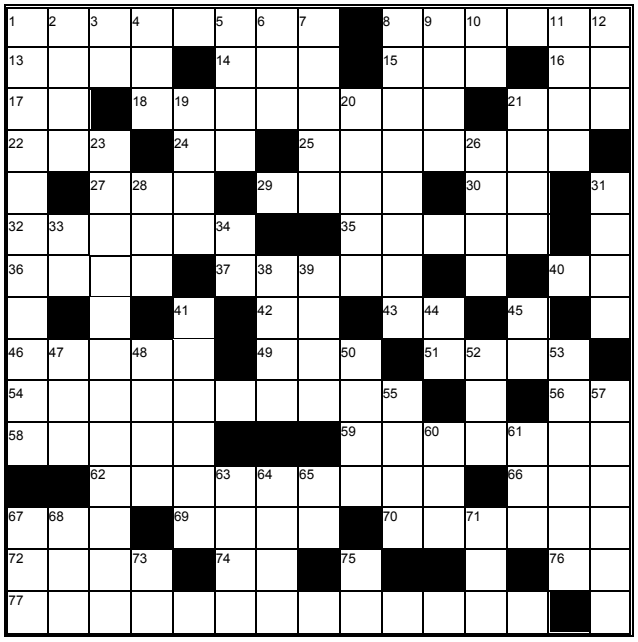
CROSSWORD PUZZLE - *Created by Dr. Laurie Sutor*



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

Across

1. Rh43 antigen
8. To qualify, a donor's must be at least 110 lb
13. Per unit
14. Needle-like fish
15. Ovum
16. "___ Golden Pond", 1981 movie
17. Blood marker for hemolysis (abbr)
18. Dreaded bacterium that can contaminate an RBC unit
21. Blood collector that supplies about 40% of nation's RBCs (abbr)
22. Hallucinogenic drug (abbr)
24. The Pine Tree State (abbr)
25. Labs need a qualification process for them
27. Fish found in the dish unadon
29. Action word
30. Johns Hopkins state (abbr)
32. Colloid used in granulocyte apheresis collections
35. Targets of phlebotomists
36. Patron saint of sailors
37. Dura ____ transplant – reason for donor deferral
40. Mycobacterium disease (abbr)
42. The other RH gene other than D
43. Units of blood should be irradiated at 2500 {2 down} or 25 ___ (abbr)
46. ____ -1- antitrypsin
49. Ultrio is this type of donor testing (abbr)
51. Tablet given to donors with citrate symptoms
54. ____ blood stem cell collections
56. Syphilis test: MHA-____
58. Calculation for CD34 collection
59. Thrombotic thrombocytopenic _____
62. Whole blood unit taking more than 15 minutes to collect (2 wds)
66. Catheter end in vessel
67. One of two possible gram stain results (abbr)
69. Devilish smile
70. Body fluid tested for secretor status
72. Bag of RBCs
74. ___-6: molecule responsible for cytokine release syndrome
76. Latin singer with 1998 hit "Bailamos" (init)
77. Complication of red cell transfusion common in sickle cell patients

Down

1. ISCT = International Society of ____ (2 wds)
2. See 43 across
3. Solution to keep blood from clotting (abbr)
4. Question meaning for what purpose?
5. Fairy tale monster
6. People who live in and monitor your college dorm (abbr)
7. Blood ___ coordinator
8. Hardy - _____ equation
9. Old time exclamation
10. Blood antibody (abbr)
11. ___ d'oeurvres
12. QC measure for cell therapy collections (abbr)
19. Numbing patch often used for skin sticks (abbr)
20. It can be accidentally hit during phlebotomy causing paresthesia
21. Severe lung disease that must be distinguished from TRALI (abbr)
23. DDAVP
26. Upscale hotel chain
28. Red blood cell production stimulating hormone (abbr)
31. ____ testing – manual way to do immunohematology
33. ___ Paso
34. State with the highest elevation capital city in the U.S. (abbr)
38. Condition for which Accutane is prescribed
39. Tiny drop of clear body fluid
41. What a seizure animal might be
44. Blood group first described by Eaton et al in 1956 (abbr)
45. Type 1 is treated with insulin (abbr)
47. Hawaiian garland
48. Norwood ____, CEO of Wadley Blood Center in the 80s
50. It holds the needle in place during phlebotomy
52. Baseball official calling strikes and balls
53. To pursue one's best
55. Old name for syphilis
57. Enzyme used in blood banking
60. Nutritional abbreviation for vitamins
61. Bacteria in the bladder (abbr)
63. ____ of habeas corpus
64. _____ lights for neonatal jaundice
65. Sentinel ____ biopsy (abbr)
67. What's in an abscess
68. Number of pregnancies to disqualify a female from plasma donation
71. British toilet (slang)
73. Standards for Blood Banks and ___ (init)
75. Hospital for retired military (abbr)

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