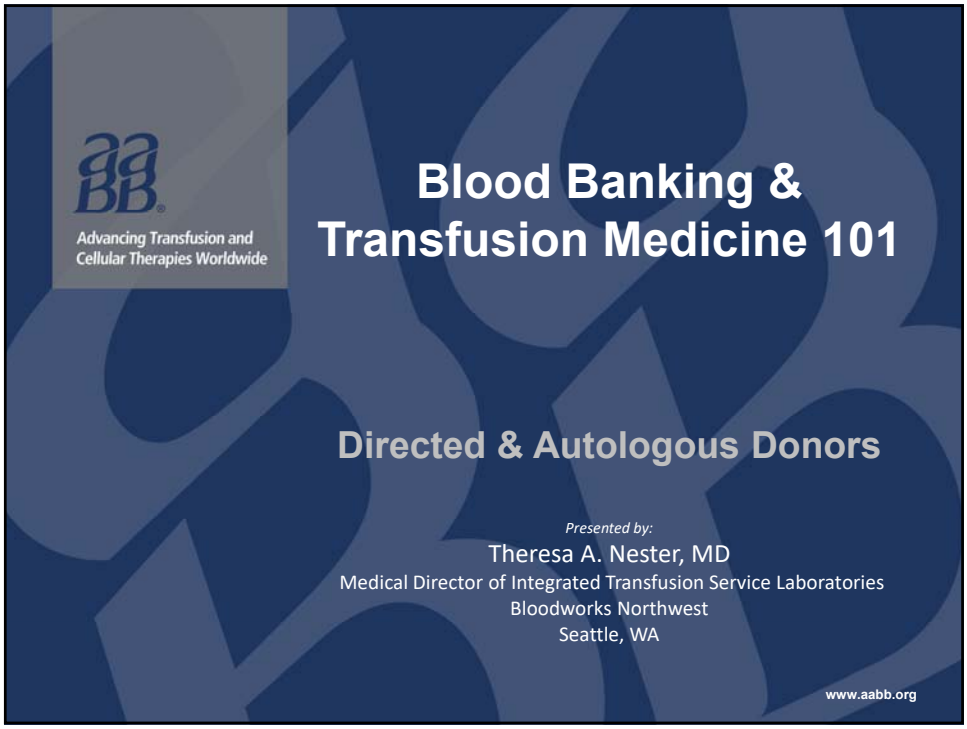


1

Learning Objectives

After participating in this program you should be able to….

- Recognize the occasional medical need for directed blood donors.
- Name the different types of autologous donation.
- Describe situations where a certain type of autologous donation may be optimal.

2

Copyright 2020 by AABB with All Rights Reserved

Some basic definitions

Allogeneic- What we normally think of as a volunteer blood donation; an individual from the community donates for an unknown recipient.

Directed- An individual donates for a specific recipient. The patient will typically have a known transfusion need, such as an upcoming surgery. An allogeneic donation for a known recipient.

Autologous- An individual donates for their own upcoming surgery or for a transfusion need at a later date. For a person with a very rare blood type, the red cell can be frozen in glycerol and stored for 10 years.

www.aabb.org 3

3

More on directed donation

- Relatively uncommon, although parents sometimes request to donate for their child for an upcoming surgery.
- The blood donor must meet all criteria for allogeneic donation and have negative tests for markers of infectious disease.

Additionally:

- The donor must have an ABO/RhD type that is compatible with the patient.
- If the donor is a first degree relative, the red cell must be irradiated.

www.aabb.org 4

4

Copyright 2020 by AABB with All Rights Reserved

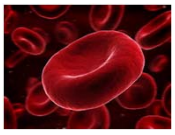
Uniform Donor History Questionnaire

Full-Length Donor History Questionnaire (DHQ)

	Yes	No
Are you		
1. Feeling healthy and well today?	❑	❑
2. Currently taking an antibiotic?	❑	❑
3. Currently taking any other medication for an infection?	❑	❑
4. Have you taken any medications on the Medication Deferral List in the time frames indicated? (Review the Medication Deferral List.)	❑	❑
5. Have you read the educational materials today?	❑	❑

5

Considerations with directed donation



- Typically, just the red cell unit is produced.
- Higher rate of positive markers for infectious disease.
- Donor confidentiality can be more difficult to maintain compared to a non-directed allogeneic blood donor.

6

Copyright 2020 by AABB with All Rights Reserved

More considerations

- The donation may be "crossed over" into the general community supply if the unit is not required by the patient. A collection center would need a clear policy for this.
- Any directed donation requires additional mechanisms for tracking and billing the correct amount to the recipient.
- The patient will typically be charged for the collection, whether or not the unit gets transfused. If the donor is a community donor unknown to the patient, this may not apply.

So, the tracking and billing can get messy…

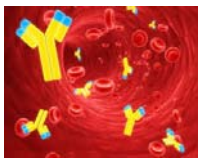
www.aabb.org 7

7

Circumstances where directed donation is useful/indicated: Scenario 1

J.H. is a 66 y.o. woman with recurrent gastrointestinal hemorrhage from stomach ulcers. She has received multiple red cell transfusions in the past, and has made several alloantibodies against red blood cells. These antibodies include: anti- c, Fya, Jka, and s. Less than 1 out of 100 people will have a red cell that is compatible with the antibodies in her circulation.

We would want to ensure that the donor's unit is specifically tracked and allocated for the patient, rather than given to a "random" recipient.

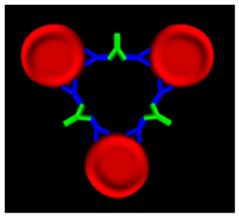


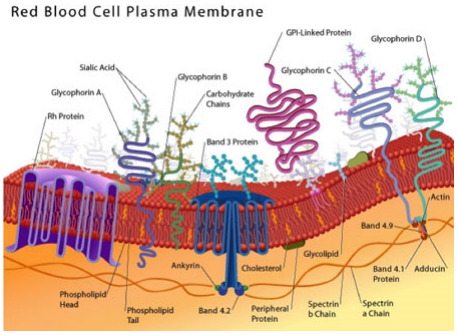
www.aabb.org 8

8

Copyright 2020 by AABB with All Rights Reserved

Immunohematology- red cell antigens and antibodies





www.aabb.org 9

9

Circumstances where directed donation is useful/indicated: Scenario 2

K.L. is a 70 y.o. man who is undergoing treatment for lung cancer. The patient's ABO blood group is AB. His red cells do not express a blood group protein known as Jk3, and (through exposure to the antigen with prior transfusion), pre-transfusion testing show that he has made anti-Jk3. The number of individuals who will be compatible with his ABO type AND lack this high-incidence antigen is low (rare in white or black individuals, 0.9% in the Polynesian population).

K.L.'s siblings may also lack Jk3, and so those who qualify for donation will be tested to determine this. If they are compatible, they can serve as the directed donor. Otherwise an unrelated blood donor whose red cells are ABO compatible and negative for the JK3 antigen will be needed for K.L.'s next transfusion.

www.aabb.org 10

10

Copyright 2020 by AABB with All Rights Reserved

Autologous donation

Before surgery or delivery
During surgery

www.aabb.org 11

11

Pre-surgical autologous donation

- Brief history
- Why do it?
- Donor criteria
- Why not do it?
- Actual use today
- Special situations where it may be useful.

www.aabb.org 12

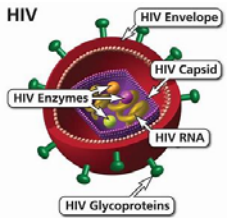
12

Copyright 2020 by AABB with All Rights Reserved

Brief history of perioperative autologous donation (PAD)

- Autologous donation prior to surgery was promoted as a response to the AIDS epidemic, and the recognition that the virus was transmissible through transfusion, in the early 1980s.

- PAD peaked in 1993, when approximately 6% of all blood collected in the U.S. was intended for autologous use.



www.aabb.org 13

13

Advantages of autologous donation

Protection against:
- Transfusion transmissible agents
- Transfusion reactions
- Antibody formation against foreign red cells, white cells, or platelets
- Transfusion associated graft-vs-host disease (white cells in the donor unit evade destruction and destroy recipient's blood cells. Rare, can be avoided by irradiation)

HIV residual risk per donated unit: 1 in 1.5 million.

www.aabb.org 14

14

Copyright 2020 by AABB with All Rights Reserved

Donor Criteria

- An order from the patient's physician must be obtained.
- Minimum hemoglobin concentration of 11 g/dL or hematocrit of 33%.
- Absence of conditions presenting a risk of bacteremia.
- Note: Uniform donor questionnaire does not ask questions related to transfusion-transmissible pathogens such as HIV.

www.aabb.org 15

15

Contraindications to autologous donation

Defined by the collection center, not the FDA
In general, the following conditions will result in donor deferral:

- Unstable angina
- Recent heart attack or stroke
- History of significant cardiac disease with symptoms and no recent visit to the cardiologist
- Untreated aortic stenosis

In general, more time and thought is required by collection staff/MD for autologous donors compared to allogeneic donors.

www.aabb.org 16

16

Copyright 2020 by AABB with All Rights Reserved

Controversial issue- storing units with infectious agents

AABB Association Bulletin #98-5 (September 18, 1995)
The ADA, HIV, and Autologous Blood Donation

"The Supreme Court recently ruled in *Bragdon v. Abbott* that asymptomatic HIV is a disability protected by the Americans with Disabilities Act….*Bragdon* may render unlawful those policies that deny HIV-positive patients the opportunity to donate preoperative autologous units for transfusion."

- *Side note*: Bulletins are intended to serve as guidelines, rather than Standards. But AABB members generally are expected to be aware of the recommendations in the bulletins.

For HIV and Hepatitis B, the FDA requires a written statement from the receiving transfusion service and the attending physician that HIV or HBV-positive units are acceptable before they may be shipped to the transfusing facility.

www.aabb.org 17

17

Disadvantages of autologous donation

- Data indicates that if a surgery will require less than 2 units of RBCs, autologous donation mainly serves to make the donor anemic.

- Additionally, if an autologous unit was collected, the mentality appears to be transfuse it back to the patient.

www.aabb.org 18

18

Copyright 2020 by AABB with All Rights Reserved

This is bad because…

Reinfusion of autologous units carries some degree of risk:

- Increased chance of bacteria compared to an allogeneic unit.
- Hemolysis of unit if not stored appropriately.
- Circulatory overload of the volume-sensitive patient.
- Possibility of a mistake and infusion of an allogeneic unit.

In one study of patients undergoing elective hysterectomy, autologous donation was an independent risk factor for transfusion. Transfusions were administered to 25 out of 140 women who had given an autologous donation, compared to 1 of 123 women who had not.
Kanter MH. *JAMA* 1996;276:798.

19

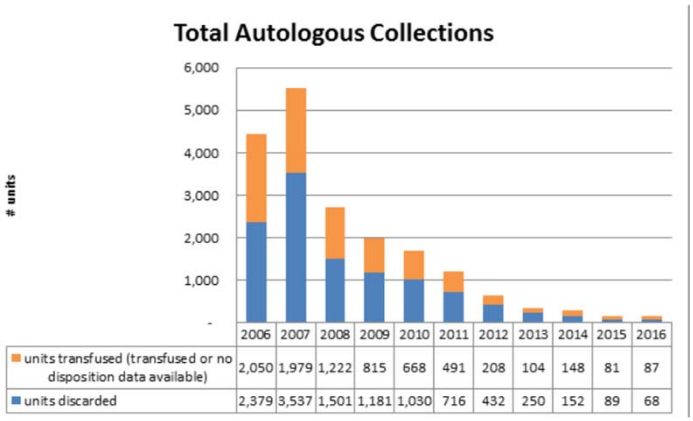
Autologous donation is more expensive that allogeneic donation:

- Special procedures are required to ensure that the unit is tracked and issued to the correct hospital.
- Transfusion service staff must have procedures to check for, and issue, autologous units before issuing allogeneic units.
- The unit cannot be "crossed over" into general inventory, unless the collection center allows for this (and the donor has completed all criteria for allogeneic donation).

20

Copyright 2020 by AABB with All Rights Reserved

Wastage of autologous units is typically high



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
units transfused (transfused or no disposition data available)	2,050	1,979	1,222	815	668	491	208	104	148	81	87
units discarded	2,379	3,537	1,501	1,181	1,030	716	432	250	152	89	68

Total autologous collections (red cells) at Canadian Blood Services by year *BloodBrief* dated 2017-4-26

21

New England Journal of Medicine

N Engl J Med 1995;332:719-24.

SPECIAL ARTICLE

THE COST EFFECTIVENESS OF PREOPERATIVE AUTOLOGOUS BLOOD DONATIONS

JEFF ETCHASON, M.D., LAWRENCE PETZ, M.D., EMMETT KEELER, PH.D., LONI CALHOUN, M.T.(A.S.C.P.), S.B.B., STEVEN KLEINMAN, M.D., CYNTHIA SNIDER, M.P.H., ARLENE FINK, PH.D., AND ROBERT BROOK, M.D., SC.D.

A decision-analysis model was used to assess the cost-effectiveness of donating autologous blood for 4 surgical procedures done at UCLA in 1992.

Cost effectiveness was expressed in dollars per quality-adjusted year of life saved.

22

Copyright 2020 by AABB with All Rights Reserved

High level results

-Substituting autologous for allogeneic blood resulted in little expected health benefit (0.0002 to 0.00044 in quality-adjusted year of life saved) at considerable additional cost ($68 to $4,783 per unit of blood).

- The additional cost of autologous blood was primarily a function of units collected but not transfused, and of a more labor-intensive donation process.

The cost-effectiveness values ranged from $235,000 to over $23 million per quality-adjusted year of life saved.

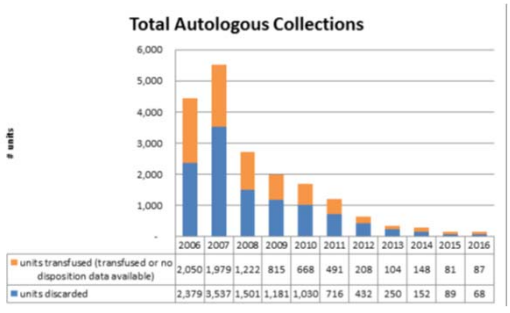
www.aabb.org 23

23

Actual use today

In part because current reimbursement programs (including Medicare) either:
- Deny the medical necessity of PAD or
- Ignore the well-documented increase in cost

The use of PAD is quite limited.



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
units transfused (transfused or no disposition data available)	2,050	1,979	1,222	815	668	491	208	104	148	81	87
units discarded	2,379	3,537	1,501	1,181	1,030	716	432	250	152	89	68

www.aabb.org 24

24

Copyright 2020 by AABB with All Rights Reserved

Special situations where autologous donation may be helpful

- The individual is identified as having a very rare blood type, either through blood donation or prenatal/pre-transfusion testing

25

Example 1

J.P. is a 28 y.o. woman who visits her obstetrician at 12 weeks of pregnancy with her second child. As part of the usual prenatal testing, an antibody screen is performed. The test is positive, and shows the pattern for an antibody directed against a high incidence antigen. Numerous subsequent tests are unrevealing as to the identity of the antibody.

26

Copyright 2020 by AABB with All Rights Reserved

Medical exceptions needed for this donation

- Donation during pregnancy
- Allowance for low blood count during 3rd trimester

Ideal plan is to collect and freeze 1 unit early, then collect 1 unit that can remain in liquid state until the time of delivery.

27

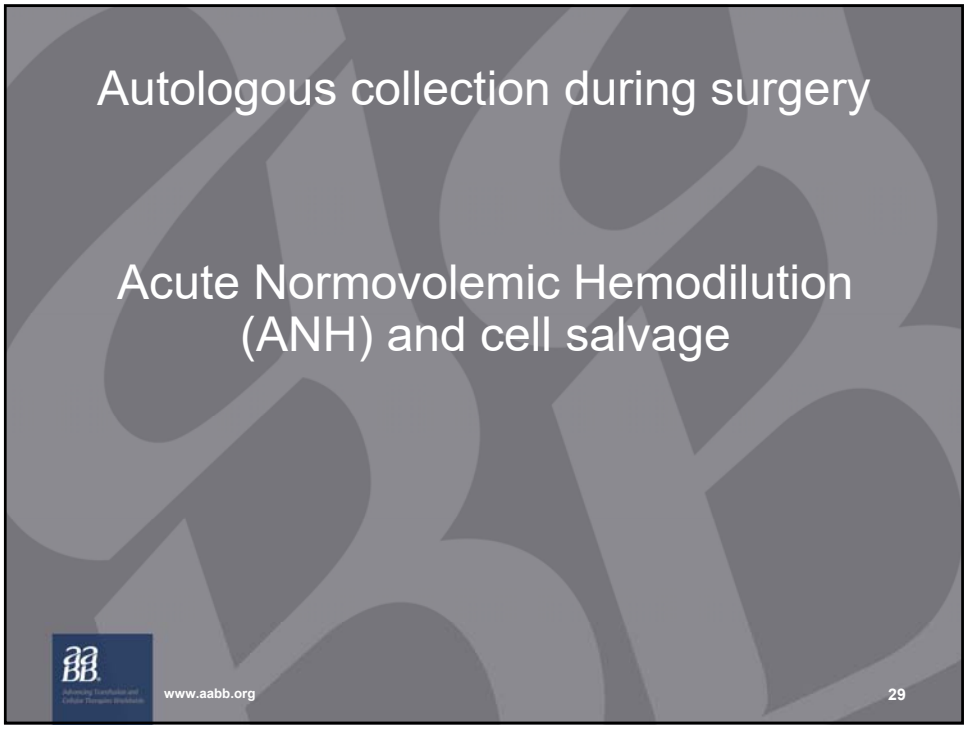
Example 2- autologous donation

A.N. is identified through blood donation as having a very rare red cell type. It is common knowledge that only a few donors in the country will match his red cell type.

- Ideally: have the donor donate subsequent units using the questionnaire and testing for allogeneic donors. Educate the donor that it is most likely he will get these units back, but that you would like to freeze 2 as allogeneic and 2 as autologous for his potential future use.

28

Copyright 2020 by AABB with All Rights Reserved



29

Acute Normovolemic Hemodilution (ANH)

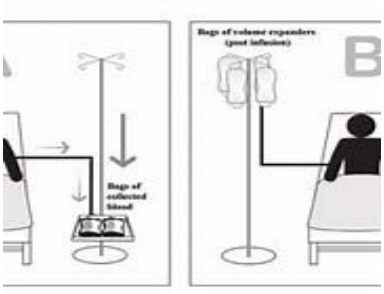
- Whole blood is collected in the operating room by the anesthesiologist.
- The units are kept within the operating room.
- The patient has blood volume maintained by crystalloid solutions.
- Most often the units are transfused back before the end of the case.
- Standards exist that dictate storage requirements in, and outside of, the operating room.

www.aabb.org 30

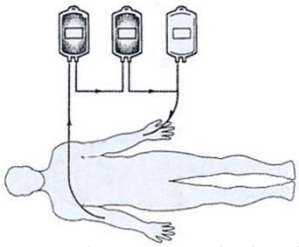
30

Copyright 2020 by AABB with All Rights Reserved

Visual of ANH



Whole blood collected using a scale after induction of anesthesia.
Crystalloid solution returned to the patient at the same time.



Keeping the units attached to the patient.

www.aabb.org 31

31

Touted benefits

- Decrease exposure to allogeneic blood, which should decrease or prevent:
  - infectious disease risk
  - allergic transfusion reactions
  - alloimmunization
  - immunomodulation

www.aabb.org 32

32

Copyright 2020 by AABB with All Rights Reserved

Generally not used in the following situations:

- Ischemic heart disease
- Impaired kidney function
- Hemoglobin < 11g/dL
- Inability to get laboratory values back quickly
- Inadequate vascular access

33

How widely used is ANH?

- Most often used in cases likely to have large blood loss.
- Depends on how committed the hospital is to "bloodless medicine."
- Requires a dedicated anesthesia team who has experience ensuring that the patient has adequate blood volume in the setting of acute anemia.
- Not reimbursed
- Most often used in planned cardiac surgery cases.

34

Copyright 2020 by AABB with All Rights Reserved

Practical and regulatory considerations

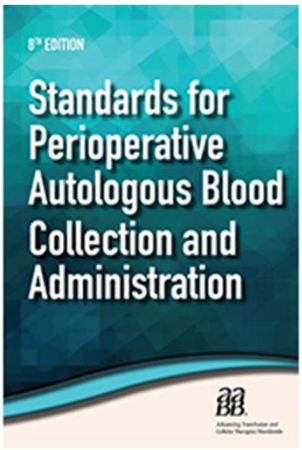
ANH requires planning because:

- The blood bags must be acquired ahead of time; a typical blood donor bag set will lead to confusion and potential clotting if the wrong bag is chosen.
- If a refrigerator will be used to store units, it must be validated.
- Training on how to label the units must be done.
- Bloodless medicine patients require that the units remain connected to the patient during the surgery.

www.aabb.org 35

35

AABB perioperative blood collection standards



Specifies items such as:

- How units are to be labeled once collected.
- Storage conditions of the units within the operating room.
- Storage conditions if the units are taken out of the operating room following surgery.

www.aabb.org 36

36

Copyright 2020 by AABB with All Rights Reserved

Cell salvage

- A specialized suction system with centrifuge that allows for retrieval of lost red cells off of the surgical field.
- The shed blood is centrifuged and washed with normal saline. Plasma, cell fragments, and anticoagulant should be removed with this step.
- The system requires heparin (an anticoagulant) to keep the system from clotting.

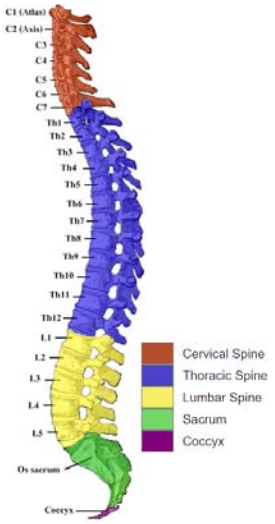
37

Typically used in high-blood loss surgeries

- Cardiothoracic
- Vascular
- Orthopedic
- Trauma

In one systematic review, cell salvage during cardiac and orthopedic surgery resulted in an average savings of 0.68 unit of allogeneic red cells per patient.

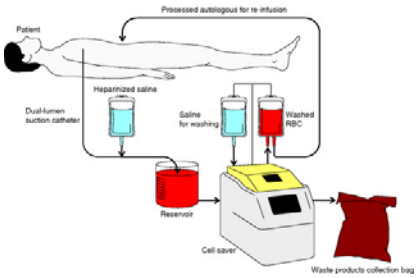
Cochrane Database Systematic Rev 2010;(4):CD001888



38

Copyright 2020 by AABB with All Rights Reserved

Picture of cell salvage device



www.aabb.org 39

39

Cell salvage (Cont.)

Typically, the anesthesia technician is trained on setting up and operating the equipment.

Care must be taken not to set the vacuum pressure too high or the cells will lyse.

On a practical level, Policy decisions will need made re: how the equipment and the staff can be shared among different clinical services.

www.aabb.org 40

40

Copyright 2020 by AABB with All Rights Reserved

More recent use- obstetrical hemorrhage

-Fear in the past about contamination with amniotic fluid and potential to cause amniotic fluid embolus.

- Current teaching is to use 2 suction devices; one for cell salvage and one (wall suction) for amniotic fluid.
- Not generally set up unless the patient is known to be at high risk for significant post-partum hemorrhage.

www.aabb.org 41

41

Transfusion medicine MD as consultant: Bloodless medicine patient

AH is a 32 year-old woman who is pregnant with twins. Due to her religious beliefs, she does not want to receive any blood products should she experience a post-partum hemorrhage.
Care plan, made between OB, anesthesia, and transfusion medicine entails:

- Special consent detailing what products are acceptable to receive.
- Ensuring patient's iron, folate, vitamin B12 levels are replete prior to delivery.
- Being ready to perform cell salvage in OR following delivery.
- Being available at the time of delivery in case questions about pharmacologic agents are raised.
- Ensuring the patient has iron stores repleted post-delivery if there is significant blood loss.

www.aabb.org 42

42

Copyright 2020 by AABB with All Rights Reserved

Summary

- Autologous and directed donation are not widely used.
- These donations can be very helpful to ensuring that patients with very rare blood types have blood available when needed. Typically much planning and additional communication is required compared to an allogeneic donation for a "random" recipient.
- Other blood sparing techniques are available, with cell salvage being performed significantly more often than acute normovolemic hemodilution.
- Transfusion medicine specialists, anesthesiologists, and the clinical team work together to ensure that protocols exist and teams are well-trained.

43

Questions?

Contact
AABB eLearning Team
eLearning@aabb.org

Program is copyright 2020 by AABB with All Rights Reserved

44

Copyright 2020 by AABB with All Rights Reserved