

Feline Transfusions: A How to Guide from Collection to Transfusion

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Road Map

- Feline Blood Type Update
- Choosing and Collecting a Donor
- Safe Transfusions
- Dog Blood

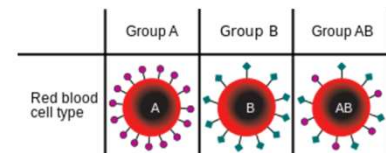
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Objectives

- Explain the importance of feline blood types for safe transfusion administration.
- Discuss safe blood product administration to an anemic recipient using point of care blood typing and cross matching.
- Identify an appropriate feline donor to provide blood products to an anemic emergency patient.

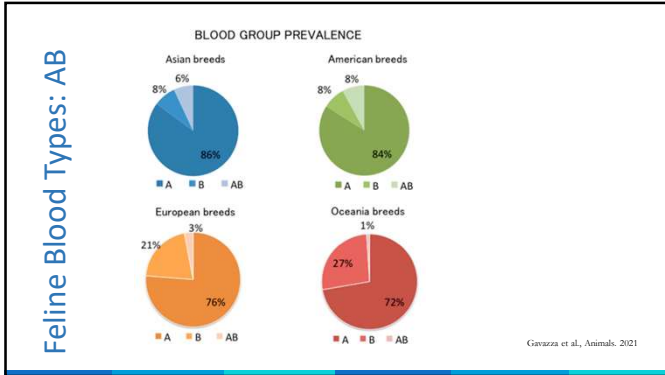
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Feline Blood Types: AB

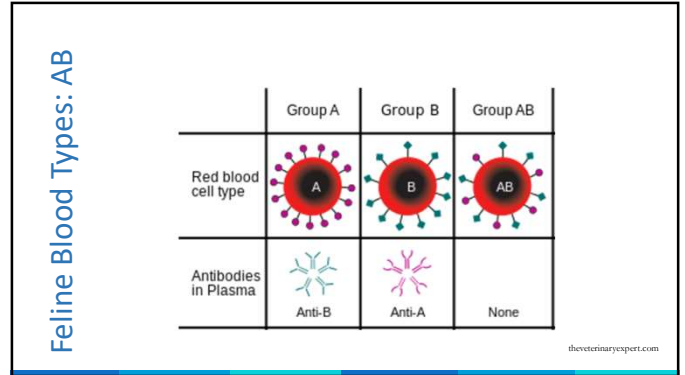


theveterinaryexpert.com

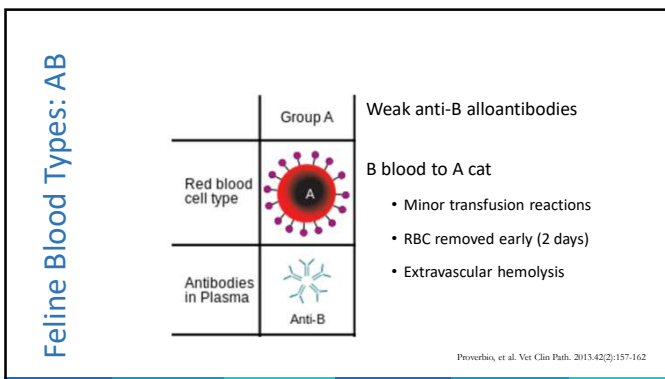
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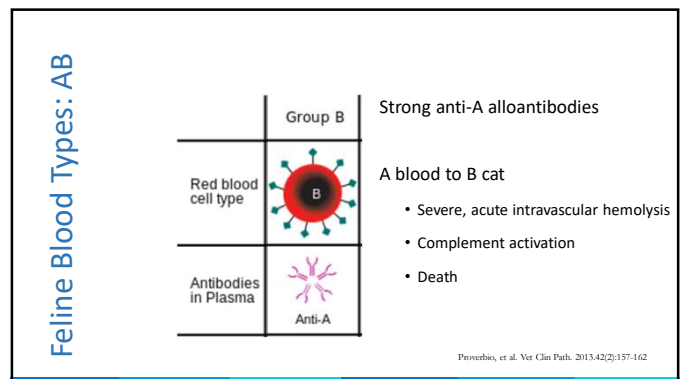
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


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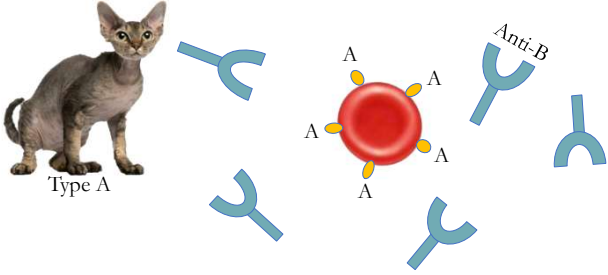
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Feline Blood Types: AB

| | | |
|----------------------|---|---|
| | Group AB | No alloantibodies |
| Red blood cell type |  | A blood, B blood, or AB blood |
| Antibodies in Plasma | None | <ul style="list-style-type: none"> Type A contains weak anti-B antibodies Lesser of two evils |

Proverbio, et al. Vet Clin Path. 2013;42(2):157-162
Gandolfi et al, PLOSone. 2016.

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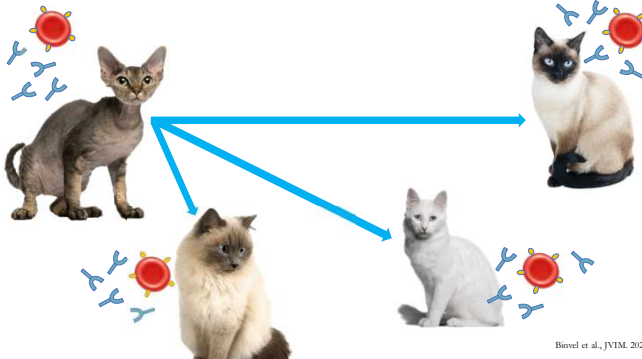


Type A

Anti-B

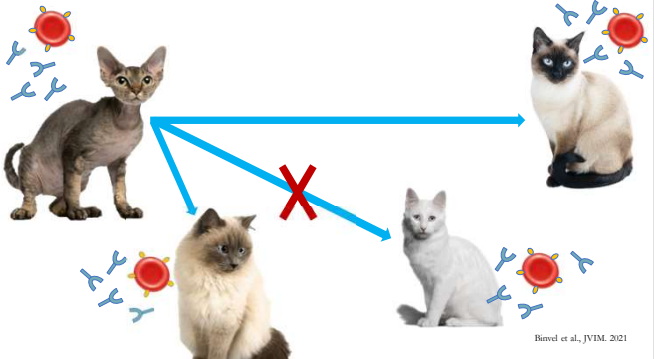
Bivell et al., JVIM. 2021

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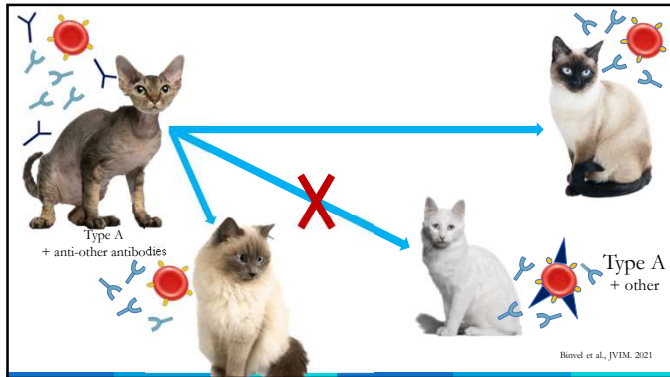
Bivell et al., JVIM. 2021

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Bivell et al., JVIM. 2021

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FEA: Feline Erythrocyte Antigen

7% of type A cats have alloantibodies to unknown blood types

Detected 5 new blood types in 2021

- FEA 1 (84% cats +)
- FEA 2
- FEA 3
- FEA 4
- FEA 5 (96% cats +)

Bivvel et al., JVIM. 2021

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FEA: Feline Erythrocyte Antigen

7% of type A cats have alloantibodies to unknown blood types

Detected 5 new blood types in 2021

- FEA 1 (84% cats +)
- FEA 2
- FEA 3
- FEA 4
- FEA 5 (96% cats +)

17% of FEA1 negative cats have anti-FEA1 alloantibodies

FEA1, have we met?

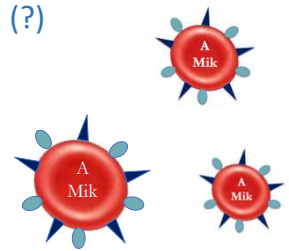
Bivvel et al., JVIM. 2021

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Mik Blood Type: FEA 1 (?)

• Mik Feline Red Cell Antigen

- Distinct from AB blood group
- Most cats Mik positive (94%?)



Weinstein, et al. JVIM. 2007. 21:287-291

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Mik Blood Type: FEA 1 (?)

Mik Feline Red Cell Antigen

- Mik negative cats can have anti-Mik antibodies

The diagram shows a single red blood cell with a red center and a white outer ring. The center contains the letter 'A'. The outer ring has several small blue protrusions. Surrounding the cell are five blue Y-shaped antibodies, some of which are bound to the blue protrusions on the cell's surface.

Weinstein, et al. JVIM. 2007.
Bavel et al. JVIM. 2021.

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Mik Blood Type: FEA 1 (?)

Mik Feline Red Cell Antigen

- Transfusion of Mik + blood to Mik - cat with anti-Mik

The diagram shows two red blood cells, each with a red center and a white outer ring. The center contains the letters 'A' and 'Mik'. The outer ring has several small blue protrusions. Surrounding the cells are five blue Y-shaped antibodies, some of which are bound to the blue protrusions on the cells' surfaces.

Weinstein, et al. JVIM. 2007. 21:287-292

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Mik Blood Type: FEA 1 (?)

Mik Feline Red Cell Antigen

- Transfusion of Mik + blood to Mik - cat with anti-Mik
- Acute hemolytic transfusion reaction

The diagram shows a single red blood cell with a red center and a white outer ring. The center contains the letters 'A' and 'Mik'. The outer ring has several small blue protrusions. Several blue Y-shaped antibodies are bound to the blue protrusions on the cell's surface.

Weinstein, et al. JVIM. 2007. 21:287-292

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Mik Blood Type: FEA 1 (?)

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- Transfusion of Mik + blood to Mik - cat with anti-Mik
- Acute hemolytic transfusion reaction

The diagram shows a single red blood cell with a red center and a white outer ring. The center contains the letters 'A' and 'Mik'. The outer ring has several small blue protrusions. A large, jagged red starburst is positioned over the cell, indicating a reaction. Several blue Y-shaped antibodies are bound to the blue protrusions on the cell's surface.

Weinstein, et al. JVIM. 2007. 21:287-292

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Blood Typing

Options for AB group only

- Card Agglutination
- Membrane Dipstick

All cats

All blood products: RBC and plasma

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Crossmatching

Is the donor blood compatible with the patient?

- Detect FEA blood types and pre-existing alloantibodies

Ideally performed for all feline RBC transfusions

Testing Time

- 1-2 hours

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Crossmatching

Non-AB crossmatch incompatibilities

- 15% of transfusion naïve cats
- 22.7% with increased risk in cats with CKD, urinary tract disorders
- 27% of previously transfused cats

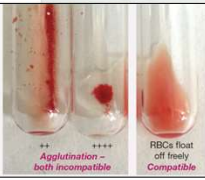
Post PCV higher in crossmatched cats

McCluskey, et al 2018
Specht et al 2017

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Journal of Feline Medicine and Surgery 23

SPECIAL ARTICLE

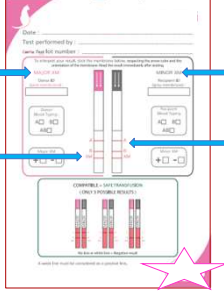


2021 ISFM Consensus Guidelines on the Collection and Administration of Blood and Blood Products in Cats

Journal of Feline Medicine and Surgery (2021) 23, 410-432

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Immunochromatographic Crossmatching



Major: Will patient destroy donor cells?

Minor: will donor plasma destroy patient cells?

Crossmatch

AB Blood Typing

Alveda

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Emergency Donors

- 1-8 years of age
- Normal physical exam with a calm disposition
- >5kg of lean body weight
- Indoor only
- No prior transfusions, no meds
- Vaccinated


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Emergency Donors

- Physical Exam
- Blood type (AB)
- CBC, Chem, UA: PCV>30%
- FeLV/FIV SNAP negative
- Bank blood for future infectious disease testing
 - EDTA tube stored at -20°C

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Collecting Donors



Wash hands and wear sterile gloves

Consider IVC

Sedation (ISFM Consensus Guidelines)

- Ketamine 5 mg/kg IV
- Midazolam 0.5 mg/kg IV

Photo Credit: Amanda Cavanagh

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Collection Set Up

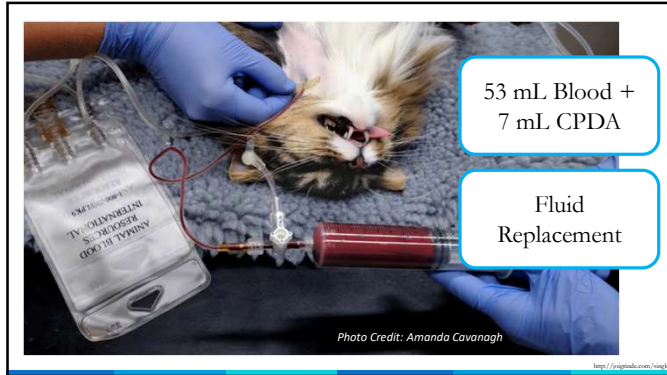
CPDA anticoagulant

- Citrate: anticoagulant
- Phosphate: substrate for ATP synthesis, pH buffer
- Dextrose: energy source
- Adenine: substrate for ATP synthesis

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Processing Fresh Blood

Administer as fresh whole blood

- Within 4 hours with an open set at room temp
- Within 24 hours in a fridge (1-6°C)

Set syringe upright: 1 hour, room temp

- Express off plasma
- Administer RBC only




Photo Credit: Amanda Cavanagh

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RBC Product Storage

- FDA standards for the humans
 - 75% of RBC remain in circulation 24 hours after transfusion
 - <1% hemolysis present at the end of the storage period
 - Free hemoglobin <0.4g/dL or <0.8% of total hemoglobin at the end of the storage period




Photo Credit: Amanda Cavanagh Wang, et al. Transfusion Practice. 2012. 52:1184-1195

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RBC Product Storage

- Shelf Life: 21 - 42 days
- Dedicated refrigerator
- Temperature: 1 - 6° C




Photo Credit: Amanda Cavanagh Wang, et al. Transfusion Practice. 2012. 52:1184-1195

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RBC Product Storage

- Bags stored upright position or hung
- Bags separated by barrier; even temp and airflow
- Bags inspected daily for discoloration
- Bags rotated weekly; mix anticoagulant/nutrients

Photo Credit: Amanda Cavanagh

Wang, et al. Transfusion Practice. 2012. 52:1184-1195

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Photo Credit: Amanda Cavanagh

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Discoloration: Contamination

A

4°C

B

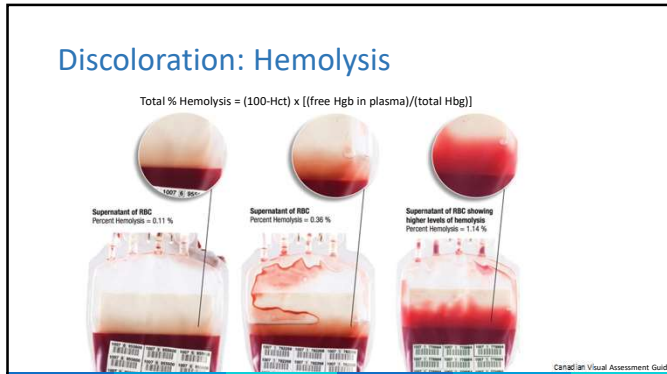
20°C

Kessler, et al. Vet Clin Path. 2010.39(1):29-38

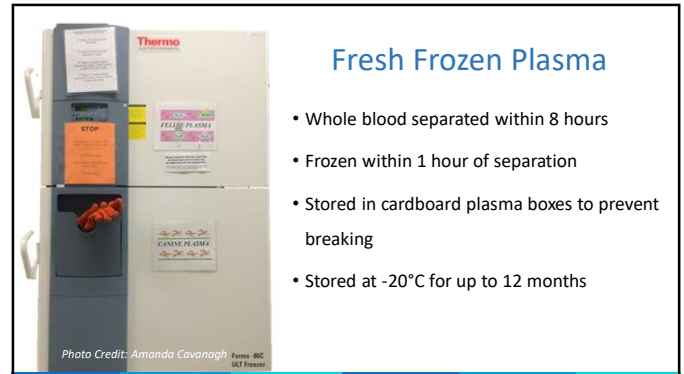
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Canadian Visual Assessment Guide

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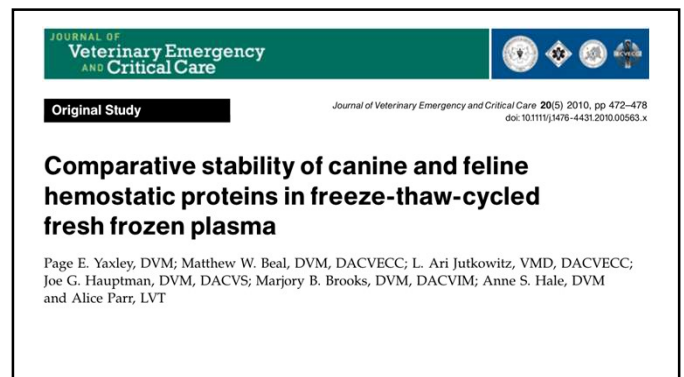
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Fresh Frozen Plasma

- Thaw and use
- Thaw and re-freeze in 1 hour
- Thaw and put in fridge up to 14d



Photo Credit: Amanda Cavanagh

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Transfusion Administration

All products AB type matched

18-micron hemonate filter

Fluids thru same IV catheter

- No calcium (no LRS)
- No glucose (no D5W)




Photo Credit: Amanda Cavanagh

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Transfusion Administration

Warming blood

- Hypothermic patients
- Massive transfusions

Warming cats

- Yes

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Transfusion Administration Speed



Photo Credits: Amanda Cavanagh

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Transfusion Monitoring

| Cross-matched? <input type="checkbox"/> Compatible <input type="checkbox"/> Incompatible <input type="checkbox"/> Not evaluated <input type="checkbox"/> | | Method of admin: Gravity <input type="checkbox"/> Syringe driver <input type="checkbox"/> Fluid pump <input type="checkbox"/> | | | | | | | | | |
|--|---------------------|---|------------|------------------------------------|---------|-----------|--------------------|---------------------------|------------------------------------|-------------------------|----------------|
| Correct patient (initialled by 2): _____ | | Correct unit (initialled by 2): _____ | | | | | | | | | |
| Start time: _____ | | Date: _____ | | | | | | | | | |
| Person starting transfusion: _____ | | | | | | | | | | | |
| Time | Infusion rate ml/hr | Resp rate | Pulse rate | MM Colour & CRT | Temp °C | Mentation | SDM blood pressure | Serum plasma/urine colour | Angioedema (Erythema/Pruritis/TxN) | Vomit or diarrhea (Y/N) | Other concerns |
| Pre-transfusion | | | | | | | | | | | |
| 5 mins | | | | | | | | | | | |
| 15 mins | | | | | | | | | | | |
| 30 mins | | | | | | | | | | | |
| 60 mins | | | | | | | | | | | |
| 2 hours | | | | | | | | | | | |
| 3 hours | | | | | | | | | | | |
| 4 hours | | | | | | | | | | | |
| 15 mins post transfusion | | | | | | | | | | | |
| 1 hour post transfusion | | | | | | | | | | | |
| 24 hour post transfusion | | | | | | | | | | | |
| Finish time: _____ | | Volume infused: _____ | | Post-transfusion PCV & time: _____ | | | | | | | |

Davidow et al. JVECC. 2021

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Received: 31 December 2020 | Accepted: 6 February 2021
DOI: 10.1111/vec.13043

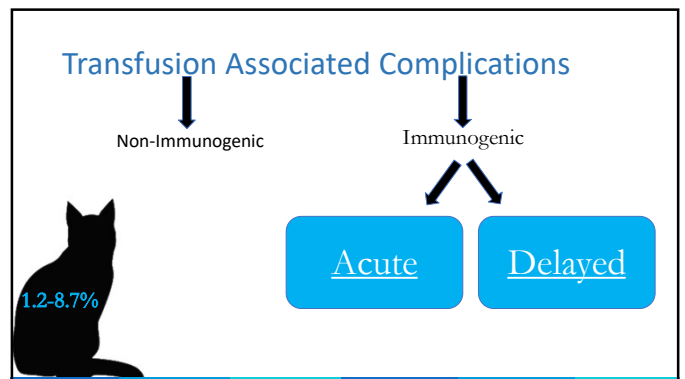
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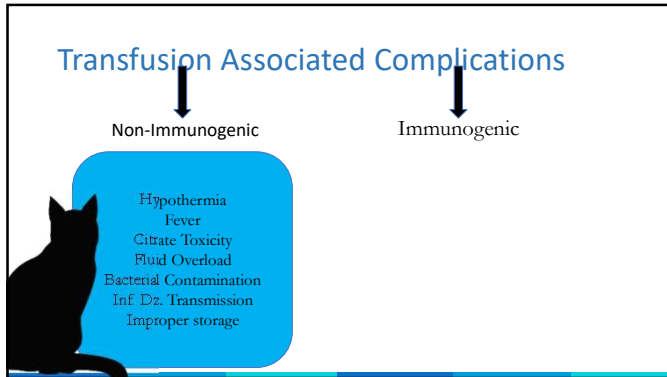
Association of Veterinary Hematology and Transfusion Medicine (AVHTM) transfusion reaction small animal consensus statement (TRACS). Part 3: Diagnosis and treatment

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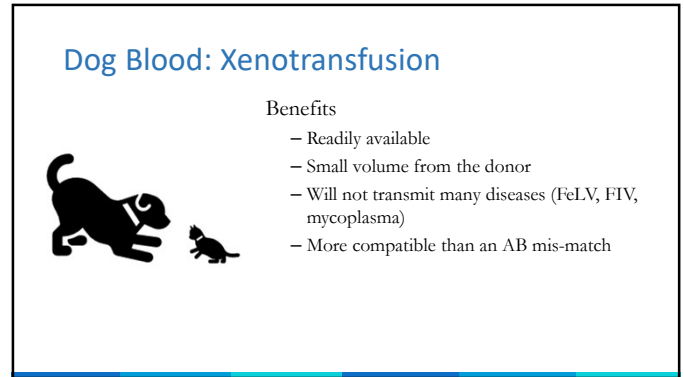
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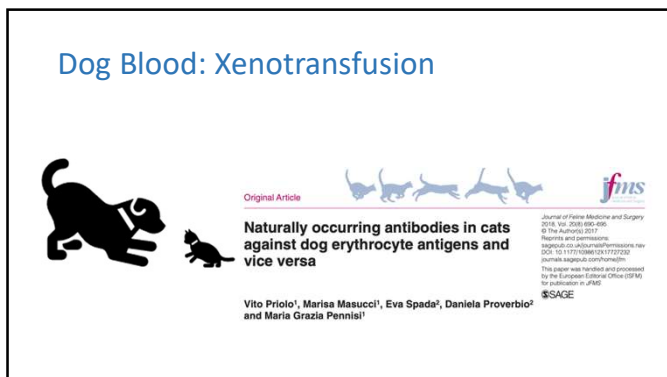
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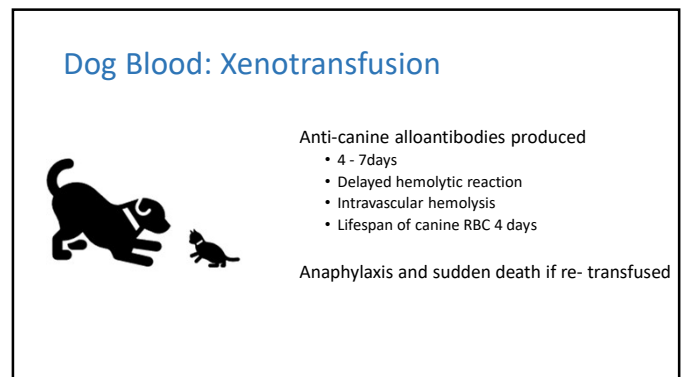
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Dog Blood: Xenotransfusion



- Last Ditch Effort
- DEA1 negative dog blood
- Warn owners of risks
- Owners need to tell all future vets about xenotransfusion

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Conclusions

- **Blood Type** all donors and recipients
- **Crossmatch** all cats*
- Careful storage, administration, and monitoring

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ASSESSMENT 1:

1. It is essential to blood type all cats for the AB blood group and transfuse only type matched blood because:
 - a. **Cats have pre-existing alloantibodies against the opposite blood type.**
 - b. Cats are all universal donors.
 - c. Cats with the AB blood type can safely receive any blood type; they are universal recipients.
 - d. Cats must receive only the opposite blood type.

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ASSESSMENT 2:

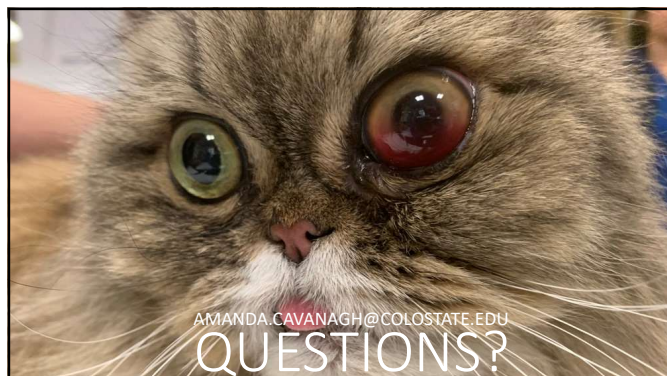
1. A clinician can collect no more than what volume of blood from a feline blood donor?
 - a. 50 ml/kg body weight
 - b. 15 ml/kg body weight**
 - c. 100 ml per cat
 - d. 5 ml/kg body weight

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ASSESSMENT 3:

1. Feline blood obtained from an emergency donor using an open collection system should be transfused within:
 - a) 4 hours
 - b) 24 hours
 - c) 48 hours
 - d) 21 days

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