Approaches to blood typing

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Since the launch of Pet Blood Bank UK (PBBuk) in 2007, canine blood products have been readily available for use in transfusion medicine, and have been used successfully in many trauma and surgical cases, and in the management of haematologic disease processes.

With developments in veterinary transfusion medicine and the advent of blood banking, it is no longer appropriate to assume that giving any blood to any dog is acceptable. Knowing the blood type of the recipient dog prior to transfusion is considered good science and best clinical practice.

Accurate blood typing, along with cross matching for any dog with an unknown history or who has previously received a transfusion, reduces the risk of potentially life-threatening conditions such as haemolytic transfusion reaction.

Canine blood types

In its simplest form, dogs have positive or negative blood types that correspond to the presence or absence of certain antigens on the red cell surface. Worldwide, more than 13 blood types have been described in dogs. The various blood groups are most universally categorised using the dog erythrocyte antigen (DEA) system. Each identified DEA type has been given a number, for example, DEA-1.1, DEA-1.2, DEA-3, DEA-4, DEA-5 and DEA-7.

In the UK, it is recommended that all donor and recipient dogs are typed to determine if they are DEA-1.1-positive or DEA-1.1-negative. The blood group DEA-1.1 is clinically the most important, as antibodies against it are capable of causing potentially life-threatening acute haemolytic transfusion reactions. Most significantly, if a DEA-1.1-negative dog receives DEA-1.1-positive blood, then antibody production will occur; the recipient will develop antibodies to the foreign blood type between four and seven days post-transfusion. These sensitised dogs are then highly susceptible to serious transfusion reactions during subsequent transfusions should the wrong donor blood type again be used. Furthermore, even if major reactions are not seen, the transfused cells will not survive as long in the recipient dog as they would if the correct type of blood is used, thus reducing the benefit of the transfusion.

The assumption that giving any blood to any dog is acceptable isn’t appropriate any more,

because this is likely to be the first and only transfusion in the recipient dog’s lifetime.

In an emergency first-time red cell transfusion, when recipient typing is genuinely not available, DEA-1.1-negative products should be used. However, in most circumstances, this scenario is readily avoidable when giving the majority of transfusions.

With blood typing, the focus is always on DEA-1.1, as reactions related to incompatible DEA-1.1 transfusions are considered to be the most serious and common. However, it is also important to note that a universal canine donation type does not exist and dogs with DEA-1.1-negative blood have been incorrectly termed universal donors in the past. Many other red cell antigens capable of causing subsequent reactions also exist.

As transfusion medicine develops, more extensive blood typing may become available, and we may be able to expand our knowledge further in this area. We also hope that with UK-wide availability and increasing use of blood products, the profession can work on further research in this area. The possibility of transfusion reactions related to other blood types is the reason for cross matching for second and subsequent transfusions, even if the correct DEA-1.1 type was administered at the first transfusion – this is discussed later in the article.

Positive or negative prevalence

A number of international studies have shown a prevalence of DEA-1.1-positive status in 55 to 65 per cent of the canine population. Furthermore, in a study of 48 dogs receiving transfusions in two UK clinics (one in the north and one in the south of England), 59 per cent of recipients were DEA-1.1-positive.

PBBuk is to publish a study of 1,000 UK dogs with their blood types, according to their breed – this will give an excellent insight into the incidence of DEA-1.1-positive status across these breed types.

From its own data, PBBuk found that at least 80 per cent of its clients chose to use only DEA-1.1-negative blood, which high-lights the demand for this type. While this can be understood from the perspective of DEA-1.1-negative blood’s comparable versatility, it does not make for the best use of the resources available. To encourage best practice and to make the most of donations made to PBBuk, using DEA-1.1-positive blood for DEA-1.1-positive recipients is highly recommended and PBBuk offers DEA-1.1-positive packed red blood cells at a reduced cost to encourage this practise.

PBBuk can demonstrate the importance of this change in blood-product purchasing attitude. Rottweilers make excellent donors, as they are calm and enjoy all the attention they receive during the collection process. So far, 100 per cent of the 39 Rottweilers that donate to PBBuk have been of the DEA-1.1-positive blood type, but consumer demand for DEA-1.1-negative blood threatens the ability to continue using these donors.

A move towards using only DEA-1.1-negative donors to reflect consumer demand would be unrepresentative of the prevalent blood type of the canine population, would put a strain on supply and be directly against the high welfare and ethical standards of the UK and, more specifically, PBBuk.

Blood typing tests

DEA-1.1-blood typing is performed on EDTA anticoagulated blood and is an accurate procedure. The preferred standard available in UK laboratories is a gel test, which requires a specific card centrifuge and takes 20 minutes to assess the blood. In-house tests are also available. These are accurate when performed with care, easy to use and economical.

Cross matching

As discussed, dogs have many blood types other than DEA-1.1, and novel blood types are being recognised as canine transfusion medicine advances. Cross matching is an in-vitro test that mixes donor red blood cells and recipient plasma or sera to look for potential reactions, such as agglutination or haemolysis. It is a test that should be used with typing for all second or subsequent transfusions in any canine patient.

Cross matching can be performed in a basic laboratory with minimal equipment, but will take between 30 minutes to an hour to perform. In-house gel cross match kits that identify agglutination reactions are simple to use, and provide a rapid in-house solution.

Alternatively, blood from both the donor and the recipient can be submitted to many commercial laboratories for cross matching. PBBuk has a rapid external laboratory cross match system to allow multiple units to be cross matched against recipient blood, subsequently allowing only cross match-compatible blood to be provided for use.

Practice protocol

• It is highly recommended and considered best practice that all donors and recipients are DEA-1.1 typed prior to donation or transfusion.

• In practices, blood typing for DEA-1.1 could be considered on a more routine basis. Any dogs considered likely to need transfusions during their lifetime, such as those considered at risk, or have been diagnosed with congenital or hereditary coagulation defects, should be typed.

• As knowledge of canine blood types increases in the public domain, DEA-1.1 typing may be considered as part of a more extensive health screen offered to owners at numerous stages during a pet’s lifetime.

Summary

Blood typing is a quick and easy procedure that reduces the risk of transfusion reactions and will improve the success of transfusions in practice. Using either in-house or laboratory tests, all canine patients could be blood typed so that practices can decide on the most suitable products for use when the need for a transfusion arises.

Further reading

- Van Der Merwe L L, Jacobson L S and Pretorius G J (2002). The breed prevalence of dog erythrocyte antigen 1.1 in the Onderstepoort area of South Africa and its significance in selection of canine blood donors, *Journal of the South African Vet Association* **73**(2): 53-56.
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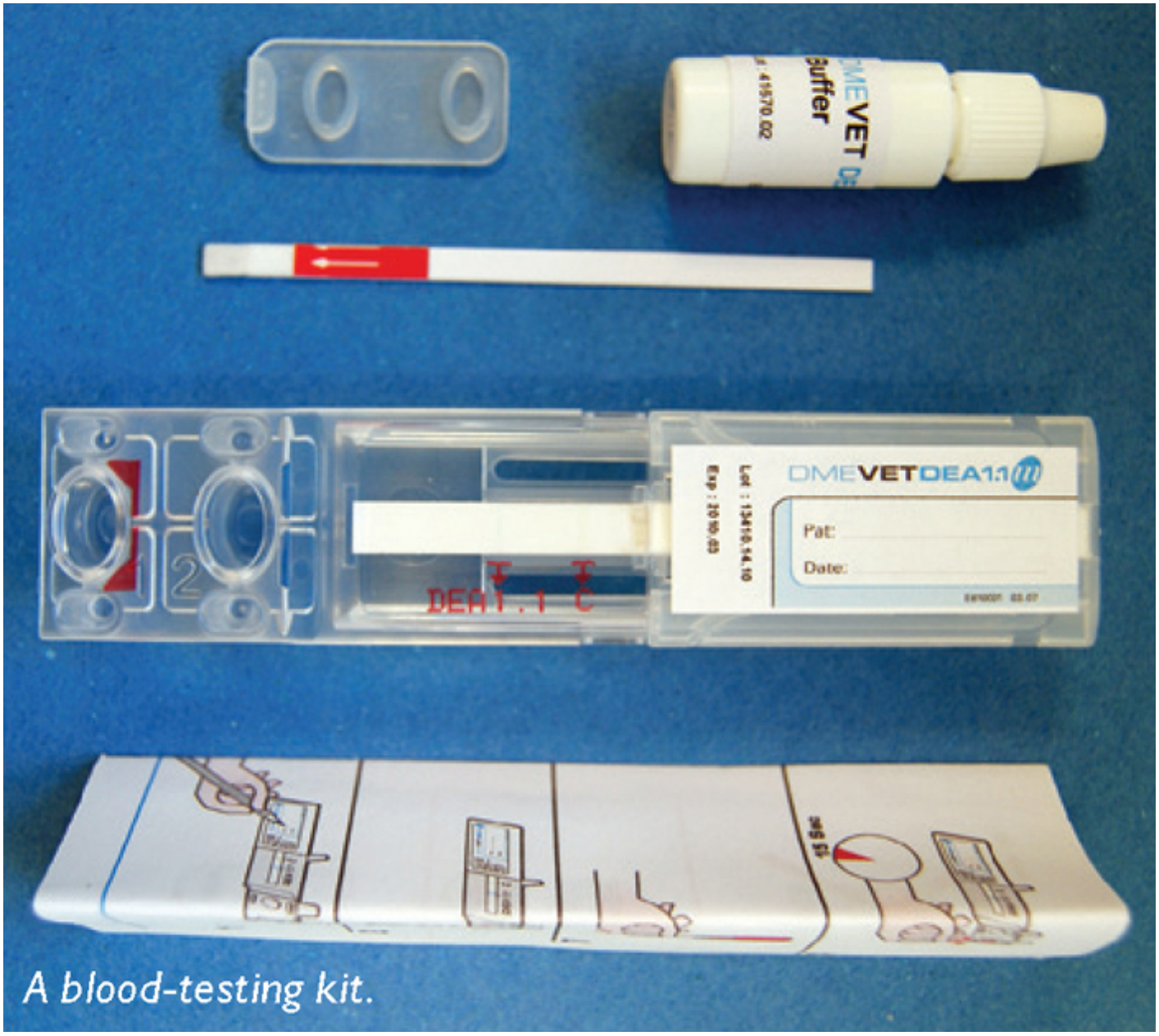

A blood-testing kit.


CPD

Above: a dog makes its contribution to the blood bank scheme.


DMEVETDEA1.1
Pat:
Date:
E610001 03.07
Lot : 13410.14.10
Exp : 2010.03

Right: an example of blood analysis taking place.

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