ACTIVATED CLOTTING TIME (ACT)

Equipment required

1. ACT vacutainer tube (Grey top tube with diatomaceous earth in it)
2. Vacutainer collection holder with 20g 1 inch needle
3. 37 degree water bath, thermos or heating block
4. Stopwatch

Method

1. Set up a water bath at 37ºC by using a thermos flask or thick walled mug.

2. Warm the grey top ACT tube to 37ºC in this bath.

3. Puncture the jugular vein with a vacutainer needle and insert the ACT tube when there is uninterrupted flow from the needle. Begin timing with a stopwatch when blood first enters the tube.

4. When the blood ceases to flow into the tube, remove tube from the needle, invert five times to mix and place in the 37ºC water bath.

5. After 50 seconds, remove the tube at 5-10 second intervals and tilt gently in front of a light source to watch for the first appearance of a visible clot.

6. Continue to replace and remove the tube from the water bath to look for a clot.

7. Stop the watch at the first appearance of an unmistakable, but not solid, clot.

For reliable results these are the critical steps:

- There is an uninterrupted flow of blood into the tube at venipuncture.
- The test is done at or close to 37C. The test is temperature dependent and clotting time is prolonged and more variable at room temperature.
- That the first sign of an unmistakable clot is detected. Considerable time can elapse between the appearance of the first clot and the clot becoming solid.

Interpretation

Prolonged clotting times are seen in a variety of coagulopathies in dogs:

DIC
Haemophilia A and B
Von Willebrands disease (some cases may have normal ACT times)
Severe liver disease
Warfarin/brodifacoum toxicity – see below for more details
Thrombocytopaenia
Heparinised patient

Levels are also abnormal if:

The sample has been collected poorly resulting in activation of the extrinsic pathway.
The animal is on salicylates, anticoagulants, some antibiotics and barbiturates.

Reference ranges

Dog	< 90 sec	n=42
Cat	< 70 sec	n=unknown
Ponies	< 280 sec	n=37
Horses	< 200 sec	n=31
Cows	< 180 sec	n=10

ACT and Warfarin/Broadifacoum toxicity

The ACT test is not as sensitive as the prothrombin time (PT) as an indicator of warfarin/brodifacoum toxicity as it is a measure of the intrinsic clotting pathway, as is APTT. In warfarin/brodifacoum toxicity, factor VII in the extrinsic pathway (PT assesses this pathway) is the first factor to decrease.

The ACT test is recommended in the following situations:

- In suspect clinical cases. The ACT level is always significantly prolonged before there is life threatening haemorrhage. Therefore, a prolonged value in a dog that has had access to warfarin is very significant. If the ACT level is normal, then warfarin/brodifacoum toxicity can be ruled out as cause of the current symptoms.

- To determine the effectiveness of vitamin K therapy. ACT levels fall to normal by 48 hours post dosing.

The ACT test is not recommended in the following situations:

- To determine if a dog that is clinically normal has had access to or has absorbed significant amounts of warfarin/brodifacoum. The ACT test is not sensitive enough for this and you will miss some early cases of toxicity. Pull a citrate and request a PT in this situation.

- To check if Vitamin K therapy can be safely stopped. A PT on citrate blood 48-72 hours after ceasing Vitamin K therapy is recommended here.

References

Woody B, Murphy J, Ray A, Green R: Coagulopathic effects and therapy of brodifacoum toxicosis in dogs. Journal of Veterinary Internal Medicine, 1992, 6:23-28

Middleton D, Watson A: Activated coagulation times of whole blood in normal dogs and dogs with coagulopathies. Journal of Small Animal Practice 1978, 19:417-422