THE TREATMENT OF ANTICOAGULANT RODENTICIDE POISONING

Advice to Physicians

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INTRODUCTION

This booklet is designed to help medical staff recognise and effectively treat poisoning by anticoagulant rodenticides, particularly those which are generally known as the second generation anticoagulants. It has been produced jointly by five companies involved in the manufacture and distribution of rodenticides to ensure widest distribution of treatment regimes which are agreed to be effective for this type of compound.

There is a range of rodenticide formulations available in the market. The signatory companies provide several types, including those containing **brodifacoum, bromadiolone, difenacoum, difethialone** and **flocoumafen** as their active ingredients. Details of locally available formulations may be given by distributors on the final pages of this booklet together with their name, address and telephone number.

Certain rodenticides contain mixtures of active compounds, and an anticoagulant may be combined with other chemicals. In poisoning incidents, where possible, establish what product is involved in order to ascertain whether additional treatment procedures may be required.

MODE OF ACTION

1. The rodenticides highlighted on page 1 are anticoagulants. Therefore, like warfarin, they act by interfering with the synthesis of prothrombin, disturbing the normal clotting mechanisms and causing an increased tendency to bleed.
2. As in warfarin poisoning, **vitamin K_1, (Phytomenadione)** is the antidote. Other analogues of vitamin K are ineffective.
3. The major difference between rodenticides like warfarin and those on Page 1 is that they have longer body half-lives and can cause an increased tendency to bleed for a longer period of time than warfarin.

It is therefore important to understand that it may be necessary to give vitamin K_1 for weeks rather than days.

SIGNS OF POISONING

Exposure to formulations of the above compounds is most likely to occur by ingestion of bait. In most cases no symptoms will occur immediately and it may be several days before features of anticoagulant poisoning develop.

The effects result from the increased tendency to bleed and include:

i) In less severe poisoning:

- bruising easily with occasional nose or gum bleeds.
- appearance of blood in stools or urine.
- excessive bleeding from minor cuts or abrasions.

ii) In more severe poisonings:

- massive haemorrhage (usually internal)
- acute abdominal pain
- shock
- coma

If underlying disease is present e.g. anaemia, liver disease or parasitic disease then the above features may be more severe and persistent and the poisoning may be more difficult to control. It is important to consider the possibilities of underlying disease if there is a poor response to treatment.

DIAGNOSIS

A reliable indication of anticoagulant effect, particularly if clinical symptoms are minimal, is the determination of the **prothrombin time**.

Anticoagulation with coumarins leads to an increase in prothrombin time and successful treatment will return it to normal levels. It is important to determine prothrombin time before start of treatment and to remember that changes in prothrombin time will not normally be seen until at least 12-18 hours after ingestion of the anticoagulant.

TREATMENT

In late presentations where bleeding is a feature basic First Aid measures to control this should be undertaken.

SEVERELY POISONED PATIENTS SHOULD BE TAKEN TO HOSPITAL IMMEDIATELY.

Whether the patient is bleeding or not, blood should be taken to check prothrombin time and the haemoglobin level, and treatment should be started according to the results. Measure the prothrombin time daily. If it has not become raised at 48 hours no further monitoring will be needed. If it is raised, continue to monitor until the prothrombin time has returned to normal for three consecutive days. Remember that oral vitamin K_1 may be required for several months.

If required vitamin K_1 should be given by either intravenous injection or orally. This will reduce the risk of intra-muscular haematomas (bleeding) caused by intra-muscular injections.

DETAILED ADVICE ON MANAGEMENT

i) Take a venous blood sample for measurement of:

a) Haemoglobin Level

b) Prothrombin Time

c) Blood Grouping and Cross-Matching

ii) the patient is bleeding severely:

- Give 10-20 mg (0.25 mg/kg for children) of vitamin K_1 (Phytomenadione) by slow intravenous injection, not exceeding 1.0 mg per minute. Check the prothrombin time at three to six hourly intervals and repeat injections of vitamin K_1 if no improvement in the prothrombin time has occurred.

Vitamin K_1 (Phytomenadione) can take up to 24 hours to improve blood clotting. In cases where active bleeding is occurring, it may be necessary to use fresh frozen plasma (1-2 units) to rapidly restore blood-clotting factors.

If it is necessary to transfuse the patient, compatible blood or plasma should be used. NB. Avoid the use of plasma expanders such as dextran as they may interfere with normal clotting.

- once the Prothrombin time has stabilised – continue treatment with an oral vitamin K_1 dose of 10 mg four times per day. Check Prothrombin time daily.

Monitor the patient until the Prothrombin time has remained normal for 3 days. Discharge patient with the following treatment: **vitamin K_1 – orally – 10 mg twice daily**.

Treatment may be necessary for up to several months. With close monitoring of the prothrombin time and regular out-patient follow-up, it may be possible to reduce the length of treatment. Prothrombin time should be checked 24 hours, 3 days and 1 week after the last dose of vitamin K_1 before a decision is made to stop follow up.

iii) In less severe poisoning cases:

- If the prothrombin ratio is greater than 2 times control vitamin K_1 (Phytomenadione) may be given by intravenous infusion (10-12 ml or 0.25 mg/kg for children).
- fresh frozen plasma (1-2 units) may be given to restore rapidly blood clotting factors.
- check Prothrombin time after 8-10 hours and repeat administration of the vitamin K_1 if necessary.
- once the Prothrombin time has stabilised, continue treatment with oral vitamin K_1 (10 mg four times daily).

Monitor the patient until the Prothrombin time has remained normal for 3 days. Discharge patient with the following treatment: **vitamin K_1 – orally – 10 mg twice daily.**

Treatment may be necessary for up to several months. With close monitoring of the prothrombin time and regular out-patient follow-up, it may be possible to reduce the length of treatment. Prothrombin time should be checked 24-hours, 3 days and 1 week after the last dose of vitamin K_1 before a decision is made to stop follow up.

FORMULATIONS AVAILABLE:

ACTIVE INGREDIENT	PRODUCT NAME	BRIEF DESCRIPTION
Brodifacoum		
Bromadiolone		
Difenacoum		
Difethialone		
Flocoumafen		

DISCLAIMER

Although the authors of this booklet have been given the advice contained here in good faith and on the basis of the best and most recent evidence available at the time of this book going to print, no warranty can be given as to the correctness of the advice nor can any liability be incurred by them in respect thereof. Further, the likelihood of success of any antidote treatment will also depend on other extraneous factors over which the authors have no control and which include, for example, the general heath of the affected patient, the period of time between ingestion of the anticoagulant and the beginning of the antidote treatment and the quantity of relevant anticoagulant which has been ingested.

FURTHER INFORMATION

Bayer Environmental Science

The Bayer Environmental Science rodenticide range includes:

RACUMIN® Wax Blocks L8465 Act No. 36 of 1947 (coumatetralyl 0.375 g/kg) **CAUTION**
RACUMIN® Paste L6401 Act No. 36 of 1947 (coumatetralyl 0.375 g/kg) **CAUTION**
RACUMIN® Tracking Powder L2800 Act No. 36 of 1947 (coumatetralyl 7.5 g/kg) **CAUTION**

FINALE® Grain Bait L7848 Act No. 36 of 1947 (difethialone 0.025 g/kg) **HARMFUL**
FINALE® Pellets L5549 Act No. 36 of 1947 (difethialone 0.025 g/kg) **HARMFUL**
FINALE® Wax Blocks L5356 Act No. 36 of 1947 (difethialone 0.025 g/kg) **HARMFUL**

RODILON® Wax Blocks L5356 Act No. 36 of 1947 (difethialone 0.025 g/kg) **HARMFUL**

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