

Investigation into an Apparent Neurological Disease Occurring in Red-Necked Wallabies in Care

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Background

Red-necked wallabies in care are developing central nervous system or neuromuscular signs and many die. The cause of this disease is unclear, and there may be more than one reason for animals to die with these signs. Testing of live animals has been limited, but at least one biochemistry profile suggested that the affected animal had marked electrolyte imbalances. Post-mortem findings to date have not been specific nor consistent.

Initially this study will be confined to red-necked wallabies. However, if other species of macropods demonstrate signs previously described in red-necked wallabies the host range will be expanded with the agreement of all investigators.

While some of the affected animals develop progressive seizure activity, others present after a single episode of neurological illness. Common differential diagnoses for neurological dysfunction in macropods include: toxoplasmosis, babesiosis, bacterial or fungal infection (brain abscess), viral

infection (orbiviruses), renal dysfunction, liver dysfunction, low blood glucose concentrations, altered electrolyte concentrations, and intoxication.

The investigative plan detailed below attempts to provide a thorough and systematic basis to simultaneously rule-in and rule-out each potential diagnosis in a cost-effective manner.

It is important to note that through the investigation:

- the syndrome description is likely to change through refinement
- the syndrome may be caused by a variety of different processes
- the syndrome may be caused by multiple concurrent processes, and
- the process of investigation may take a considerable period of time, particularly when the disease is seasonal or occurs at low prevalence.

Investigative Plan

Key to a successful investigation into the cause of this syndrome will be detailed record keeping on all red-necked wallabies in care, appropriate testing of affected wallabies, and complete post-mortem examinations of joeys that die.

Record keeping:

1. Hand raising protocols: Renata has already provided background information on her protocols for hand raising red-necked wallabies. David will review the protocols and may follow up with additional information. Similar detailed information will be required from other carers that participate in the study.
2. For all joeys in care, a treatment and monitoring sheet should be used that records the animal's weight (minimally once a week and ideally every other day),* the diet fed, amount fed, and notes on attitude and faecal production. The form should also have a space to put in other relevant observations and any medications or treatments given. Once every three months, hard or digital copies of these records should be sent to David. The sheet should also provide background information on why the animal came into care, where the animal came from, and any pre-existing problems that it might have had. Renata has developed an app that she can use to record data and begin to track the data. She is looking into finding ways that other participants can also put their husbandry data into a central electronic data base.
3. It is a natural part of the weaning process to provide joeys with native plants to eat. Photo documentation of what is fed, once if it is consistent, or as the composition of the plants changes, should also be done.

*The most important time to get weight data is during the joey's growth phase where this disease is most likely to occur. Once animals are out of the pouch and moving around in the "yard" and are no longer being handled, then weighing them on a regular basis may not be possible or appropriate.

Diagnostics in affected animals:

1. Video documentation: If a joey begins to have changes in behaviour, please video record this change in behaviour. Similarly record any seizure activity. At this point David and Bree should be notified that there is a case. Please rename the video file with the animal's species, identification and date and upload into Karrie's Dropbox folder.

2. Ideally, any animal demonstrating signs should be examined by a veterinarian as soon as possible.*
3. Complete blood count, biochemistry panel, and urinalysis: As soon as possible after abnormal behaviour is observed or after an animal has a seizure, blood should be collected by a veterinarian into EDTA and serum tubes. EDTA blood should be submitted for a complete blood count. Blood in the serum tube should be spun down so that the serum can be separated from the cells. Sufficient serum should be submitted for a biochemical panel (Appendix 1). Remaining serum should be frozen for future studies (such as serological or additional biochemical testing). If possible, urine should also be collected for urinalysis.
4. Any unusual foodstuffs provided in the 48 hours prior to clinical signs should be photographed, labelled and frozen.
5. It is noted that the animals may be held on a property that is not close to a wildlife veterinarian and getting the animal to a wildlife veterinarian may be difficult. However, getting blood samples from affected animals, particularly when they are experiencing signs or have recently experienced signs is critical to this study. Therefore, it may be necessary to work with a local dog and cat or mixed animal veterinarian to get these samples taken. The cost of the complete blood count and biochemistry panel will be covered by David Phalen's grant. If a local veterinarian, other than Bree, will be used to collect samples, please have them contact either Bree or David so that they can be made aware of the protocol.

*It is recognized that signs may develop at a time where it is not possible to immediately take a joey to the veterinarian (nights, weekends, holidays). In the end, survival of the animal is the priority. Therefore, if a treatment appears to be increasing the chance of an animal surviving, then it should not be delayed, even if it may mean that it subsequently impacts the outcome of the diagnostic testing. This applies to all joeys under any circumstances. Therefore, the working rule is that if an animal needs immediate treatment to save its life or reduce its suffering, then it should receive it. However, if the joey is stable and treatment can be postponed until testing is done, then testing should be done before treatment is started.

Post-mortem diagnostics

1. If an affected animal dies, it should be placed in an eskie, covered with ice and transported to a wildlife veterinarian who can do the post-mortem examination and collect appropriate samples as soon as possible (<24 hrs).
2. A sample collection protocol will be provided to all veterinarians participating in the study by Karrie.
3. All diagnostic samples collected should be sent to Karrie Rose at the above address, and an email alerting Karrie that samples are being submitted should be sent to avoid delays.

Communications

1. All participants will have an initial meeting with David to make sure that they understand the protocol.
2. All parties will meet, initially, once every three months to discuss findings and to determine if there is a need for any changes in this protocol.
3. Additional meetings will be scheduled as needed.

Based on current diagnostic knowledge, collection of cerebral spinal fluid and imaging of the neurological system are not recommended as they are highly unlikely to provide data to rule-in or rule-out the vast majority of differential diagnoses. The value of these and other diagnostic modalities will be re-evaluated as the study progresses.

Appendix 1: Biochemistry Panel

Liver enzymes:

- Alkaline phosphatase (ALP)
- Alanine aminotransferase (ALT)
- Aspartate aminotransferase (AST)
- Bile acids (optional)
- Gamma glutamyl transferase (GGT) (optional)

Kidney function:

- Blood urea nitrogen (BUN)
- Creatinine

Muscle injury:

- Creatinine phosphokinase (CPK)

Pancreatic enzymes (one or the other or both):

- Amylase
- Lipase

Other analytes:

- Total protein
- Albumen
- Globulins
- Glucose
- Calcium
- Phosphorus
- Sodium
- Potassium
- Chloride