A Protocol for Post-Mortem Examination of the Cardiovascular System

Of Great Apes

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GUIDELINES

A Protocol for Post-Mortem Examination and Sampling of the Cardiovascular System of Great Apes

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1. Introduction

This protocol has been created as part of an EAZA Great Ape TAG led initiative; a Europe wide collaboration striving to achieve a better understanding of great ape cardiovascular disease.

This protocol aims to provide a guideline for performing a systematic and comprehensive approach to the post-mortem examination and sampling of the cardiovascular system in great apes.

Cardiovascular system examination should form part of a whole body gross examination and histopathology; this protocol is therefore intended to be supplementary to the general Great Ape TAG Veterinary Guidelines for performing post-mortem examination.

The purpose of this protocol is to;

- Promote consistency and quality in post-mortem examination of the cardiovascular system in great apes
- Standardise and maximise information gathering
- Facilitate comparative study between post-mortem findings and relevant samples
- Permit consistent sampling of the heart for subsequent examination by a designated pathologist

It is our ambition that all veterinarians and pathologists will follow these guidelines when performing post-mortem examination of great apes within EAZA collections.

If you still wish to use your own pathologist for examination of the heart, please refer them to us for a copy of our full cardiac post-mortem examination protocol.

When post-mortem examination of the cardiovascular system is performed, it is requested that photographs are taken at all stages of the process, and in particular of any abnormalities.

If the abnormal accumulation of fluid is noted at any stage, it should be quantified (in ml, or weighed if clotted), characterised (colour, consistency, specific gravity) and where possible a sample stored.
2. **Identifying Information**

All information requested in the Cardiac Post-mortem Examination form should be provided. All photos, paperwork and samples must be clearly labelled with patient identifying information, including the following:

- Studbook number
- Species (and subspecies if known)
- Individual institution ID (name/number)
- Zoological collection
- Date of birth
- Date of death

3. **Report**

A complete post-mortem examination involves the completion of a report – see ‘cardiac post-mortem submission form’. This, along with any supporting documents should be made available to the supervising vet, zoo/institution and also the **EAZA Great Ape TAG Cardiac database**.

4. **Supporting Documents/Files**

A copy of the full post-mortem report or summary of the findings elsewhere in the body should also be sent, where possible. Other documents of use are:

- Copy of the animal’s clinical history
- A copy of the animal’s records (e.g. ARKS/ZIMS report)
- Photographs taken during the post-mortem examination;
  - Ideally photographs should be taken at all stages of the examination
  - Photographs of any abnormalities found are of particular use

5. **Sending Samples**

Once the heart is in formalin, contact the project at the email address below to arrange for a shipping container to be sent to you. Once the heart is fixed, remove it from the formalin (this can be re-used) and wrap it in saline soaked gauze swabs or similar to prevent desiccation. Double bag the sample and place it into the container for postage/courier to the address below. Send all samples with a completed sample submission form.

If sending the sample from a zoological collection **within the EU** no CITES permit is required, but the sample should be accompanied by a letter detailing the nature of the contents (e.g. chimp post-mortem sample), and the reason for the transfer (i.e. research). If sending the sample from a zoo **outside the EU** additional advice from CITES should be sought.


A preliminary report of macroscopic findings will be sent to the submitting zoo/vet within a week of receipt of the sample (by email or phone), and a full written report within 4 working weeks.
## Protocol for Post-Mortem Examination and Sampling of the Cardiovascular System of Great Apes

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<thead>
<tr>
<th>STEP</th>
<th>ACTION</th>
<th>EXPLANATORY NOTE</th>
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| 1    | Weigh the animal  
Body condition score  
Measure crown-rump length | Record the weight (in kg)  
BCS scale 1-5  
From top of the head (crown) to the bottom of the buttocks |
| 2    | Open the chest and examine the thorax | Note appearance of lungs, pleural cavity etc.  
Assess for presence of lesions or fluid |
| 3    | Examine the pericardium | Assess for lesions, thickening or fluid (if present quantify, characterise and sample). Formalin fix the pericardium |
| 4    | Remove the pluck | Check the anatomy of the great vessels before sectioning, e.g. check for patent ductus arteriosus (PDA) especially in young animals  
Use a needle and syringe to draw blood from RA before opening and freeze the sample as whole blood (-80°C if possible, -20°C otherwise)  
Cut the pulmonary trunk transversely 3cm above the pulmonary valve – assess the lumen for thrombi |
| 5    | Examine the epicardium | Note any thickening, lesions, changes in appearance, colour etc. |
| 6    | Open the ventricles | Make a single transverse incision through the lower third of the apex perpendicular to the long axis of the heart to expose the chamber of both ventricles. Remove any clots before weighing. |
| 7    | Weigh the heart | Record the weight (in grams) |
| 8    | Sample the apical myocardium | Take one 1x1cm portion of the sectioned piece of apex and freeze (at -80°C if possible, or -20°C otherwise)  
If RNA later is available, also preserve an additional portion of myocardium approx. 3x3mm in size and immerse in fluid |
| 9    | Perform gross post-mortem examination of rest of carcass | Open the entire aorta along itself length to the level of the iliac bifurcation; sample and formalin fix any lesions  
Examine the remaining major body organs as per the GATAG post-mortem protocol and take relevant samples for histopathology. Take special note of the lungs, liver and kidneys and where possible also provide a formalin fixed sample (1cm x 1cm) of these |
| 10   | Fix the heart | Fully submerge the heart in 10% neutrally buffered formalin ensuring all surfaces are covered. Leave to fix for at least 48 hours. |
| 11   | Complete paperwork | Complete cardiac post-mortem examination form |
| 12   | Contact us | Email heartproject@twycrosszoo.org to inform us of the death and to arrange transport of the sample |
| 13   | Send the heart | Refer to Point 5 entitled “Sending Samples” above |

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**EAZA Great Ape Cardiac Biobank and Database**  
c/o Victoria Strong, Twycross Zoo, Burton Road, Atherstone, Warwickshire, UK, CV9 3PX  
**Website:** www.twycrosszoo.org/ape-heart-project.aspx  
**Email:** heartproject@twycrosszoo.org

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Don’t forget to take photos at all stages of the cardiac post-mortem examination (include a scale marker)