The Royal College of Pathologists
Pathology: the science behind the cure

Changes to the FRCPath Part 2 Examination in Toxicology

Background

This document outlines changes to the necropsy component of the Toxicology Part 2 practical examination. This component will now be delivered as a casebook rather than being carried out onsite as part of the practical examination.

Changes to the Part 2 Examination

Candidates will undertake a minimum of six supervised necropsies which are then written up as a "Necropsy Casebook" to be submitted to the College for appraisal and a viva at the formal practical for the Part 2 examination in Toxicology. The necropsies will need to be carried out within a limited time frame for each necropsy to avoid introducing postmortem changes to the tissues, and an acceptable timeframe for each necropsy would be 1 to 1.25 hours. Training for the necropsy would be focussed on the candidate becoming competent in completing the necropsy within this timeframe. The necropsies are observed by the candidate's supervisor (or other suitably qualified colleague), and the necropsies are scored on the basis of carrying out the necropsy as described in the accompanying checklist below and sign each of the six necropsy reports as being carried out to the required standard.

Necropsies should be taken within the 12 months preceding the examination date – depending on availability at their training centre - and submitted for assessment at least 4 weeks prior to the practical examination.

1. Check list for Candidates/Assessors

Procedure	Satisfactory/ Unsatisfactory
1. Review of study protocol for any special requirements of necropsy (blood, extra tissue samples for biochemistry, frozen samples, etc) and candidate should prepare a required tissue list for sampling (from study protocol), if one is not already supplied. This will provide a check list for quality control that all tissues have been sampled at the termination of the necropsy.	
2. Prepare check list for quality control of tissues sampled such that all required tissues have been sampled.	
3. Check that correct dissection equipment is available to perform the necropsy – cork boards, forceps, scissors, glass microscope slides for bone marrow and blood smear, syringes (1ml, 5ml, 10ml).	
4. Ensure correct fixatives are available – formalin, Davidson's for eyes, Bouin's for testes, etc.	
5. Ensure correct sample containers and appropriate labels are available for tissue samples – separate containers for small tissues that might be lost in a general container (adrenal, pituitary, etc.); eye and testes containers with correct fixative; compartmentalised containers for easing QC check? (the use of a compartmentalised fixation container depends upon individual laboratory SOPs and is helpful but not essential). Ensure that all containers are correctly labelled with study and animal number and that these correspond with the identification of the animal intended for necropsy.	

6. Ensure that correct sample tubes for blood are available (EDTA/citrate/ heparin for plasma, tubes for preparation of serum)	
7. Ensure that animal is dead – blinking reflex, heartbeat, etc.	
8. Ensure that the animal has the correct animal number, and is from the correct study number, before proceeding with the necropsy.	
9. Weigh animal or ensure that the animal has been weighed.	
10. Thorough examination of external features and accurate recording of any abnormalities – head, eyes, ears, skin, paws, hair, dorsal and ventral surface.	
11. Sample the eyes and Harderian glands (rodents only) and place into correct fixative (modified Davidsons etc.)	
12. Partially separate skin from underlying muscle and examine mammary glands throughout the body, salivary glands around neck region, and sample the skin and those glands required by protocol.	
13. Pinning out carcass ready for necropsy (rodents only).	
14. Opening of abdominal muscle to reveal the internal organs (dependent upon laboratory SOP the thorax can be dissected first).	
15. Thorough examination of abdominal organs *in situ* for abnormalities before sampling! Record any gross abnormalities, colour or size differences from normal, etc.	

16. Blood sample from abdominal vena cava (cardiac sample would be acceptable). Volume of at least 1.5ml depending upon species.	
17. Place correct volume of blood in required tubes	
18. Remove protocol required tissues, trim (as appropriate) and place into correct fixative.	
19. Weigh those tissues required by the protocol.	
20. Sample peripheral nerve (generally sciatic) from at least one leg.	
21. Prepare bone marrow smear from one femur (in addition to fixing whole femur from opposite side of animal.	
22. When all abdominal tissues/organs have been sampled move to thorax.	
23. Open thorax and thoroughly examine all thoracic tissues for abnormalities before beginning dissection of individual tissues. Record any gross abnormalities, colour or size differences from normal, etc.	
24. Remove protocol required tissues from thorax, weigh those required by the protocol (generally heart, lungs, thymus, etc.	
25. Trim those tissues requiring trimming for adequate fixation (inflate lungs with formalin if this is required from the laboratory's SOP).	
26. Examine brain after removal of skull and record any gross abnormalities, colour or size differences from normal, etc. Dissect it free from meninges, weigh it if needed and place it in	

formalin fixative (some laboratory SOPs may require the brain to be trimmed before fixing).	
27. Examine the pituitary gland in the base of the skull, record any gross abnormalities, colour or size differences from normal, etc. and remove and weigh it if required by the protocol. Fix in formalin fixative in a small container to prevent loss of the tissue.	
28. Remove sections of vertebrae containing spinal cord as required in the protocol, generally cervical, thoracic and lumbar samples, and place intact into formalin fixative (some laboratory SOPs will require the spinal cord to be dissected free from vertebrae prior to fixation).	
29. Carry out a QC check that all the tissues required by the protocol have been taken - sign and date the QC check list.	
30. Place all remaining tissues, and the carcass, not required in the protocol into a container labelled with the animal and study number and place into a freezer, or into formalin fixative, for retention in case additional tissue might be needed in the future. (Individual laboratory SOPs may influence whether or not this is needed).	

2. Additional notes for the Candidate:

1) The case book should include a section for reflection from the candidate on the necropsies undertaken and lessons learnt which would demonstrate their understanding of:
a). The importance of why the need for in vivo work,

b). That they are aware of good laboratory practice (not necessary in compliance with GLP if they are not a registered lab but that good practice has been followed),
c). The need to document if the procedures have not been followed and there are deviations- why and what mitigation has been undertaken?
2) The case book should also have a page inserted in the casebook at the beginning and signed as a “Statement of Originality” by the candidate confirming that the submitted work was solely undertaken by them.

3. **Notes for Assessors:**

1. The training assessor will be responsible for necropsy training of the candidate and for marking the check box for each task in the necropsy list.
2. The scoring of 1-5 is an arbitrary one and scores of 5 should be given when the candidate is competent. Lower scores should be given where certain aspects might be missing from the required task (examiners will note where/what these deficiencies are). This will help assess the progress of the individual and confirm their eventual competency in carrying out necropsies.
3. It will be expected that a candidate competent in necropsy would achieve a score of 5 in each of the boxes from the table above.
4. Different laboratories (if they are GLP compliant) will have established standard operating procedures, and the order in which the procedures occur may differ from the list given above. The important feature here is that all of the procedures are undertaken, and the order that things are carried out is unimportant.

5. Preparation of the QC tissue check list (if not already supplied by the conducting laboratory) is the responsibility of the candidate but is highly recommended to avoid missing tissues.
6. The assessor will ensure that all required tissues are taken at the examination.
7. It is important that the organs and tissues are removed carefully to avoid physically damaging the tissues. Marks should be taken off for rough tissue handling as the quality of the resulting histology will be poor for any pathologist reading the slides from the tissues.
8. The whole necropsy should be completed within a time frame of 1.25 hours for a rodent necropsy. This is to ensure that tissues do not show unacceptable postmortem autolysis.
9. Taking blood and bone marrow smears may not be a protocol requirement but the candidate should be able to show competence in both of these procedures. Sampling these may contravene GLP compliance on regulatory studies but in this case additional non-GLP studies may have to be used to demonstrate competence in these techniques. DRF studies (non-GLP) may be a possibility for these procedures.
10. Assessors should also submit a separate statement that is included in the necropsy casebook confirming that they have been present at all necropsies and that the candidate has performed the necropsy according to acceptable practices and SOPs. A suitable individual acting as an assessor would typically be a head of department or head of the laboratory where the candidate works.

Next steps

Candidates should submit their casebook for assessment to exams@rcpath.org at least 4 weeks before their Part 2 Practical examination. Applications for the Spring 2025 examination will close on Friday 3 January so candidates should ensure that they have applied for the examination by then.