Useful Information regarding the ECVP examination

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Information on the creation of the exam
The following is information about the process of the creation and formatting of the ECVP Qualifying Exam. It also includes some sample questions from previous years, this part will be updated in the future. At the end is a list of tips (do's and don'ts) for candidates with examples from previous exams including 2011.

1. Creating the exam

The members of the Exam Committee (EC) are all ECVP diplomats and are chosen in order to represent various areas of expertise (e.g. large animals, poultry or toxicological pathology), area of employment (academia or industry), and different European countries. There are usually 13 members. Each exam section has a section leader (SL) who is responsible for the collation of questions and editing of the final exam paper. During the year exam material is collected from all members and at a 4 full day preparatory meeting in the fall each question and case is discussed amongst the EC members. The final version, i.e. all the questions of all the parts of the exam, is therefore approved by all 13 EC members.

All diplomats are strongly encouraged to submit exam cases/questions to support the work of the EC and contributing to the quality of the exam. Submission is acknowledged by the EC and carries CPE points as support of the ECVP. For further information and proper format see http://www.ecvpath.org/mock_exams.asp.

Histology:
Each of the members of the EC submits at least 3 cases (blocks with one H&E slide) with a board-type description, including point distribution, to the SL. The cases are deposited in a histology archive, from which the histology SL prepares a preliminary exam keeping an appropriate distribution between species, organs, disease processes and difficulty levels in mind. Slides and point distribution are discussed and decided upon during the preparatory meeting. Every case carries 20 points, distributed between description, morphological diagnosis, etiology/name of the disease/etiological diagnosis (where appropriate) and design of the description (style). The majority of the points are attributed to the description. The distribution between the different animal species is roughly 30% large animals, 30% small animals and 30% remaining species (exotics, fish, lab animals, or poultry). Slides from the last 30% usually represent "classic" conditions.

Gross:
Each EC member submits digital gross photographs including appropriate questions (e.g. morphological diagnosis, cause/etiology, lesion in another organ, pathogenesis, or clinical signs) to the SL. If the photos are considered to be high enough quality (e.g. lesion should be mainly in the centre, recognizable, good lighting, etc.) they are deposited in a gross slide archive. From this slide archive the SL prepares a preliminary exam. Slides and point distribution are discussed and decided upon during the fall meeting. Distribution is roughly 30 % large animals, 30% small animals and 30% remaining species (exotics, fish, lab animals, poultry) with an equal distribution between organs, disease processes, and difficulty levels.

General pathology:
Each EC member submits at least 7 multiple choice questions (MCQ) and 3 short answer questions (SAQ) in the correct examination format, including the references for each question, to the SL. The SL prepares a first draft of the exam keeping in mind an appropriate distribution between disease processes (e.g. immunopathology, tissue repair, or neoplasia), questions taken from books and journal articles and difficulty levels. A first draft of the preliminary exam (including the references) is sent for review to 3 EC members. Taking their comments into account, the SL prepares a second draft to be presented to all members at the preparatory meeting.

Veterinary Pathology:
Three EC members submit at least 7 MCQ and 3 SAQ in an adequate format, including the references for each question, to the SLs. The vet path SLs are chosen according to their expertise in this area (large animals, small animals, exotics, fish, poultry, lab animals or tox path). The vet path SL prepares a first draft exam keeping in mind an appropriate distribution between disease processes, organ distribution, species (eg. large animals between ruminants, pigs and horses), and difficulty levels. This first draft of the preliminary exam (including the references) is sent for review to 3 EC members. Taking their comments into account, the section leader prepares a second draft for the fall meeting.

Comprehensive pathology:
Six EC members submit questions including the references for each question to the SL, who prepares a first draft, which is sent for review to 3 EC members. Taking their comments into account the SL prepares a second draft to be presented to all members at the preparatory meeting.

At the preparatory meeting the exam drafts are presented to all EC members and the exam is finalized in a definitive format, which is additionally reviewed by another EC member only for format and spelling errors.

2. The format of the exam

Histology:
The exam consists of 18 glass slides, 1 cytological smear and one glossy print of an EM. Each of these carries 20 points, with the description of the lesion carrying the most points and few points for the morphological diagnosis and (where appropriate) cause/etiologies, pathogenesis and/or name the disease and style. Total time frame is 4.5 hr (with a mean of 13.5 min/slide). One slide set has to be shared between 2 candidates.

Gross:
The exam consists of 60 photographs, which are presented via an electronic projection system ("beamer"). Each slide carries a total of 3 points. Time frame is 2 min/slide (Total time 2hr).

General pathology:
The exam consists of 60 questions, 40 MCQ and 20 SAQ. MCQs give only one correct choice out of 5 possibilities. Each question carries 5 points. Total time frame is 4h.

Veterinary Pathology:
The exam consists of 3 subsections, two of which have to be chosen in specific combinations (see http://www.ecvpath.org/info_brochure.asp). In each subsection there are 20 MCQ and 10 SAQ. MCQs give only one correct choice out of 5 possibilities. Each question carries 5 points. The first two subsections are given in one session of 3hr followed by a break and another 1.5hr for the third subsection.

Comprehensive Pathology:
The exam consists of five parts/questions, and could comprise the following topics: assessment of an abstract, evaluation of toxicological pathology data, provision of a second opinion, analysis of a scientific study, and/or assessment of clinical cases. Each part/question is equally valued at 100 points, hence a total of 500 points for the whole comprehensive exam. However, the time needed for each part may not be equal. Total time frame is 4.5hr.

- The abstract is frequently put in the context of a grant application, a conference participation or article submission and comprises about 400-500 words. It usually contains mistakes that need to be identified and rectified. To fulfill this task background knowledge of general and/or special veterinary pathology shall be applied. Moreover, the candidate must approach this question as if they were a reviewer and in addition to observing obvious mistakes, points may be given to candidates who come up with creative criticism that is applicable to address the question.
- The tox path part of the comprehensive exam consists of selected histo slides, gross or histo pictures, survival curves, organ weight tables, clinical pathology parameters, macro and/or microscopic incidence tables not only to be described but also interpreted. The candidate is asked to apply his knowledge of clinical and/or anatomic pathology findings in laboratory animals comparing treated and non-treated groups. A basic experience regarding the format of tox path data and the methodology as well as vocabulary of toxicology studies, though not compulsory, is highly recommended. Background observations and/or outlier values will have to be differentiated from test article-related findings. Conclusions or hypotheses regarding the safety of the test article, the dose-dependency of effects, and putative mechanism of action or additional refinements of the study protocol may be asked as well.
- For the analysis of a scientific study basic knowledge on molecular pathology needs to be applied. In this part of the exam, original data in various forms (e.g. graphs, blots) are presented. Questions usually ask for data description and interpretation. In addition to the analysis of the provided data, there is

usually a sub-question about a technique that was applied in the study. You should therefore know the **basic principles** of frequently applied techniques. Questions in the last years included techniques to analyze DNA (e.g. PCR, Southern Blotting, BrdU incorporation), RNA (quantitative RT-PCR, Northern Blotting), proteins (e.g. Western Blotting, tissue microarrays, immunohistochemistry, immunofluorescence, ELISA), epigenetic alterations (e.g. DNA methylation, modifications of histones), genetic modifications (e.g. transfection of cells, overexpression of genes, RNA interference, inducible expression, targeting of genes in mice), reporter assays (e.g. luciferase assays). Experimental details (e.g. the pH of a certain buffer) are not asked for. This part of the exam tests the basic understanding of techniques used to complement pathology findings. The candidates may also be asked for new hypotheses drawn from the data presented, and points are given for not only for one or multiple "correct" answers but also for creative ideas that make sense.

- Regarding the second opinion, a forensic case or a clinical case can be chosen. In this part, like for clinical cases, the candidate should apply diagnostic knowledge. Histo slides, gross slides, clinical data (including reference values) or special staining may be provided. A detailed description of histology is not asked for (this is addressed in the histo part of the exam and not in the comprehensive part) but morphological or etiological diagnoses may be required.

3. Passing rates

Each of the 5 sections is passed by reaching 60% of the total possible marks (e.g. 180 point for general pathology or 300 points for comprehensive pathology).

4. At the exam

The exam is usually early February in Hannover. It starts with histopathology Monday morning, followed by gross pathology Monday afternoon. Tuesday starts with general pathology followed by veterinary pathology in the afternoon. Comprehensive pathology is on Wednesday morning.

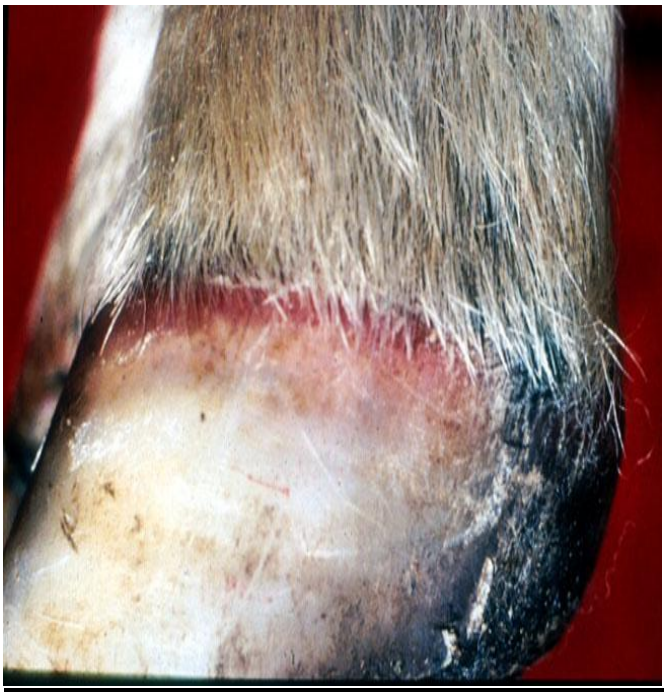
Candidates will be randomly assigned a seat through a lottery process. Candidates have the possibility to set up their own or hired microscope the day before the exam. They may use pens or pencils; have food and drinks on their table. No other utensils, in particular noisy timers or mobile phones are allowed during the exam. On the morning of the exam the candidates draw a number and their exam scripts are only identified by this number and not by name. Dictionaries in various languages (covering the languages spoken by the candidates) are available at the front of the examination room. Candidates are not allowed to talk to each other under any circumstances**.** In addition, candidates are not allowed to take any exam material or notes out of the examination room. Contravention is regarded as cheating. Candidates are accompanied if they leave the room during the examination.

For consistency reasons each EC member marks a complete question (for example histology case 3) from all candidates. Every slide and question is marked independently by two EC members based on the scoring agreed by all members during the preparatory meeting. They then compare their marks (consolidation). If

there is a discrepancy between marks, the answers are looked at again and the discrepancy is discussed until a final agreement is reached. All marks are registered in a computer program which calculates percentage of points reached per candidate, slide or question. The results from the first 4 sections are statistically analyzed at the Medizinische Fakultät der Universität Bern, Switzerland, Institut für Medizinische Lehre, Abteilung für Assessment und Evaluation for their quality and discriminatory power. All results are approved before disclosure of candidates' names. A candidate has to have 60% of the total points possible in a section to have passed this section. ECVP council has the final decision about approval of the results. Candidates are usually informed of their results within a couple of days.

6. The following are examples from previous exams (examples for histopathology and comprehensive pathology will follow).

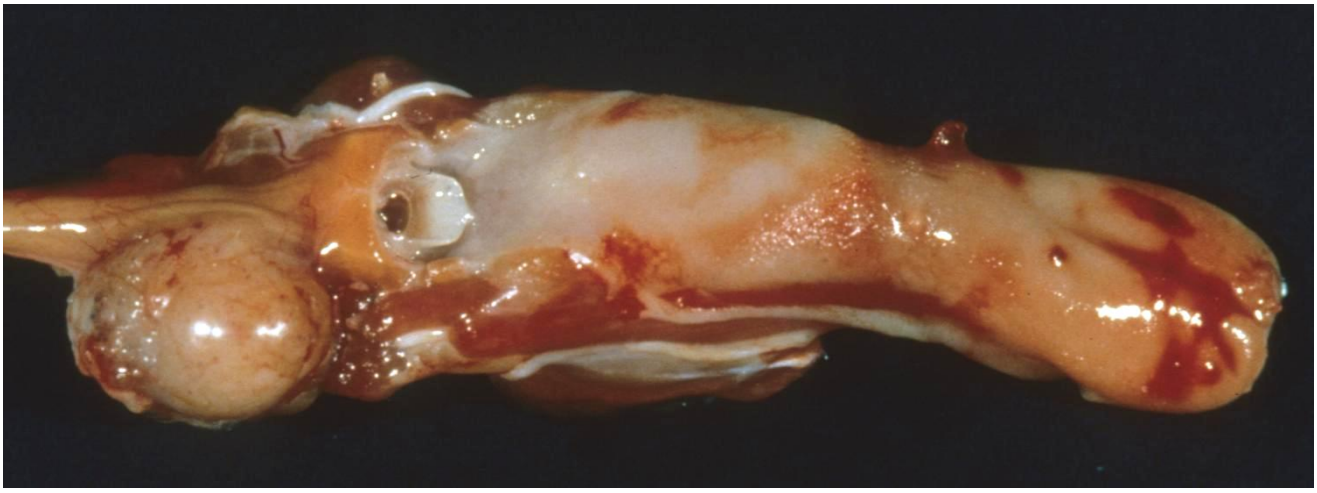
Gross:



Case 1: Tissue from a sheep

Name the disease: *blue tongue (2 pt)*

Etiology: *Bluetongue virus (1 pt)*



Case 2: Tissue from a rat

Morphologic diagnosis: *unilateral thyroid (1 pt) adenoma (2 pts)*

General Pathology:

1. Which **ONE** of the following morphological changes of neoplastic cells is **NOT** specifically associated with malignancy? *(submitted by XY*)

☐ A. Pleomorphism (c, p273)
☐ B. Hyperchromasia *(c, p274)*
■ C. Mitoses *(f, p274)*
☐ D. Loss of polarity *(c, p274)*
☐ E. Large nucleoli *(c, p 274)*

Correct answer: C
Source: Robbins-Cotran, p273-4

2. Which combination of the following statements regarding the role of transforming growth factor-β (TGF-β) is **CORRECT**? *(Submitted by XY)*

TGF-β

1. induces angiogenesis by upregulating the expression of VEGF and angiopoietin-1 (c, p 444)
2. induces cell-cycle arrest and apoptosis in the late phase of tumorigenesis (f, p 444)
3. promotes tumor invasion in the early phase of tumorigenesis (f, p 444)
4. represses the expression of MHC II molecules (c, p 444)
5. is present in three isoforms in mammalian tissues *(**c**, Laboratory investigation, abstract)*

☐ A. 1, 2, 3
☐ B. 1, 2, 4
■ C. 1, 4, 5
☐ D. 2, 3, 5
☐ E. 3, 4, 5

Correct Answer: C
Sources: Christophori G, Nature, 444-450, vol 441, May 2005
Saika, Laboratory investigation, 106-115, vol 86, 2006

Veterinary Pathology:

Large animals

Which **ONE** of the following statements regarding intestinal disease in horses is **NOT CORRECT**? *(submitted by XY*)

☐ A. *Rhodococcus equi* causes necrosis and ulceration. (c, p. 368)
☐ B. *Ehrlichia risticii* causes congestion and edema. (c. p. 369)
■ C. *Helicobacter equorum* causes lymphoid proliferation. (f, paper,

abstract)

☐ D. *Salmonella typhimurium* causes fibrin exudation and hemorrhage. (c, p. 222, J&K)

☐ E. *Clostridium perfringens* type C causes hemorrhage and necrosis. (c, p.240, J&K)

Correct answer: C
Sources: Mc Gavin, P. 368-369, Equine Vet J. 2007, 39(4):370-2.Acute in vivo interactions of Helicobacter equorum with its equine host. J&K, Vol. 2, p. 222-223 and p. 240

Poultry

Which **ONE** of the following statements regarding avian mycobacteriosis in poultry is **NOT CORRECT**? (submitted by XY)

☐ A. Avian mycobacteriosis is most commonly caused by *M. avium* . (c, p 442)

☐ B. Classic tubercles are rare in Columbiformes and Anseriformes. (c, p 442)

☐ C. Pigeons are resistant to *M. avium* infection. (c, p 442)

☐ D. Pheasants are particularly susceptible to *M. avium* infection. (c, p 442)

■ E. Lesions develop most frequently in the lungs and the reproductive tract. (f, p 442)

Correct answer: E.
Source: Avian Diseases 49, 442-445, 2005.

Fish

Which **ONE** of the following statements regarding furunculosis induced by *Aeromonas salmonicida* is **NOT CORRECT**? (*Submitted by XY)*

Furunculosis

☐ A. primarily affects salmonids *(c, p 15 and 318)*
■ B. lesions are restricted to the skin in young animals *(f, p 15 and 319)*
☐ C. is characterized by minimal inflammatory response *(c, p 15 and 320)*
☐ D. is mainly transmitted by the horizontal route *(c, p 15 and 319)*
☐ E. is characterized by subcutaneous swelling *(c, p 15 and 320)*

Correct answer: B
Sources:ROBERTS, Fish Pathology, 3rd edition, pp 318-321; Fish diseases CLDavis 2006, p 15

ToxPath

Which **ONE** of the following statements regarding administration of phenobarbital in rats is **NOT CORRECT**? *(submitted by XY)*

Phenobarbital

☐ A. induces hepatic microsomal enzymes *(c, p427)*
☐ B. increases the risk of developing thyroid follicular cell tumors, predominantly in males *(c, p427)*
☐ C. markedly decreases circulating T3 and T4 after one week *(c, p427)*
☐ D. is associated with centrilobular hepatocellular hypertrophy *(c, p136, 140)*
■ E. inhibits 5'-deiodinase in the liver and kidney *(f, p426)*

Correct answer: E
Source: Fundamentals of Toxicological Pathology. Haschek, Academic Press Inc, US 1998. pp 136, 140, 426-427

Lab animals

Which **ONE** of the following statements regarding proliferative lesions in the adrenal medulla of aging Wistar and Sprague-Dawley rats is **CORRECT**? *(submitted by XY*)

☐ A. They are more common in female rats. *(f p 492)*
☐ B. Ganglioneuromas are commonly associated with pheochromocytomas. *(c, p 494)*
■ C. Ganglioneuromas consist mainly of chromaffin cells. *(f, p 494)*
☐ D. Pheochromocytomas contain abundant multipolar ganglion cells. *(f p 494)*
☐ E. Pheochromocytomas frequently metastasize. *(f p 494)*

Correct answer: B
Source: Pace et al., Tox Pathol 2002, 30: 492-500

Exotics

Identify **ALL** of the **CORRECT** statements regarding avian influenza H5N1 infection in tigers and leopards. (*Submitted by XY)*

1. Lungs are consolidated.
2. Multifocal hemorrhages are present in the heart.
3. Alveolar lumens contain neutrophils and macrophages.
4. Influenza virus antigen is present in bronchiolar epithelial cells.
5. Encephalitis has been reported.

☐ A. 1
☐ B. 1, 2
☐ C. 1, 2, 3
☐ D. 1, 2, 3, 4
■ E. 1, 2, 3, 4, 5

Correct answer = E
Source: Avian influenza H5N1 in tigers and leopards. Emerg Infect Dis. 2004 Dec;10(12):2189-91.

Small animals

Regarding dysautonomia (Key-Gaskell syndrome) in cats and dogs *(submitted by XY)*

A. List the two locations where histological lesions can be observed

1. *peripheral ganglia (0.5 points)*
2. *autonomic ganglia (0.5 points)*

B. List four histological findings

1. *neuronal chromatolysis*
2. *neuronal nuclear pyknosis*
3. *loss of neurons*
4. *proliferation of satellite cells / minimal to mild leukocytic infiltration*

(1 point each, max to 4 points)
Source: Thomson's Special Veterinary Pathology. McGavin, Carlton & Zachary, 3rd ed, Mosby Press, 2001 p454

7. Do's and dont's

Examples are from the exams from the last years including the 2011 exam.

In General

The following points are meant to help candidates be better prepared for the questions and to get some ideas about what is expected from them. The most common problems are also highlighted.

Be prepared:

- If your scoring is below the 50% rate, you most likely sat the exam too early.
- The summer school is a valuable training experience, but 6 or 8 weeks at the summer school cannot replace at least three years of vigorous training in diagnostic pathology and studying.

Be as precise as possible in regard to terminology.

Histopathology

Write legibly:

- If your handwriting is not readable, you are likely to lose points.
- Work on your handwriting and test it on colleagues and friends!
- Train not just for speed (mean of 13.5 min/slide!), but also for numbers of slides. Do mock exams of 20 cases. Empty pages won't get you points.

Know your anatomy/histology. There are people making mistakes in recognizing the organ, which means the loss of points which could be easily obtained. The localization of the lesion is important. Remember, that a slide where you can not recognize the organ will not be selected for the exam or you will be given the organ. Below is a collection of mistakes which were recently experienced with the exam.

- Cases can be taken from any organ, such as endocrine, reproductive, or respiratory system including nasal turbinates or skeletal system.
- The pituitary gland was mistaken to be pancreas, pancreatic adenoma, and the neurohypophysis was mistaken for brain stem.
- Do not mistake the mammary gland for an epididymis or salivary gland. Corpora amylacea which are common in the mammary gland were interpreted to be mineral deposits or bacteria.
- Know the difference between different glands, do not state that the tissue is salivary gland and than specify it to be a Harderian gland since this is not a salivary gland.
- 'Bladder' can be gall bladder or urinary bladder, be specific.
- Know the difference between different epithelia so that you do not mistake the urinary bladder to be skin.
- It is very unlikely that in a cytological smear from a tracheal exudate 70 % of the cells are fibroblasts.
- Do not mistake the uterus to be a prostate, nor mammary gland and it is necessary to know the different layers in the uterus (endometrium, myometrium…). Also know the differences between species since not all animals have uterine horns

- Intestine (large, small and try to specify segment) again, be specific.
- Exotics and fish: know at least the anatomy of the major organs, e.g. a bird lung is not a bird liver.
- Remember that fish also have osteoclasts so that you do not over interpret these normal cells to be protozoa.
- Again, know your terminology, remember that granulocytes are termed differently in different species (reptiles have heterophils and fish have eosinophils and neutrophils).

Know specific variations of different species:

- Granulomas in reptiles are usually different than those in mammals.
- *Hexamita sp*. are usually specific to reptilian urinary bladder or kidney and have not been reported in birds.
- Exotics: know the classic conditions, remember common disease in an uncommon species or organ

Use correct terminology:

- Acanthocytes are not the same as acantholytic cells.
- There is no such condition as a mammitis.
- Inflammation of the stomach is not stomatitis.
- Desmoplasia is usually associated with neoplasia not with inflammation.
- Melanomacrophages are usually found in the reptile or fish liver.

Look at all the tissue/whole slide:

- Brain sections usually have meninges (at least the leptomeninges).
- Lung usually has some pleura.
- There is tissue around a neoplasm which may have some important changes and diseases that can be more relevant for the animal health (Leishmaniasis in a skin with hemangioma).
- A slide may contain two organs, which are anatomically attached to each other such as pituitary and *rete mirabile*, when this is important for the orientation and helpful for the diagnosis.

Make sure that there is a logical connection between your description and the morphological diagnosis.

- Normal appearing fibroblasts are not typical for a fibrosarcoma.
- There should be inflammatory cells in a lesion called "…itis".
- There should be macrophages in a lesion when it is granulomatous.

Do not list inflammatory cells without a quantitative modifier:

- Many lymphocytes, fewer plasma cells, some neutrophils…
- Order of quantity.
- You will not get all points possible by just listing every inflammatory cell you know without any indication about how many there are (many, few, rare, plenty, abundant…) and where they are (in the white matter, in the subcutis, perivascular, in the lamina propria). The EC do not pick the ones which are correct; you need to make this decision.
- Always: What, where and how many.

Read the question carefully:

- Be sure to know the difference between etiology, etiologic diagnosis, name the disease or pathogenesis. (What is described below for gross is also valid for histology).
- Malignant catarrhal fever is a disease, not an etiology.

Give only one answer if only one is required:

- Do not offer multiple etiologies, always the most likely. If there are two possibilities, we will accept either but not both at the same time. If we want more than one, we ask specifically for it for it (e.g.: Name two potential etiologies/causes). Questions are generally put in plural (morphological diagnoses/etiologies); this does not necessarily mean that there are two etiologies. There may be just one or two, you cannot deduct this from the question, you have to look at the slide.

Do not overuse your imagination:

- Urate crystals are not mycobacteria (size, form, structure differences but also stain!!!).
- Macrophages are not amoeba, especially in bird lungs.
- Mycobacteria are usually not seen in H&E stains.
- Do not invent cells, bacteria and/or parasites or giant cells.
- **Invention will lead to loss of points!**

Do not get fixed on a disease and make your description fitting this imagined disease:

- Do not describe multinucleated giant cells because you want to diagnose mycobacteriosis in a case of mycoplasmosis.
- There are other disease processes than tumors and inflammation.

Do not waste time to extensively describe **normal** inflammatory cells.

- It is enough to name them as for example „multinucleated giant cells (foreign body type)“ or „epitheloid macrophages“.
- You will get no points for giving cell or nuclear size of such cells in µm.
- Cell sizes are given in descriptions of tumors and cytology preparations, they do not need to be in µm, but can be in ratio to erythrocytes or other standard sized cells.
- Abnormal cells need to be described.

Items you must always write:

- Firstly the tissue type (i.e. haired skin, urinary bladder (not just bladder); if the hair skin is found on the ear or tail and the lesion is not in the skin, also state that you are looking at a tail or ear with haired skin).
- With tumors:
    - Location, demarcation, encapsulation, arrangement, stroma, tissue replacement.
    - Cell shape/type, size, cell borders, cytoplasm (amount, color, texture)
    - Nuclear characteristics (size, shape, number, chromatin pattern and nucleoli (size, number, prominence), location within cell.
    - Mitoses, number (MI or average/hpf), bizarre.

    - Know the difference between anisokaryosis vs anisocytosis.
- With inflammation:
    - Cell types, number in order, location (diffuse multifocal, perivascular…)
    - Always: what, where and how much.

EM:

- Describe everything, including normal structures (correct terminology!).
- Know how to recognize tissue.

Cytology:

- The cytology is the only exception where the organ and the sampling method (i.e. smear from an exudate, fine needle aspiration, impression from an organ) are given. This is important in order to figure out a list of differential hypotheses (disease processes) already before looking at the slide. By reading the organ and the sampling method, you should already know what you expect to see in the slide.
- Gross examine the slide (gives a lot of information on the cellularity and on the background, i.e. calcifications, black pigment, blood and so on)
- You have to be able to classify the cells (normal, hyperplastic, neoplastic, inflammatory, mixed) and always remember to evaluate the acellular component of the slide (background, granules, crystals, etc).
- As in any other slide, the cells have to be **recognized.** Experience is fundamental in this case in order to distinguish different cell types. In cytology almost all cells are individualized and roundish and you cannot rely on architecture as you do when you read histology. However when clustered then you can often gain more information i.e. epithelial or mesenchymal. All cells have to be **described** and **interpreted**.
- The final judgment and the morphological diagnosis must be consistent with your previous description.

Gross:

Be specific:

- Bladder: which bladder?

Do read the questions carefully. Commonly asked questions include but are not restricted to the following:

- Morphologic diagnosis: name the lesion in specific pathologic anatomic terms (multifocal severe, ulcerative esophagitis; diffuse, severe, visceral urate deposition; moderate, unilateral atrophy of nasal turbinates)
- Etiology or likely cause: name the cause as specific as possible: (Equine herpes virus 1, *Mycoplasma bovis*, lead poisoning, uremia; and not only herpes virus or Orbivirus)
- Name the disease: give the commonly used appellation of the case shown (visceral gout, canine distemper, Bluetongue).
- Etiologic diagnosis: name the organ and the most likely disease process/cause (viral pneumonia, mycobacterial enteritis, uremic gastritis).
- Differential diagnosis: give a diagnosis for another lesion or disease that would resemble the first diagnosis (lymphadenitis – malignant lymphoma).

- Pathogenesis: list or describe briefly the series of pathogenic events that resulted in the lesion or disease shown (glomerular amyloidosis > proteinuria > hypoalbuminemia > decreased plasma colloid pressure > generalized edema)

Do not overuse your imagination:

- There is no morphological change which can be appreciated grossly suggesting reliably the presence of inclusion bodies.

Look at as many images you can. Do not restrict yourself to just one source.

General pathology

Read the questions carefully:

- Immunohistochemistry does not relate to DNA analysis.

Do not forget basic (undergraduate) pathophysiology; cytokines and intracellular pathways are not all.

Veterinary Pathology

Start on time to review the literature and to study:

- Do not ignore the books.
- Do not ignore the pertinent journals.
- There is a recent paper in Science by Karpicke and Blunt about learning which you may find useful: Retrieval practice produces more learning than elaborative studying with concept mapping. Science, 2011 Feb 11;331 (6018):772-5. Epub 2011 Jan 20 by Karpicke JD, Blunt JR.
- Do not assume that you can ignore one of the three sections and pick up those points in the other two, this is unlikely to work.

Comprehensive pathology

Read the questions carefully:

- Be concise in your description and analysis! No points are given for the length of the text.
- When asked to describe and interpret some survival curves, do not interpret tumor incidences or any other data you are presented with.
- When asked to describe and interpret the incidence of neoplastic findings, do not waste time in describing non-neoplastic changes such as inflammatory and/or degenerative findings.
- When asked for a cytological interpretation **without** detailed description, do not write a detailed description **without** any interpretation.
- Briefly means succinct, precise and no logorrhea. Do not waste time to fill the pages beyond the offered lines. We assume that the space we provide is sufficient to answer the question (unless your hand writing is really large).
- Again, write legibly, if it cannot be deciphered it will get no points.
- Clearly distinguish between describing results (3 % decrease of survival rate) and interpretation (compound X administration does not alter survival rate after a 28-day study).
- When reading research papers look at graphs, figures and establish the results before you read the text.

Sources of potential use for candidates
The EC considers the following sources of potential use without giving any guarantee for the content. They may be beneficial in addition to other resources available at the training centers.

http://www.vet.uga.edu/vpp/noahsarkive/na.php#newversion (Noah's Arkive > 30 000 gross images, also some histology and cytology)
http://w3.vet.cornell.edu/nst/ (John King's gross collection)
http://www.cldavis.org/woodard_bone/index.html (a lecture about bone pathology)
http://www.cldavis.org/syllabi/archive/downloads.html?id=104 (Syllabi from the Gross Pathology/General Pathology Review Course)
http://www.cldavis.org/syllabi/archive/downloads.html?id=11 (Syllabi from the Diagnostic Pathology of Diseases of Aerial, Terrestrial and Aquatic Wildlife)
http://www.vet.cornell.edu/oed/neuropathology/index.asp (gross and histo in addition to the Book Veterinary Neuropathology)
http://www.cldavis.org/syllabi/archive/downloads.html?id=115 (Syllabi from the Descriptive Veterinary Pathology Course (US edition)