

**Certificate in Advanced Veterinary Practice**  
**C-SAM.7 Small Animal Neurological Medicine**  
**Neurological disorders affecting dogs and cats**

**Module Outline**



**Module Leaders:**

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## Enrolment guidance

Before embarking on this module, you should fulfil the following criteria:

- a) You should have completed module B-SAP.1.
- b) If you are only enrolling for the C medicine modules with RVC, it is **highly recommended** that you write the medicine report in module B-SAP.1 and this will be reviewed by the assessors prior to assessment of any C module work. If you have completed the B-SAP.1 module at another institution, your medicine report may be submitted for feedback.
- c) It is your responsibility to ensure that you have access to sufficient cases to produce adequate material for the module.

Coverage of this module may be integrated with others, particularly other B and C modules. All candidates will normally have completed A-FAVP.1 Foundations of Advanced Veterinary Practice module, and at least one of the practice B modules, before undertaking a C module, although you can choose to work through modules in a different order if you wish. In whichever order modules are tackled, compliance with best practice for all the topics covered by module A-FAVP.1 will be expected whenever these are appropriate in C modules. For example, awareness of, and compliance with, all relevant legislation, welfare and ethical principles will be required throughout.

You are advised to plan a structured programme of continuing professional development to help you achieve your objectives. Involvement in 'learning sets' and networks of other candidates working towards the same or similar modules is encouraged; this could be initiated by the candidates themselves via RVC Learn. The RCVS considers that candidates will need advisers/mentors to support them through the certificate.

For a designated Certificate in Advanced Veterinary Practice (Small Animal Medicine) you must complete this module, two other Small Animal Medicine modules, a fourth 10 credit module and an RCVS synoptic assessment.

## Aim

The aim of this module is to advance your knowledge and understanding of clinical neurology, including relevant neuroanatomy and neurophysiology. It should ensure that you gain a thorough knowledge of the commonest examples of neurological disease occurring in dogs and cats.

You should be able to carry out a neurological examination and to demonstrate an ability to localise lesions within the nervous system, establish protocols for diagnostic work-ups and understand the factors that allow the neurologist to give guidance on prognosis and potential treatments. It is understood that you will not necessarily see all of the potential conditions, and that cases will often require referral for complete investigation. The emphasis should be on the ability to demonstrate a sound clinical reasoning approach to neurological problems in small animals.

You should be able to outline appropriate treatment strategies and possess knowledge of alternative approaches to management where appropriate, although experience of neurosurgery is not required.

## Learning outcomes

At the end of the module, candidates should be able to:

- Explain the pathophysiology of specific neurological diseases.
- Describe the clinical presentation of the common neurological conditions affecting dogs and cats.
- Explain and prioritise diagnostic processes for investigation of neurological presentations, using a problem-based approach to clinical reasoning.
- Review and constructively criticise current literature on neurological disease, to enable candidates to determine its relevance to their current practice.
- Utilise understanding of evidence-based veterinary medicine and clinical reasoning skills to formulate practical treatment protocols for their patients.

- Use available resources and communicate with owners in such a way as to achieve optimum results in their practice circumstances in relation to neurological cases.
- Recognise which neurology cases are unusual as well as those that require referral for specialist investigation and treatment.

## Learning topics

### Neuroanatomy and Neurophysiology:

- Anatomy of the central and peripheral nervous systems.
- Basic histology of nervous system tissues and associated cells (e.g. functional significance of the difference between grey and white matter)
- Basic neurophysiology including transmission of the impulse, the synapse and the properties of the other excitable cells (e.g. muscle fibres).

### Neuropathology:

- Pathogenesis in the context of the nervous system.
- Common pathological processes in neurological disease

### Diagnosis of neurological disease:

- Evaluation and recognition of the importance of clinical history (onset and progression of signs) and signalment.
- Clinical and full neurological examination – including accurate neuroanatomical localisation of neurological lesions based on examination findings.
- Clinical reasoning and problem solving in neurological disease: constructing a prioritised list of differential diagnoses based on sound clinical history-taking and examination skills
- Laboratory analyses of blood and cerebrospinal fluid.
- Appropriate use of imaging in diagnosis; familiarity with myelography, CT scanning and MRI scanning.
- Applications of electrodiagnostic procedures in neurology.

### **Clinical neurology:**

- Neurological diseases in dogs and cats, including inherited (genetic), degenerative, metabolic, neoplastic, inflammatory, traumatic and vascular conditions.
- Knowledge of diseases or conditions elsewhere in the body which may be responsible for neurological dysfunction, or, alternatively, may result from a primary lesion in the nervous system, eg. pituitary macroadenoma.
- Establishment of treatment and management regimes for neurological patients, including the indications for physiotherapy and hydrotherapy.

### **Neurosurgery:**

- Key concepts regarding basic neurosurgical procedures (indication, complications).
- The special nursing, handling and rehabilitation requirements of the neurological patient.

### **Medical management:**

- The significance of the blood-brain barrier in neuropharmacology.
- Therapeutic protocols for individual patients and rational choice of drugs.
- Use of drug monitoring in neurological disease.
- Long and short-term side-effects and drug interactions in clinical neurology.

## Assessment

- A case diary of 20 neurological cases.
- A 1,000 word reflective essay (synopsis) reflecting upon what has been learned from the cases in the case diary. This may include a discussion of how you developed and used an effective clinical reasoning approach to cases.
- One case report can be submitted for review prior to being marked. This is only permitted once per candidate per discipline. It must be submitted as a fully written report and not a draft version. Feedback will be given on the approach to writing the case report that can be applied to all future medicine reports and modules, rather than specific comments on management of the individual case.
- 3 case reports of 1,750 words each including critical discussions covering diagnosis and prognosis associated with the condition and treatment with regard to the current literature.
- A 90 minute written examination (short answer questions and one long answer question) to assess clinical reasoning in the context of neurological diseases.

Further guidance is given below for preparation of case diaries, reflective essays and case reports.

## Annual assessment timetable

<b>1<sup>st</sup> October</b>	If you are submitting work for assessment on the following dates, please inform the CertAVP office
<b>15<sup>th</sup> October</b>	Case diary and synopsis to be submitted by this date.
<b>1<sup>st</sup> December</b>	You will be informed of the outcome/marks of your submitted work
<b>15<sup>th</sup> December</b>	You are given the opportunity to have one case report per discipline reviewed prior to marking (therefore only one for all medicine modules). Please submit your report by this date if you haven't already had a review.
<b>22<sup>nd</sup> January</b>	Case report feedback returned to you
<b>1<sup>st</sup> March</b>	Case reports to be submitted for marking by this date
<b>1<sup>st</sup> June</b>	You will be informed of the outcome/marks of your submitted work
<b>Mid July</b>	Written examinations to be held (date to be confirmed)
<b>1<sup>st</sup> September</b>	You will be notified of your exam result

## Learning support

Learning support is provided to aid self-directed learning and to provide easy access to published articles. You will be given a username and password which will allow you to log on to 4 different systems:

### 1. RVC Learn (<http://learn.rvc.ac.uk/>)

- For each module there are medical cases to work through, with guideline answers and relevant references as well as some cytology and endoscopy images.
- Sample case diary, essays and case reports
- Forums to discuss any topic relevant to the medicine C modules
- A webinar which contains guidance on preparing written work for this module.
- Access to the RVC online library. This is invaluable when researching literature for writing up case reports. This means that (with rare exception) all journal articles that you want to view can be downloaded to your PC with a few mouse clicks. This includes original research articles as well as review articles and case reports. IT and Library support is available for this facility (email [library@rvc.ac.uk](mailto:library@rvc.ac.uk) or [helpdesk@rvc.ac.uk](mailto:helpdesk@rvc.ac.uk)).
- There are also several CPD courses run each year at the RVC that support some of the learning outcomes for C-SAM modules. CertAVP candidates receive a 20% discount on some RVC CPD courses – please email [cpd@rvc.ac.uk](mailto:cpd@rvc.ac.uk) for details.

### 2. RVC Intranet (<https://intranet.rvc.ac.uk>)

Access to all information available to all RVC students and employees, for example, news, events, policies, committees, services, Library, IT helpdesk, etc.

### 3. Athens (<http://www.openathens.net/>)

A huge amount of any library's information is now available online, e.g. electronic journals, e-books and databases. 'Athens' is a system used by UK universities for controlling access to these type of online services and with your username and password, you can access many of a library's online databases, electronic journals and e-books seamlessly.

### 4. Email (<http://mail.rvc.ac.uk>)

You are given an RVC email address, which is **compulsory** to use for CertAVP communication and submission of work.



## Preparing a case diary

For this C-SAM.7 module you must prepare a case diary of 20 cases presenting with neurological problems to assess your range of experience and encourage reflection on cases managed.

The aim of the case diary is to demonstrate that you have exposure to an appropriate range of cases over the time period that you study for the C-SAM.7 module. A secondary aim is for you to demonstrate to the examiners that you are investigating and managing cases appropriately. If (for example) an important diagnostic test is missing from a particular case early on in the diary, the examiners would expect to see evidence of you improving your diagnostic skills and including such a test in a similar case later on in the diary. Conversely whilst appropriate and complete investigation is ideal, the examiners are keen to see that indiscriminate testing is not performed and an awareness that some cases will require referral for complete investigation.

The examiners appreciate that collating cases in first opinion practice may result in including animals without a confirmed diagnosis and/or that underwent limited work-up for various reasons. We encourage you to include cases that are the best examples of your medical case load but we will accept a smaller proportion of cases that have a presumptive diagnosis and those that had limited work-up. For either you should indicate this by indicating e.g. 'presumptive diagnosis' or 'limited investigation due to .....'.

The examiners are aware that there may be a predominance of the more common neurological conditions (such as intervertebral disc disease or idiopathic epilepsy) within the case diary when you work in general practice. Indeed it is important to include these cases to demonstrate your progression in the investigation and management of these conditions. However, including more than 5 cases with the same diagnosis is not advised. Conversely, we do not expect you to have seen every type of disorder that might be included within the learning objectives (especially rare disorders).

The following guidelines will help with compiling your case diary:

- Cases should be submitted in chronological order.
- The diary must be able to be viewed on one page when reading from left to right (landscape).
- Cases can be collected from up to 12 months prior to the date of enrolment on the CertAVP programme. Please note that the learning involved in studying for a C module should enhance your case management, therefore if all cases are selected from the period prior to enrolment this might adversely affect the quality of the diary.

- Neurological examination findings should be listed as well as the general physical examination for all cases (it is understood that they may both be normal).
- To demonstrate the breadth of case exposure, as well as your ability to perform and interpret a neurological examination, it is important to include a “Neuroanatomical localisation” column. It is important to demonstrate that you can reach an appropriate neuroanatomical localisation based on the neurological examination findings and clinical history.
- We encourage the use of abbreviations where appropriate (e.g. UA for urinalysis, U/S for ultrasound) but you must include a key to your abbreviations. Please also include a key for exactly which diagnostic tests have been included in each e.g. UA; urinalysis (includes specific gravity, dipstick and sediment examination) or faecal; faecal parasitology (includes egg count, giardia and cryptosporidium unless otherwise stated).
- We strongly advise that you record potential cases directly into a spreadsheet as you go along, as soon as you have enrolled onto the C-SAM modules. This will save you a lot of time nearer to the submission date. Any unwanted cases can easily be removed.
- Try to avoid including cases when the management was predominantly surgical with minimal medical investigation or management.
- Whilst the case diary is meant to be a brief summary of the case, do include detail where needed. If physical examination was normal then state ‘normal PE’ for example. Bear in mind what minimum information the examiner requires when assessing a case presented in this format.
- The diary should be written using scientific terminology e.g. fluid therapy rather than ‘iv drip’. Using this example it would be even better to state ‘crystalloid intravenous fluid therapy’.
- The three cases that you choose to write up as case reports are eligible to be included in the case diary.
- Cases that have already been submitted for any other examination or assessment are not eligible to be used in the CertAVP.
- Only include examples of canine and feline medicine in your case diary.
- Sample case diaries and an Excel template as a guide are available on Learn.

## Preparing the case diary synopsis

A 1,000 word reflective synoptic essay is required to accompany the case diary. This synopsis might include

- discussion of what might have changed in your approach to a new case
- any new procedures or investigations that are now considered during case investigations
- any unexpected features of a case which might influence decision making or case management in the future
- discuss whether there has been any impact on you and your team for future practice and learning
- any additional reading which was helpful

This is a good opportunity to explain or clarify any aspects of your case diary to the examiner and to state any plans you have for future study. Wherever appropriate use your further reading and available evidence to support any statements that you make – further examples of this are given in the assessment webinar available on the Learn C module homepage. Examples of reflective essays are also provided although please note that there is not a specific format that must be followed. You will probably find it easier to write your reflective synopsis after you have finished your case reports as well as once your case diary is completed. You must stay within the word limit given or the work will be returned unmarked.

## Preparing the case reports

Select your cases from a range of commonly presented conditions which fall within the learning topics for the chosen module. Ideally, cases that have been well investigated and followed-up will be chosen, and we do expect these to be your best neurological case examples. Please remember to use canine and/or feline cases only; all three cases can be just canine or just feline (the case diary must demonstrate breadth and include both cats and dogs). Although cases may be worked up collaboratively you must be the primary clinician and have been actively involved in the diagnostic and therapeutic decision making for the cases you present. Where external centres or visiting specialists have been used for part of the diagnostic investigation (e.g. referral for advanced imaging and/or surgery) then this should be specified within the report.

Ideally, you will choose cases that span all or most of the learning topics rather than choosing cases that are similar to one another. We can assess your approach to neurological cases, clinical reasoning and knowledge more effectively if the cases chosen represent a range of different disease processes, diagnostic work-up and management.

If you are unsure about case selection please consult your mentor or the CertAVP team for further advice. As a guide the following cases usually represent **poor** case selections:

- Extremely rare or overly complicated cases.
- Cases that do not enable you to demonstrate your problem solving ability, clinical reasoning and ability to perform appropriate treatment and case follow-up. This might include cases with an obvious diagnosis on presentation, those with limited clinical pathology or imaging findings and those cases for which treatment and follow-up are very simple or minimal.
- Cases without a diagnosis or lacking appropriate investigation to substantiate a given diagnosis.
- Cases whose diagnosis is substantially made by post-mortem examination.
- Cases that are euthanatized following diagnosis with minimal medical therapy.

## Writing the case reports

We expect that you will build on the writing skills already demonstrated in your B module essay writing whilst taking into consideration that for the C modules, a more classic scientific case report is expected. We hope to see evidence of your problem solving skills and clinical reasoning as well as sound management of medical cases.

We expect case reports to be written in a succinct and logical manner with the use of tables and high quality images such as radiographs and advanced imaging if these were part of the diagnostic investigation. Ensure that all tables and figures are correctly labelled and appropriate legends are included. Where the results of diagnostic tests are included in the case reports, ensure that normal values for each parameter are also included. It is helpful to include diagnostic test results for the examiners' information (within an appendix if necessary) and details of external laboratories if used (see also comments below).

The case report should be written in the third person in a style suitable for publication in a Journal (for example Journal of Small Animal Practice). You are expected to demonstrate a high standard of literacy and please ensure that any spelling and grammatical errors have been corrected. You may use well-known abbreviations as long as these are explained in an appendix.

Case reports should be set out in the following order (where relevant):

- Signalment
- History and clinical signs
- Physical and neurological examination findings
  - Ensure that these sections contain all relevant information about the presenting problems as well as complete neurological examination findings with neuroanatomical localisation. For neurological cases the history, general physical examination neurological examination and an accurate neuroanatomical localisation are vital to defining the problem/s and making the correct diagnosis. Imagine what the reader will want to know particularly taking into consideration your final diagnosis.
- Problem list and problem-based assessment of the specific and important problems
  - This will be similar to the style of your B module medicine essays but you are likely to need to write very succinctly to stay within the word limit.

- It can be useful to list your problems starting with the most specific and finishing with the least specific. Then discuss each problem in turn, defining the problem if necessary and defining the body system which is affected if possible (many neurological cases will have other problems and systems affected). Some problems are better when considered together e.g. seizures with altered behaviour.
- Most candidates include a differential list for each problem at this point. Make sure that differential lists are relevant and prioritised for your case rather than a long list that might be simply copied from a textbook. You may choose to use a different font to indicate which differentials are more likely in your opinion, or simply order differentials from most likely to least likely. Do indicate to the reviewer which method you have chosen.
- Initial overall case assessment
  - This should be a brief summary of your initial thoughts including the differentials you think are most likely in light of the information you have given so far. This information then allows you to justify the diagnostic pathway you have chosen for this particular animal.
- Investigation
  - Within this section there needs to be some rationalisation of why certain diagnostic tests were chosen. Avoid testing for disorders/diseases that were not considered in your problem based assessment or differential diagnosis.
  - The examiner is looking for a safe and logical approach to investigation.
  - All relevant results should be listed in the main body of the report although full results may be included in an appendix for the examiners information.
  - Images may be included in this section or in an appendix but your interpretation must be described within the main body of the report. Reproduced images must be of high quality.
- Diagnosis
  - This will be one short sentence. The diagnosis must be logical and unequivocal unless there is some discussion adequately justifying any limitations later in the report.
- Treatment
  - This section should include details of treatment including doses of medications used, route administered, frequency of administration etc. The cascade should be followed whenever possible or justification should be

given. If a critical care case is being reported then this section is likely to form a larger part of the report.

- Outcome and follow-up
  - Follow-up is an important aspect of medical case management and this should be appropriate but not excessive. If you have a large amount of follow-up information (e.g. follow-up blood results) you may find it useful to tabulate this in an appendix.
- Discussion
  - The discussion does not need to make the largest part of the report and in most instances this is not possible to remain within the word limit.
  - The discussion should be pertinent and relate to observations relevant to the case, rather than being a review of the literature. Instead use your knowledge gained from research to justify and explain your clinical reasoning or case management. You may also use available evidence to highlight your case was similar or different to reported cases with the same diagnosis.
  - Some reflective component is expected even if the case outcome was excellent, there are usually lessons to be learned somewhere. What could have been done differently; were there any limitations of investigation or management; what other treatment options could have been considered? Reflection cannot excuse a serious mistake in case management but can highlight how minor errors would be improved upon next time if they have occurred.
  - For C modules we expect you to have read a range of material when researching your case such as relevant textbooks, review articles, case series and research articles from peer reviewed journals.
- References
  - These should be properly cited in the text, in accordance with the style in the Journal of Small Animal Practice (JSAP). Avoided listing references that were not cited in the text or vice versa.
  - We recommend using Harvard referencing as described by the Anglia-Ruskin University (<http://libweb.anglia.ac.uk/referencing/harvard.htm>).
  - You will find it very helpful to use a program such as Endnote® or Reference manager® to organise your references.
- Appendices
  - You may include appendices to provide laboratory reports or other information that you may wish the examiner to have access to but please note

that the examiners are not obliged to read them (so please don't include essential case information).

- The appendices may not be used to provide additional information that should be within the case report e.g. justification for use of antibiotics. Any such information will not be marked and will not contribute to the overall grade.
- Images may be included here or in the main body of text. Include any images that you think are relevant as these generally enhance your report and enable examiners to assess your interpretation. Normal ultrasound images need not be included unless you would like to do so but clear abnormal images should be included if possible. Radiographs must be interpreted within the text of the case report and not as part of the figure legends or within the appendices.
- Laboratory reports may be included here but all abnormalities need to be written in the text and reference ranges must be included. All laboratory results should be interpreted appropriately within the text of the case report and not within the appendices.
- It is acceptable to scan printed reports rather than re-type them if you prefer, but any case details or details of your name or practice must be blanked out.

The word limit is 1,750 words per case report. Tables, figure legends (including description of radiographs), appendices and reference list are NOT included in the word count. The report title and titles within the report ARE included. You should not put important information, such as the physical examination, in to a table to avoid the word count; only numerical data should appear within a table (such as laboratory results). In the interests of fairness to all candidates the word count is strictly adhered to and reports that exceed it will be returned unmarked.

All written work submitted to the Royal Veterinary College is passed through plagiarism detection software. Work submitted for this module should not have been submitted for any other courses at RVC or other institutions.



## Instructions for submitting work

Each piece of work you submit must be anonymous and please ensure that your work includes this table on the front page:

<b>Student number:</b>	
<b>Module:</b>	C-SAM.7
<b>Piece of work:</b>	<i>For example, case diary synopsis, case report 1, case report 2 etc)</i>
<b>Word count:</b>	

Contact the CertAVP office if you need a reminder of your student number (found on your Rover email when you first enrolled). All work is submitted online via Learn; you will be given further instructions when you enrol.

The case diary should be written in Excel and organised in such a way that it can be easily viewed on one page/screen in landscape view. The synopsis and case reports should be in Word.

The content of case reports must also be anonymous, e.g. removing practice details from discharge notes or laboratory reports.

## Mentor

Candidates who study for the CertAVP medicine C modules with the RVC are advised to find a mentor who can guide them. Finding a mentor, and maintaining appropriate and regular contact, are the responsibility of the candidate and mentors operate on a goodwill basis only. Mentors are usually either holders of the RCVS CertSAM or RCVS CertAVP qualifications or holders of American, European or RCVS Diploma qualifications. Ideally mentors will have some experience of teaching and examining at either undergraduate or post-graduate level. Members of the RVC Small Animal Medicine department cannot act as mentors as they are involved in setting and marking the assessed work. We recommend that an individual mentor does not take on more than 5 CertAVP candidates if possible.

We consider that the role of a mentor should/may include:

- Becoming familiar with the guidance notes that are supplied to candidates (see each of the three C-SAM module outlines).
- Encouraging candidates to undertake continuing professional development and to 'see practice' at a relevant centre/s appropriate to their strengths and weaknesses.
- Encourage candidates to join relevant societies and associations and attend meetings where appropriate.
- Guide candidates on the level and amount of reading that they should be doing during their period of study. There is a reading list for each C-SAM module which can be used as a framework. Most RVC CertAVP candidates also choose to have access to the RVC library and have an Athens password for online journal access.
- Encourage candidates to plan their time carefully for logging cases, writing case reports and essays, reading and exam preparation. A reminder of good examination technique may also be useful for some candidates.
- Encourage candidates to get support from other CertAVP candidates either through the RVC learning support discussion forums or by other means.

We consider that a mentor can give general advice on preparation of a case diary and selection of cases for writing up into full length reports. Unlike the previous RCVS CertSAM we do not recommend that mentors read any of the case reports in detail and/or give detailed written advice. However, one read through of one case report and some general feedback (ideally verbally) is acceptable. You should notify the CertAVP office when you have a mentor, and confirm which report has been reviewed by them at the time of submission.

## Recommended reading list

The following list is given as a guide as to where to start and for this reason cannot be considered 'complete'. We also don't expect you to read texts from cover to cover or to use all of the texts listed, however we do recommend you make use of the most recent edition of textbooks where available. We apologise if you feel a particular favourite is missing - feel free to use the Learn discussion board to pass on additional suggestions to other candidates.

### Textbooks:

If you are planning on buying textbooks ensure that you buy the most recent edition and check before purchase that a new edition is not about to be published.

- Clinical Reasoning in Small Animal Practice (Maddison, Volk, Church)
- Small Animal Internal Medicine (Eds. Nelson and Couto)
- Ettinger's Textbook of Veterinary Internal Medicine
- Consultations in Feline Internal Medicine (ed August)
- Small Animal Clinical Pharmacology (Maddison, Page and Church)
- Course notes from relevant RVC courses are available from the CPD Unit
- Kirk's Current Veterinary Therapy XIV, Bonagura and Twedt

### Journals:

Interesting articles can be found in all of these journals and may be useful when writing up case reports.

- Journal of Small Animal Practice
- In Practice
- Veterinary Clinics of North America (Small Animal Practice)
- Compendium on Continuing Education for the Practicing Veterinarian
- Clinical Techniques in Small Animal Practice
- Journal of Veterinary Internal Medicine
- Journal of Feline Medicine and Surgery
- Journal of the American Veterinary Medical Association
- Journal of Veterinary Emergency and Critical Care
- Clinically relevant ACVIM consensus statements:  
<http://www.acvim.org/Publications/ConsensusStatements.aspx>

### **Additional Reading Material for C-SAM.7:**

The following textbooks specific to canine and feline neurology are useful resources:

- BSAVA Manual of Canine and Feline Neurology (Platt and Olby)
- Practical Guide to Canine and Feline Neurology (Dewey and da Costa)
- Small Animal Neurological Emergencies (Platt and Garosi)
- Veterinary Neuroanatomy and Clinical Neurology (de Lahunta, Glass and Kent)
- Veterinary Neuroanatomy: A Clinical Approach (Thomson and Hahn)
- Canine and Feline Epilepsy: Diagnosis and Management (De Risio and Platt)