UNITED COUNCIL FOR NEUROLOGIC SUBSPECIALTIES

Test Development Guidelines

Developing a Certification Exam

- Establish content outline
- Item writing
- Item review
- Setting a pass point
  - Criterion standard setting
- Post-exam analysis
- Final scoring and examination outcomes

Exam Measurement Terms

Validity

Does the test measure what it is supposed to measure with regard to:

- Content: a representative sample of major areas of the field
- Construct: a representative sample of the skill needed to practice in the field

Reliability

- Amount of measurement error
- Confidence in the accuracy of the pass or fail decisions
- Reliability improves with better quality items

Bloom's Taxonomy

- Recall
- Interpretation
- Problem Solving

Taxonomy levels provide a measure of cognitive difficulty. It is important to have a balance of these levels of questions to effectively assess candidate abilities.

Bloom's Taxonomy

Recall

- Recall items require the candidate to recognize or recall a specific fact or concept.
- The cognitive task is to remember correctly.

Bloom's Taxonomy

Interpretation

- Interpretation items require the candidate to read and interpret information presented in the form of x-rays, laboratory data, patient history, etc.
- Often interpretation items ask for a diagnosis, prognosis, or some other decision that requires comprehension of data and other information.

Bloom's Taxonomy

Problem Solving

- Candidate must use a base of knowledge to
  - interpret data and then solve a problem, or
  - make a decision
- Problem-solving items often:
  - ask for management or treatment options
  - add complications
- Candidate must determine the best management or treatment for the patient

Multiple-Choice Item Structure

- **Item:** a question on a test or quiz
- **Stem:** the main text that presents the item and question, located above the answer options
- **Lead-in Question:** the question posed at the conclusion of the stem
- **Distractors:** the incorrect answer options, which although incorrect should be plausible and ideally related to the lead-in and share the same "domain" as the key
- **Key:** the correct answer option

Developing Items

- Items should have one best answer that is widely agreed upon by experts in the field.
  - Avoid items based on opinion or for which there is not an accepted answer.
- Items must focus on a single issue, fact, or problem in each item.
- Items should test important and pertinent material while avoiding trivial facts and controversial topics/findings.

Developing Items

- Items must be developed utilizing good grammar, punctuation, and spelling.
- Attempt to write interpretation and problem-solving items.
- Use a standard number of responses.
- Avoid “all of the above” and “none of the above.”

Stem Construction

- Avoid overly specific knowledge, excess information, and teaching in the stem.
- Include the central idea and most text in the stem.
- The stem and lead-in question should be stated positively; do ***not*** use negative phrasing such as “no,” “not,” “except,” “never,” “least,” etc.
- Use terminology common to practice and avoid verbatim textbook phrasing.
- Spell out unfamiliar abbreviations on first instance, with abbreviation in parenthesis. Abbreviate for following instances.
- Avoid personal pronouns (i.e., you). Asking what “you” would do presents a legal conundrum.
- Avoid absolutes such as “always” and “never” in stem or answer options.

UCNS Style

- For stems/lead-in questions that end with a question mark: First letter of answer options is capitalized with no period at the end of answer

Question Mark Example:

Ergotamine differs from triptans in binding to which class of receptors?

A. 5-HT-1

B. Adrenergic

C. CGRP

D. Histamine

UCNS Style

- For stems/lead-in questions that end with a colon: These are considered complete-the-sentence type questions. ***Note***: answer options must complete the sentence logically and in grammatically correct fashion. First letter of answer options is <u>not</u> capitalized, and a period is placed at the end.

Colon Example:

Cluster headache attacks are typically provoked by:

A. sleep.

B. hypomagnesemia.

C. weather changes.

D. cigarette smoking.

Item Framework – Vignette example

A 55-year-old accountant suddenly finds herself unable to add or subtract and then develops a severe left occipital headache associated with photophobia. Emergency department examination two hours later shows a BP of 190/110 mm Hg, inability to identify fingers correctly, right-left confusion, and difficulty reading. Mental status, cranial nerve, motor and sensory examinations are normal. Which of the following is the most likely diagnosis?

A. Herpes encephalitis
B. Hypertensive encephalopathy
C. Cerebellar infarction
D. Parietal Infarction

Includes patient history and current lab values pertinent to answering the question

Ends in a lead-in question that typically calls for clinical decision-making skills

Item Framework

*__What makes this item a pseudovignette?__

A 33-year-old man is diagnosed with cluster headaches. In addition to prophylactic treatment, acute treatment of attacks is discussed. The patient indicates that rapid relief of pain is an important quality of the treatment. Which of the following offers the most rapid relief of a cluster headache?

A. High-flow oxygen via mask
B. Sumatriptan NS
C. Zolmitriptan NS
D. Rizatriptan ODT

*__ANSWER__: *The lead-in question does not directly tie in with the patient presented to begin the short vignette. The lead-in could theoretically function without the vignette.*

Item Framework

Item revised to avoid a pseudovignette

A 33-year-old man is diagnosed with cluster headaches. In addition to prophylactic treatment, acute treatment of attacks is discussed. The patient indicates that rapid relief of pain is an important quality of the treatment. Which of the following treatments would give the patient the most rapid relief?

A. High-flow oxygen via mask
B. Sumatriptan NS
C. Zolmitriptan NS
D. Rizatriptan ODT

The lead-in question was revised to focus back on the patient in the vignette.

Anatomy of an Effective Item

Clinically relevant, focused, applied

Item Stem: Keep length to about 5 sentences (Typically a clinical vignette: "A 59-year-old woman presents with….")

Answerable (even without options)

Lead-in question ("Given these findings, what is the most appropriate next step in management?" etc.)

Short, parallel, plausible

A. Distractor
B. Key
C. Distractor
D. Distractor
E. Distractor

Key Point: Effective items are normally top heavy – text/details concentrated in the stem versus the answer choices

Anatomy of an Ineffective Item

Short, vague stem

Unfocused lead-in (e.g. “Which of the following is true?”)

Long, heterogeneous answer choices

Key Point: Ineffective items tend to be bottom heavy, with text/details concentrated in the answer options vs. the item stem. Also, they often cannot be answered when the options are covered up.

Response Construction

- Responses should be:
  - organized in a logical order
  - independent and not overlapping
  - fairly consistent in length
  - plausible (consider common misconceptions when drafting distractors; avoid made-up answers)
  - homogeneous in content focus (same domain, or dimension)

Writing Options—
Are these options homogeneous?

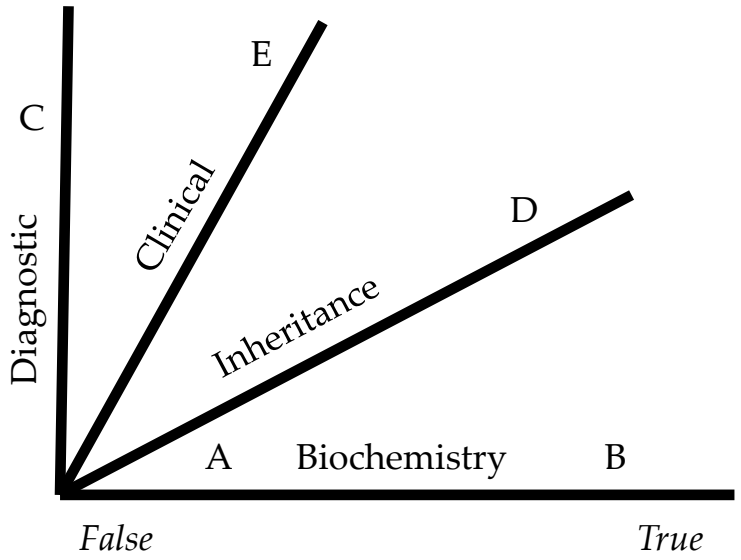
Which of the following is most characteristic of Addison's disease?

(A) Accumulation of medium-chain fatty acids
(B) Defective beta oxidation of fatty acids
(C) Inability to be detected in utero
(D) Autosomal dominant inheritance
(E) Neonatal onset of progressive spastic paraparesis

Diagram of Heterogeneous Options

In order to rank the relative correctness of options, they must differ on a single dimension.

The options from the item shown previously deal with miscellaneous facts. They can be diagrammed as follows:



This item is inherently flawed.

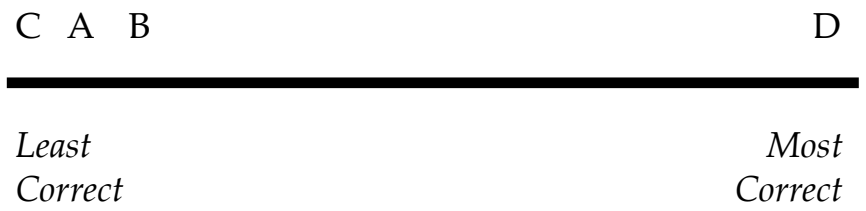
Writing Options—
Are these options homogeneous?

A 63-year-old man develops right arm weakness five days after coiling of a ruptured anterior communicating artery aneurysm complicated by cardiomyopathy and neurogenic stunned myocardium. In addition to fluid administration, which of the following infusions would be the best next intervention?

(A) Norepinephrine
(B) Vasopressin
(C) Furosemide
(D) Dobutamine

Diagram of Homogeneous Options

The options are all in the domain of "infusions" relative to the clinical vignette and can be diagrammed as follows:



There is clearly one **most** correct option. While the incorrect options are not completely wrong, they are less correct than the keyed answer.

Item Review

All of the following in vitro techniques for characterizing allergenic extracts require antisera EXCEPT:

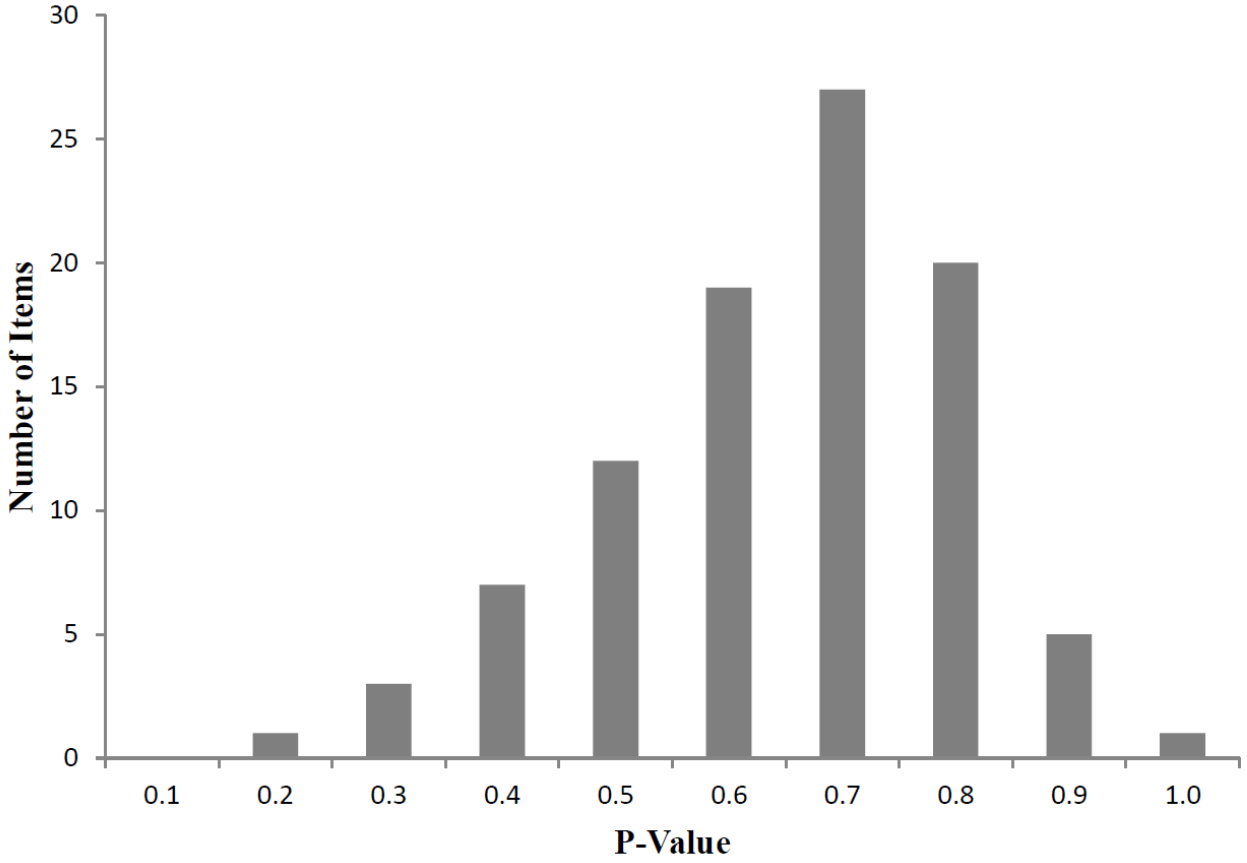
A. Western blot analysis.
B. specific IgE immunoassay.
C. thin-layer isoelectrofocusing.
D. rocket immunoelectrophoresis.

Issue: negative stem

Negative stems:

- Test reading skills over knowledge
- Force the test-taker to make a cognitive shift to answer them
- Are more focused on what's "wrong" than what's "right"
- If a teaching point calls for avoiding something, can try "contraindicated" instead

Examination Outcomes



A **p-value** is the proportion of times an item is answered correctly; it is also referred to as item difficulty, with lower values reflecting higher difficulty and higher values reflecting lower difficulty (more correct answers).

Establishing a Pass Point

- Criterion-referenced testing is based on the concept that candidates should be measured against the skill and knowledge represented in each test question.
- The criterion standard is the pass point that represents the ability level candidates must demonstrate to pass the exam.
- The level of acceptable performance is based on the knowledge and skills needed to perform effectively in the field of practice.

Item Review

9 observations

P-Value	0.2222
RPB	-0.3737
CRPB	-0.3990

Which of the following is most likely to increase postganglionic muscle sympathetic nerve activity recorded by microneurography?

Key	Alternative	Low	Med	High	Overall	Count
A	Intravenous digoxin	0%	0%	0%	0%	0
B	Oral lisinopril	0%	0%	0%	0%	0
C	**Intravenous nitroprusside**	**50%**	**25%**	**0%**	**22%**	**2**
D	Phase IV overshoot of the Valsalva maneuver	50%	75%	100%	78%	7
E	Vasovagal response	0%	0%	0%	0%	0

Item is more difficult than desired. Inverse relationship. Confirm key. Is D also correct?

- Item too difficult with only 22% answering correctly
- Examinees only went for two answers
- Better performing candidates selected "D"
- Question was double keyed giving credit to both "C" and "D"

Item Review – example of a deleted item

47 observations

P-Value	0.0851
RPB	0.0650
CRPB	0.0400

A 72-year-old man presents with an unprovoked generalized tonic-clonic seizure. Neurologic exam is normal. MRI shows 13 sub-centimeter enhancing lesions in both hemispheres. CT chest shows a lung mass, which upon biopsy shows small cell carcinoma of the lung. Which of the following is the most appropriate treatment option for this patient?

Key	Alternative	Low	Med	High	Overall	Count
A	Stereotactic radiosurgery to each of the lesions	6%	19%	7%	11%	5
B	Whole brain radiation	81%	75%	80%	79%	37
C	**Platinum-based systemic chemotherapy as frontline therapy**	**6%**	**6%**	**13%**	**9%**	**4**
D	Osimertinib to target possible EGFR mutation	6%	0%	0%	2%	1
E	Intrathecal chemotherapy with methotrexate	0%	0%	0%	0%	0

- Item too difficult with only 9% answering correctly
- Examinees went for three answers
- Better performing candidates selected "B"
- Item was removed from scoring.

Anatomy of a C-cert Question

CT hyperattenuation (hyperdensity) in a medulloblastoma is most likely due to:

A. tumor hypercellularity.

Correct. Medulloblastomas are dense hypercellular tumors and are hyperattenuating (hyperdense) on CT in 62-97% of cases.

B. intratumoral hemorrhage.

Incorrect. Tumor bleeding is rare in medulloblastoma, ranging from 5-15% of cases.

C. intratumoral calcification.

Incorrect. Calcification is also rare, occurring in 10-40% of medulloblastomas.

D. intratumoral cysts.

Incorrect. Cysts are common in cases of medulloblastoma, but cysts are hypoattenuating (hypodense) on CT.

4 options, not 5!

STEM

FOUR ANSWER OPTIONS: 1 KEY AND 3 DISTRACTORS

A RATIONALE FOR EACH OPTION

C-cert Questions: Special considerations

- Write items that focus on the key points and clinically important takeaways from your assigned article versus obscure facts/figures hidden in tables
- Write using a variety of styles versus writing all questions as "complete the sentence"-type questions; challenge: write one vignette (out of 4)
- All C-cert questions require rationales for both correct and incorrect answer options, thereby meeting CME requirements
- Include images or tables when it would make sense to add a visual or diagnostic element

C-cert Questions: Special considerations

- Avoid writing overly tricky questions or questions based on minutiae
- While C-cert questions may be simpler and/or involve fewer vignettes than certification questions, they should still be focused and include elements of clinical decision making when possible (ie, interpretation or problem solving)
- Goal is not to merely confirm they've read the article, but to confirm they understand and can apply the key points

Rationales for C-cert Questions

Rationale:

1. Explain why the right answer is right
2. Explain why each of the wrong answers is wrong

Key Points:

- Writing effective rationales requires planning – plausible distractors lead to more worthwhile explanations (instead of "this is right/this is wrong" - "this is right/wrong in this situation because . . . ")
- An item is ***not*** truly finished until the rationale is finished
- Succinct explanations are acceptable if they are logical, accurate, and clearly explain why something is correct/incorrect

Example of Standard Rationale

CT hyperattenuation (hyperdensity) in a medulloblastoma is most likely due to:

A. tumor hypercellularity.

Correct. Medulloblastomas are dense hypercellular tumors and are hyperattenuating (hyperdense) on CT in 62-97% of cases.

B. intratumoral hemorrhage.

Incorrect. Tumor bleeding is rare in medulloblastoma, ranging from 5-15% of cases.

C. intratumoral calcification.

Incorrect. Calcification is also rare, occurring in 10-40% of medulloblastomas.

D. intratumoral cysts.

Incorrect. Cysts are common in cases of medulloblastoma, but cysts are hypoattenuating (hypodense) on CT.

C-cert Quiz Format

- 25 multiple-choice questions based on 10 selected articles
- Diplomates are given 100 minutes to complete each attempt
- Diplomates are given three attempts to pass the quiz at 80% or greater
- Clicking on an image will enlarge it
- The 26th question is designed to collect self-report number of CME hours spent in the activity (up to 15 CME hours earnable)
- Upon quiz submission, diplomates may scroll down to read through all item rationales

C-cert Quiz-taker's POV

Immediate Quiz Results

All Rationales Provided Post-quiz

Assessment review

Sorry, you did not receive a passing score on the 2023 UCNS C-cert Quiz.

Scroll down to "question details" to review answers and their accompanying rationales. You may take the quiz a total of three times in an attempt to achieve a passing score of 80% or higher. *AMA PRA Category 1 credits™* and ABPN Self-Assessment credits for the C-cert activities are only available upon passing the quiz.

You may access the quiz again at any time using the initial login information that was emailed to you or click on "Assessments" above which takes you back to the initial page where you may "write assessment" again.

You have until December 1 to take and pass the 2023 C-cert quiz to meet all 2023 C-cert requirements.

If you have questions, please contact Bryan Hagerla, Manager Continuous Certification at bhagerla@ucns.org or (612) 928-6326.

Summary

Assessment	Neuroimaging (NI) - C-cert 2023
Started	June 22, 2023 at 04:03 PM (MDT)
Finished	June 22, 2023 at 04:04 PM (MDT)
Points	12 / 26
Score	46.15%
Result	Failed

Question details

Question #1

1/1

In children who sustained an abusive head trauma, there was a significantly longer ICU stay recorded if the patient had a history of a:

A) skull fracture.

↳ *Skull fracture is not listed on Page 766, Column 2, paragraph 4.*

B) diffuse axonal injury.

↳ *In the article as listed on Page 766, Column 2, paragraph 4, diffuse axonal injury = 15.6 days of average stay.*

C) subdural hematoma.

↳ *Subdural hematoma is not listed on Page 766, Column 2, paragraph 4.*

D) bridging vein thrombosis.

↳ *Bridging vein thrombosis is not listed on Page 766, Column 2, paragraph 4.*

Text Reference: Orman G, Kralik SF, Desai NK, et al. An In-Depth Analysis of Brain and Spine Neuroimaging in Children with Abusive Head Trauma: Beyond the Classic Imaging Findings. AJNR Am J Neuroradiol. 2022;43(5):764-768. doi:10.3174/ajnr.A7492

Call for Article Submissions

- All exam committee members required to submit a minimum of four articles
- All Diplomates invited to submit articles
- Easy online article submission process
  - https://www.surveymonkey.com/r/2025articles
- Submission deadline: July 1
- Article submissions are compiled for exam committee rating, discussion, and selection
- Final 10 selected articles are posted on UCNS website in January

Article Submission/Selection Criteria

- Reflects recent advances within the past four years (counting from release year) or current clinical knowledge in the subspecialty field
- Clinically relevant and important articles (will change or influence practice)
- Drawn from peer-reviewed journals relevant to the subspecialty and/or the related primary specialty field
- New or updated practice guidelines published in print or electronic form
- Available to and easily accessible by UCNS diplomates (prefer free/open access)

UCNS Certification Staff Liaisons:

Certification Examinations: Todd Bulson, Senior Manager Certification
tbulson@ucns.org

C-cert Activities: Bryan Hagerla, C-cert Manager
bhagerla@ucns.org

Questions?