
APPLICANT INFORMATION FOR THE NEUROSONOLOGY CERTIFICATION EXAMINATION

PURPOSE OF THE EXAMINATION

The Neurosonology Examination is offered by the ASN to assess proficiency in Neurosonology. The examination is intended for physicians who, through several years of training and experience in this neuroimaging modality, have acquired enough of a foundation in the basic principles and interpretation of neurosonology to be able to interpret these studies independently.

PREPARATION FOR THE EXAMINATION

The Neurosonology Certification Examination is not based on the review course in neurosonology given at the ASN Annual Meeting. The course is intended as a refresher and by no means covers the entire content of the exam. Examinees are encouraged to use the enclosed reference list to prepare for the exam.

EXAMINATION FORMAT

The Neurosonology Examination consists of 240 multiple-choice questions addressing various aspects of neurosonology (100 physics, 100 carotid, 100 transcranial). The examination consists of the following three parts: 1) Basic principles, physics and fluid dynamics; 2) Cerebrovascular extracranial, and 3) Cerebrovascular intracranial. The fourth part, Pediatric neurosonology, is optional and free of charge.

The exam will be given on PC computer workstations; therefore familiarity with a mouse on an IBM compatible computer will be helpful. Assistance with these computer operations will be available throughout the examination. No typing skills are required.

Question Formats

The following question formats may appear on the examination. The directions for answering and an example are given for each type of question.

One-Best-Choice questions: Choose the one BEST answer.

Transcranial Doppler is used for diagnosis of:

- A) cerebrovascular disease
- B) pediatric neurologic diseases
- C) neurosurgical diseases
- D) peripheral vascular diseases
- E) renal diseases

Digital images are provided to some questions. One-best-choice answer is required.

Some images may be linked to Matching questions: For each numbered question or statement, select the one-best-choice lettered answer that is most closely associated with it. Each lettered answer may be selected ONCE, MORE THAN ONCE, or NOT AT ALL.

- A) Cranial sonography
 - B) Transcranial doppler
 - C) Carotid duplex doppler
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- 1) Hypoechoic plaque
 - 2) Intraventricular hemorrhage
 - 3) Proximal vasospasm

Examination Committees

The examination material for each component is prepared by examination committees composed of faculty members, teachers, investigators, and clinicians with recognized prominence in their respective fields. Committee members are selected to provide broad representation from the academic and practice communities. The test development committee subjects each prospective exam item to critical appraisal and any doubtful item is revised or discarded. All accepted items are reviewed prior to use by the committee overseeing exam development.

Ownership and Copyright of Exam Items

All of the test items used are owned and copyrighted by the American Society of Neuroimaging. Any reproduction or distribution of these test materials without the express written authorization of the ASN is prohibited.

Examinees with Disabilities

Accommodations will be made for examinees with disabilities. If a candidate has a disability and requires special accommodations, he or she must contact the ASN Executive Office to make arrangements prior to the administration of the examination.

Testing Conditions

Policies and procedures to govern administration of the examinations have been established to ensure that no examinee or group of examinees receives unfair advantage. Efforts are made to ensure that the examinations are administered under standard conditions and consistent with the principles upon which the examinations are developed and scored. However, if the integrity of the examination process is jeopardized, the ASN reserves the right to invalidate all or any part of an examination.

All ASN examinations are proctored. Candidates may not bring books, notes, or any other aids into the testing room; nor are they permitted to make written notes of, or to record in any way, the contents of the examination. No mechanical or electronic devices are permitted. The candidate's identity will be verified before he or she is admitted to the testing room.

Score Reporting

Examinees' responses are submitted and stored electronically. Examinees will receive written reports of their pass/fail status approximately six weeks after the exam is administered. To avoid misinterpretation and to protect the privacy of individual examinees, scores will not be provided by telephone. Scores are not reported to third parties unless requested in writing by the examinee.

Validity of Scores

To ensure the integrity for the examination system, the validity of scores reported for performance on ASN examinations is assured by every means available, including a rigorous evaluation by committee members of each exam item.

An indeterminate score is a result that the ASN program can not certify as representing a valid measure of an examinees performance. A classification of indeterminate may result from irregular behavior (described below) or from other factors, such as unexplained inconsistency of performance of an examinee.

The performance of all examinees is monitored and may be analyzed statistically for purposes of detecting inconsistencies that may result in a classification of indeterminate. If the reporting of the score is delayed, the examinee will be so notified. The examinee will be given an opportunity to provide information that he or she deems relevant to the assessment of score validity. Upon review and analysis of all available information in such

circumstances, a determination will be made as to whether the score is valid. If the score is classified as indeterminate, the examinee will be advised of the options for corrective action.

Irregular Behavior by Examinees

Irregular behavior includes all actions on the part of the candidates and/or examinees, or by others when solicited by a candidate and/or examinee, that subvert or attempt to subvert the examination process. Specific examples of irregular behavior include, but are not limited to, the following: seeking and/or obtaining access to examination materials prior to the examination; falsification of information on application or registration forms; impersonation of an examinee or engaging a proxy to take the examination; copying answers from another examinee; allowing answers to be copied; possessing unauthorized materials during an examination; altering or misrepresenting examination scores; theft or other unauthorized possession of examination materials; memorizing and reproducing test items and any unauthorized reproduction by any means and/or dissemination of copyrighted examination materials.

Anyone having information or evidence indicating that any type of irregular behavior or any infringement of legal rights has occurred should submit a written report to or telephone the ASN. Upon receipt of information suggesting that irregular behavior has occurred, the information will be evaluated, and, if indicated and feasible, statistical analysis will be conducted and/or additional information will be gathered. Every measure available will be implemented to ensure the integrity of the examinations.

ICAVL (Intersocietal Commission for the Accreditation of Vascular Laboratories)

On September 25, the American Society of Neuroimaging examination in Neurosonology was approved by the ICAVL Board of Directors as an appropriate credential for the Technology Director and technical staff members according to the ICAVL *Essentials and Standards*.

SUGGESTED READING

Babikian VL, Wechsler LR, eds. (1999). *Transcranial Doppler Ultrasonography Second Edition*. Butterworth Heinemann, Woburn, MA

Bartels E (1999) *Color Coded Duplex Ultrasonography of the Cerebral Vessels* Schattauer, Stuttgart

Edelman SK (1997). *Understanding Ultrasound Physics*. 2nd Ed. ESP, Inc. Woodlands. (www.esp-inc.com)

Hennerici M, Neuerburg-Heusler D (1998) *Vascular Diagnosis with Ultrasound*, Thieme, Stuttgart

Kremkau FW (2020) *Sonography Principles and Instruments*. 10th edition

Tegeler CH, Babikian V, Gomez C (1996). *Neurosonology*. Mosby Year Book, St. Louis, MO

ASN Outline of Core Curriculum in Neurosonology (Basic Framework)

1.0 General Neurosonology

1.1 Basic physics and principles of ultrasound

1.11 Doppler

1.112 Principles

1.113 CW Doppler

1.114 PW Doppler

1.12 B-mode/Real-time imaging

1.13 Color-flow imaging

1.114 Color Doppler

1.115 Color Velocity Imaging

1.14 Doppler Embolus Detection

1.141 Principles

1.2 Ultrasound Artifacts

1.3 Ultrasound equipment and hardware

1.4 Basic cerebrovascular hemodynamics and anatomy

2.0 Neurovascular Sonology

2.1 Carotid/Vertebral sonography

2.11 Pulsed Doppler

2.111 Techniques

2.112 Spectral analysis

2.113 Interpretation/Criteria

2.114 Clinical applications

2.12 Duplex sonography

2.121 Techniques

2.122 Spectral Analysis

2.123 Plaque morphology

2.124 Interpretation/Criteria

2.125 Clinical applications

2.126 Color-flow imaging

2.131 Techniques

2.132 Clinical applications

2.133 Extracranial

2.134 Transcranial

2.14 Power Doppler

2.141 Technique

2.142 Applications

2.2 Transcranial Doppler

2.21 Adult TCD and TCD in sickle cell disease

(all aspects of clinical applications)

see Babikian VL, et al. J Neuroimaging 2000;10:101-115.

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