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American Society of Neuroradiology Section
Chiefs Leadership Group**

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Recommendations for Neuroradiology Training during Radiology Residency by the American Society of Neuroradiology Section Chiefs Leadership Group

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The American Society of Neuroradiology [ASNR] Section Chiefs Leadership Group strongly feels that residency education in neuroradiology should become more standardized and wishes to make recommendations and facilitate the ability of residency programs to educate and train their residents in neuroradiology.

Background

Various changes to Accreditation Council for Graduate Medical Education (ACGME) radiology residency programs have resulted in a highly variable amount and type of exposure to neuroradiology cases and education. These include, but are not limited to, the advent of the IR residency and ESIR training, potentially limiting the number of rotations by the IR residents to neuroradiology, increased reliance on overnight and float rotations that may have significant neuroimaging exposure but are staffed by non-neuroradiologists, and specialized curricula or mini-fellowships in non-neuroradiology areas in the R4/PGY5 year that may limit the exposure to the expertise of neuroradiologists and neuroimaging. Additionally, the structure of the current ABR certification process, though allowing testing for routine competency with the Core Examination, does not necessarily ensure that there is continued learning and growth, because the individual can opt out of the neuroradiology modules.

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Thus, the ASNR Section Chiefs Leadership Group has made the following recommendations:

Exposure

- It is strongly recommended that radiology trainees have at least 16–24 weeks of training in neuroradiology under the direction of a neuroradiologist. Additionally, it is recommended that at least 8–12 of those weeks occur during the last 3 years of their training before they start practicing independently.
- Continued exposure and education in neuroimaging is needed to maintain skills developed during the early years of residency. The neuroradiology training during residency should be modeled on the neuroradiology curriculum developed by ASNR (<https://www.asnr.org/education/neuroradiology-curricula-for-trainees/>).
- It is strongly recommended that radiology trainees have at least 60 hours of dedicated instruction in neuroimaging. Additionally, it is recommended that at least 30 of those hours occur during the last 3 years of their training before they start practicing independently.
- It is strongly recommended that residents be exposed to educational activities including lectures and other didactic education by faculty at the institution/program. In addition, it is recommended that online resources such as (but not limited to) those made available by ASNR (<https://www.asnr.org/education/fellowship-portal/educational-resources>) be used during residency training.

Experience

- It is strongly recommended that radiology trainees interpret a variety of neuroimaging studies throughout their training.
- Continued interpretation and education in brain, spine, head & neck, and neurovascular imaging should occur throughout the residency. Although specific numbers of cases are not an indication of competency, a guideline for consideration is that a radiology trainee interpret at least 300 neuroimaging CT scans, 150 Neuroimaging MRI scans, and 50 neurovascular imaging studies (neuro CTAs and neuro MRAs) under the guidance and direction of a neuroradiologist during the last 3 years of their training, before he or she starts practicing independently.

- It is important to read a significant number and variety of neuroimaging cases and although we understand the value of float and call type experiences for neuroimaging, the fundamental aspects of routine neuroimaging are felt to be best done under the direction and guidance of dedicated neuroradiologists, even if the feedback from the neuroradiologists may not be in real-time.

Competency

- It is strongly recommended that competency in Neuroimaging be tested.
- Resources for evaluation could include competency tests established in the home institution, performance on RadExam (<https://www.acr.org/Lifelong-Learning-and-CME/Learning-Activities/RadExam>), or similar testing formats. Ideally, competency testing should occur at each level of residency either defined by year in residency or number of rotations completed.
- The ASNR has developed milestone recommendations for each level of residency defined either by the year in residency or number of rotations completed (<https://www.acgme.org/Portals/0/PDFs/Milestones/NeuroradiologyMilestones.pdf?ver=2015-11-06-120525-910>).

Resources

As mentioned above, the ASNR is committed to supporting the education of radiology trainees and provides educational and evaluation resources to help optimize resident education and competency in neuroradiology.

CONCLUSIONS

From a patient safety perspective, radiology trainees graduating on or after June 2021 and joining practice who have not met the recommendations listed above should seriously consider *not* interpreting even *routine* neuroradiology studies.

For the independent practice and interpretation of *advanced* neuroradiology (including pediatric neuroradiology, head and neck radiology, and advanced neuroimaging), a formal, ACGME-approved neuroradiology fellowship is *strongly recommended*. A neuroradiology fellowship will ensure exposure, experience, and competency for both *routine* and *advanced* neuroradiology. The ACGME requirements for a neuroradiology fellow include the interpretation of 3000 cross-sectional neuro examinations including CTs of the head, neck, and spine; at least 1500 MRIs of the brain, neck, and spine; and at least 250 neurovascular imaging examinations (CTAs and MRAs) (https://www.acgme.org/Portals/0/PFAssets/ProgramRequirements/423_Neuroradiology_2020.pdf?ver=2020-06-29-164131-690). These numbers are significantly higher than the number of imaging studies required for radiology residents as listed above and are justified for the safe practice of *advanced* neuroradiology as opposed to *routine* neuroradiology. The Neuroradiology Subspecialty Examination administered by the American Board of Radiology (ABR) allows direct testing of the competencies acquired during a neuroradiology fellowship (<https://www.theabr.org/diagnostic-radiology/subspecialties/neuroradiology>).

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Disclosures: Max Wintermark—*UNRELATED: Board Membership:* icometrix, EMTensor, Nous. James Anderson—*Other Relationships:* current member of the Board of the Association of Program Directors in Radiology. Laurie A. Loevner—*UNRELATED: Board Membership:* ASNR Board of Directors, Co-Chair of the Foundation of the American Society of Neuroradiology; *Grants/Grants Pending:* Guerbet.* Christine Glastonbury—*UNRELATED: Royalties:* Elsevier-Amirsys, *Comments:* not even vaguely related to this work; for writing and editing books. *Money paid to the institution.