CT Protocol Design and Optimization

Michael F. McNitt-Gray, PhD  David Geffen School of Medicine, UCLA, Los Angeles, CA
James M. Kofler, Jr. PhD  Mayo Clinic, Rochester, MN

Protocols, or scan instructions, are the core of every CT examination. All aspects of the exam should be included in the protocol, including patient positioning, nursing instructions, scan parameters, reconstruction/reformatting instructions, and any other information necessary for the imaging team to complete the CT study successfully. Derivation and approval of all components of the protocols should be completed by a team consisting at least of a radiologist, a medical physicist, and a technologist. Representatives from other areas, such as nursing, should also be consulted as necessary. The protocol team should assure that protocols are appropriate for the clinical indication and that the scan parameters, including radiation dose, are tailored to the specific imaging task.

Some general information and philosophies on protocol design and optimization can be found at the following sites:


- The ACR and American Society of Neuroradiology Statement on CT Protocols and Radiation Dose. Available at:  


The following references discuss dose-reducing techniques, including the principles and considerations for optimizing dose using automatic exposure technologies in CT:


The following references discuss the potential advantages and disadvantages of using in-plane patient shielding in CT, which has been suggested as a means to reduce radiation dose:

