Achievements

The selected procedures for the quality criteria study were chest and skeletal imaging for storage phosphor radiography, small bowel examinations and ascending venography of the legs for image intensifier radiography, and angiography of the pelvis and lower extremities and the dilation of the iliac arteries for Digital Subtraction Angiography (DSA). An interim review has been conducted of the clinical visualisation criteria for these procedures to categorise the image criteria, important image details and critical structures. These criteria have been developed through informed consensus opinion, and formed an input to the Guidelines on CT [European Guidelines on Quality Criteria for Computed Tomography EUR 16262].

Methods and protocols for the assessment of radiological information content and image quality have been reviewed for particular digital applications. It is apparent from this work that a broad consensus indicated that the objective index of Signal-to-Noise Ratio (SNR) is related to radiological information content, but details of this relationship remain vague among the scientific community at large. This project also identified Modular Transfer Function (MTF) and Wiener Spectra (WS) as important and widely used objective indices of image quality, even though their interpretation is also not well understood.

An interim review has been carried out specifically for DSA. A number of currently used measures of image quality for DSA have been cited for both subjective and objective approaches. Here again MTFs and WSs are useful indices. There appears however to be no current consensus on optimum dose levels for DSA, furthermore DSA optimisation would appear to be driven by clinical criteria rather than the technical limitations of present technology.

Constancy check methodologies have been reviewed for storage phosphor systems, coronary angiography and DSA systems, and also dosimetry equipment. These reviews indicated the advantages to performing constancy checks, the features of different equipment that must be checked, and the components of constancy check methodology that are practices by all participants in the concerted action. These reviews will be used to develop protocols for the different equipment classes.
Various approaches to dosimetry in digital, fluoroscopic and interventional systems have been reviewed, and three dosimetric approaches identified. These are 1) use of an ionisation chamber to determine patient entrance skin dose; 2) monitoring of dose area product; and 3) use of TLDs placed on patients’ skin at the centre of the field. Other progress involved the completion of a TLD intercomparison among the participants.

Finally there has been some progress regarding the definition of equipment requirements in the form of a draft document entitled “Requirements for Dose Display Systems Integrated in Radiological Equipment”. This document states that display systems should ideally provide Effective Dose as well as Entrance Surface Dose.

Outlook

While this Concerted Action group has made significant progress during the contract period, there is still a substantial body of research to be completed arising from the progress, achievements, and deliverables in terms of clinical, technical, industrial, standards and regulatory objectives.

An international Workshop was organised in Dublin in June 1999 entitled “Dose and Image Quality in Digital Imaging and Interventional Radiology” in order to present the results of this Concerted Action. The proceedings are in the process of being published.