Advanced imaging – science to practice

14:30–14:55

Recent advances in computed tomography (CT) technology

Dr Gareth Iball, Leeds Teaching Hospitals NHS Trust

Learning points

All modern CT systems incorporate iterative reconstruction (IR) techniques. Their basic functionality and uses will be presented along with the differences between manufacturers’ systems and potential pitfalls which need to be avoided.

Although dual-energy CT scanners have been available for over a decade, new techniques for dual and multi-energy (spectral) scanning are still being developed and as a result new clinical applications are now available. The functionality and pros and cons of these systems will be presented.

A further look at emerging and in-development technologies will cover ultra-high resolution scanning, cinematic rendering and photon counting technologies.

References


Incorporating advanced computed tomography (CT) applications into routine clinical practice

Dr Damian Tolan, Leeds Teaching Hospitals NHS Trust

Learning points

New CT applications are moving beyond standard high-resolution morphological assessment of CT datasets to a more interactive assessment of organs and abnormalities. This is particularly true for multi-energy CT and radiologists need to be familiar with the techniques, the clinical applications and image post-processing to maximise the diagnostic benefits of this technology.

There are also challenges in creating protocols and harmonising image quality across different CT scanners and manufacturers. This is particularly true for comparison of quantitative analysis related to multi-energy CT assessments on different machines.

Determining the added value and cost of these assessments remains challenging. However there is growing evidence of the benefits of multi-energy CT imaging for a range of tumour types, body areas and conditions and it seems probable that this will become a mainstream technology in the coming years. Several authors have described potential benefits from cutting down unnecessary additional examinations for common clinical problems such as characterising abnormalities such as adrenal nodules and renal cystic lesions.

Integration of multi-energy CT into routine reporting workflow will be critical to allow interpretation as part of routine work and maximise uptake of this technology. While routine post-processing can assist, radiologists are likely to need their own advanced post-processing skills in image manipulation for problem solving challenging cases.

Radiology departments will also need to define which patients are likely to benefit from multi-energy CT protocols, as access is likely to be limited for the foreseeable future due to the constraints of scanner replacement programmes and limited access.

References


Textural analysis of computed tomography (CT) and magnetic resonance (MR) data – ready for routine clinical use?

Dr Balaji Ganeshan, University College London Hospitals NHS Foundation Trust

Learning points

How does texture analysis of routinely acquired diagnostic images (for example, CT, MRI) quantify tissue/tumour heterogeneity which is key component of malignancy

What does texture analysis actually measure/mean? What are various steps undertaken in qualifying texture analysis as an imaging biomarker?

- Biological correlate
- Clinical applications – lesion classification/prognosis/treatment response, prediction
- Technical validation
- Clinical utility and cost-effectiveness

What are barriers in the clinical adoption/implementation of texture analysis in routine practice?

How easy is it to undertake texture analysis and statistical analysis which can be an integral part of data-mining and machine learning/artificial intelligence?

References


Miles KA et al. CT texture analysis using the filtration-histogram method: what do the


