EFOMP

EUROPEAN FEDERATION OF ORGANISATIONS FOR MEDICAL PHYSICS

Council Meeting, Zagreb

EMP NEWS

ISSUE 03

AUTUMN 2025

www.efomp.org

Streamlining CT Quality Assurance: RTI Group's Innovative Solutions for Accurate Dosimetry

Figure 1. RTI Mako testing Computed Tomography X-ray.

In the rapidly evolving landscape of medical imaging, Computed Tomography (CT) has become an indispensable diagnostic tool. As CT technology advances, ensuring precise calibration and quality assurance (QA) is paramount to maintaining image accuracy and patient safety. RTI Group, a leader in X-ray QA solutions with over 40 years' experience, addresses these challenges with its state-of-the-art CT calibration probes and measurement tools, designed to meet the rigorous demands of modern imaging environments and streamline testing.

Figure 2. RTI Mako CT solution with accessories.

RTI Mako

With the launch of the latest X-ray meter, Mako, RTI Group has further strengthened CT dosimetry and X-ray testing capabilities, offering the most advanced CT testing tools available. The RTI Mako system measures all parameters required for routine testing, including kV measurements (on the couch or on the gantry) with the industry-leading accuracy of the Mako R/F Probe, typical CT Dose Index with the RTI CT Ion Chamber, and streamlined tests of CTDI, DLP and FWHM with the patented RTI CT Dose Profiler, either free-in-air or in phantom. RTI also provides regulation-size CTDI phantoms and the leading Ocean Next software for an all-in-one premium solution.

RTI CT Ion Chamber

A range of parameters influence the uncertainty of CTDI measurement in axial scans. Two particular factors pertaining to the Ion Chamber are: 1) energy dependence, and 2) effective length, with different manufacturers showing variation in effective length from 97 mm to 117 mm – with an estimated uncertainty of ±1 mm.

For this reason, the RTI CT Ion Chamber has been built with outstanding energy linearity, within 0.5% in the range 70–150 kV for the IEC 61267 radiation qualities RQR 5 to 10, RQA 5 to 10, and RQT 8 to 10, as well as ISO N-150. This applies to soft radiation (low HVL) as well as highly attenuated radiation (high HVL). With an effective length that is very precise (100 ±0.5 mm), a chamber that is traceable to primary standards, and integrated with the advanced electrometer in the Mako system, users can be assured of a premium solution for CT dosimetry.

To further enhance the efficiency of CTDI testing, the RTI Ocean Next software includes built-in measurement protocol templates which automate and streamline typical CTDI measurements. For example, the procedure of one axial scan in the isocentre of the PMMA CTDI phantom, and four scans in the periphery, can be fully automated in Ocean Next with fully traceable reporting. The weighted CTDI is calculated automatically upon completion of the five scans. Templates can be customised to any routine and setup.

Overcome wide-beam CT challenges with the RTI CT Dose Profiler

Over the past decade, there has been more discussion about the testing of wider beams in CT, and how the CTDI100 formalism applies. As technology has advanced, wider beams in CT combined with helical scanning have placed greater demands on CT dosimetry testing, to ensure that the CT Dose

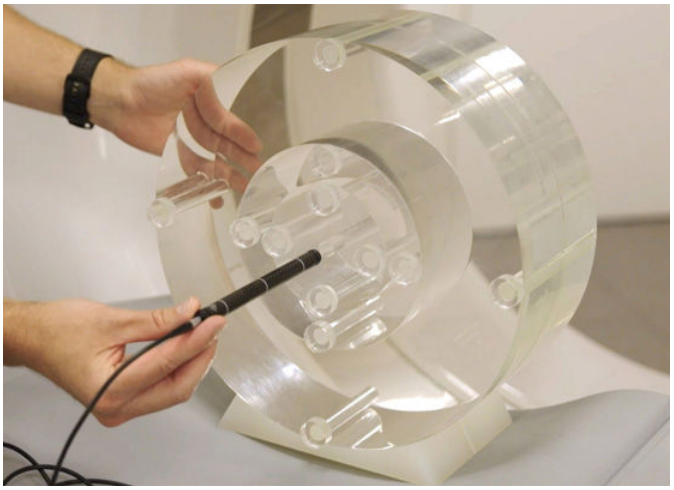

Figure 3. RTI CT Ion Chamber.

Index measurement provides a solid foundation for calculating patient or effective dose.

The patented RTI CT Dose Profiler (CTDP) was developed to overcome such challenges and streamline routine testing. The CT Dose Profiler has the same form factor as an Ion Chamber (fitting into standard CTDI phantoms) but uses solid-state technology with a point-dose detector. It can be moved through the beam, such as in a helical scan, to obtain dose data throughout the entire scan profile, overcoming the traditional drawback of an Ion Chamber and avoiding multiple scans.

The CT Dose Profiler provides a clear view of the dose profile. When scanned in the isocentre of the CTDI phantom, one helical scan provides the weighted CTDI measurement (typically requiring five axial scans with an Ion Chamber), which can streamline routine testing. When scanning free-in-air, the CT Dose Profiler also provides information on geometric efficiency, beam width (full width at half maximum; FWHM), and the CTDI100 in mGy, providing a unique tool in CT scanner testing and dosimetry.

Bringing It All Together

RTI Group's advanced tools—Mako, CT Ion Chamber, CT Dose Profiler, and Ocean Next software—offer a complete solution for accurate, efficient CT quality assurance. Together, they simplify testing, support compliance, and enhance patient safety.

Figure 4. RTI CT Dose Profiler.

Michael Olding, PhD, is Head of Product Management at RTI Group. Michael works on the interface between product development at RTI and global end users of RTI's products & solutions (physicists, engineers and medical professionals), and is passionate about ensuring user needs are at the forefront of new product development at RTI Group.

mography, radiography, CT, dentistry). Radiopharmaceutical exposures are excluded.

In nuclear medicine therapy, accurate documentation of dosimetric evaluations remains a challenge. Cooperation between the EFOMP QSPECT WG, WG-28, and WG-02 is ongoing to create CPs capable of handling these clinical and dosimetric data.

Why DICOM Matters for MPEs

Familiarity with DICOM is now essential for MPEs. It enables comprehensive dose tracking, standardised patient exposure documentation, and safe management of equipment acceptance tests. Correct implementation of DICOM supports interoperability, improves workflow efficiency, and enhances patient safety—making it a critical skill for modern medical physics practice.

Alberto Torresin is Professor of Diagnostic Imaging at Università Statale di Milano and Consultant for Regione Lombardia. He specialises in coordinating interdisciplinary research in radiotherapy, medical imaging, MRI, nuclear medicine, and AI, with expertise in quantitative imaging for clinical and research applications across CT, MRI, radiotherapy, and stereotactic procedures.