RapidCHECK 2.0 Software for Streamlined Diagnostic Image Analysis

Kenneth Ruchala, PhD
Product Manager
SunCHECK™: A Comprehensive Analysis Software Platform for Radiotherapy QA/QC

- **SNC Routine™**
  - Comprehensive TG142
  - Daily/Monthly/Annual
  - Includes Imaging

- **SNC Machine™**
  - TG142 Imaging & MLC QA
  - VMAT QA

- **PlanCHECK™**
  - Physician DVH Protocols
  - Automated DVH Checks
  - Initial Physics Checks

- **DoseCHECK™**
  - 3D Secondary Checks

- **PerFRACTION™**
  - Pre-Treatment QA
  - In-Vivo QA
RapidCHECK 2.0: Streamlined SunCHECK for Diagnostic Phantoms

Key Tenets of RapidCHECK 2.0:

• Software is installed locally  
  – All data remains with you
• Data is stored, enabling comparisons with baseline data and trending
• One-time purchase, no recurring analysis charges
• A single installation can support multiple CT units
• Runs as a web page – the application and database are available to multiple users from different locations
RapidCHECK 2.0 Workflow

• Mainline Workflow
  – Simply import DICOM data
  – View results vs. baseline
  – Approve

• Additional features
  – Review/adjust image registration
  – Review trends and historical data
  – Export reports
  – Export results
  – Manage user privileges
RapidCHECK 2.0 Phantom Supported

- 464/ACR CT phantom
  - Image Quality for Dx CT, CT Simulation, and TG 66

- 1467 Advanced Electron Density Phantom
  - CT-to-density values for Dx CT, CT Simulation, RT TPS calibration
  - TG 66 (meets monthly check of 4-5 CT values and annual check of full electron density phantom)

- Addition phantom support is being added in accordance with user priorities
Why use the ACR 464 CT Phantom?

Proven CT Image Quality Phantom

- Compliance, positioning and alignment
- CT number accuracy
- Slice thickness
- Low contrast detectability
- Image resolution and uniformity
- Spatial resolution
- Inter and intra plane distance

- “I thought this was a Gammex Phantom?”
  - Yes, Gammex is a wholly-owned subsidiary of Sun Nuclear Corporation
CT to Electron Density: That’s a Solved Problem, right?

• HU phantoms are common
  – Typically tissue-mimicking rods in a water-like base
• Dx CT: Checking consistency of HU values
• RT: Calibrating a TPS with CT to density information

• Solved problem status:
  – Now: yes
  – Imminently: no
  – 20 minutes later: yes, with the AED phantom

• “Solved problems” to be re-opened and re-solved
  – Materials
  – Efficiency
Rethinking the Efficiency of the CT to Electron Density Workflow

Common current steps to generate an IVDT
- Set-up and image phantom
- DICOM transfer the image
- Photograph or manually record insert arrangement
- View data on analysis computer
  - Cross-reference photo with computer screen
  - Circle each ROI
  - Transcribe density value from photo with HU value from analysis workstation
  - Repeat ~10-20x
- Transfer values to TPS

Clinical inefficiencies
- Time consuming
- Error prone
- Requires paper/photo record keeping
- Potentially difficult to analyze data retrospectively
An Improved CT to Density Workflow

What it should be
• Set-up and image phantom
• DICOM transfer the image
• Photograph or manually record insert arrangement
• View data on analysis computer
  – Cross-reference photo with computer screen
  – Circle each ROI
  – Transcribe density value from photo with HU value from analysis workstation
  – Repeat ~10-20x
• Transfer values to TPS

Clinical Improvements
• Faster
• Reduced staff effort
• Removes human factors from processing
• Record keeping is built into DICOM image set
• Easy to analyze data retrospectively
• Automated error-detection (eg over-ranged values)
Improving Clinical Workflow

- Gammex rods have patent pending rod identifiers
- Each pattern is uniquely identifiable in the CT image
- Enables automated analysis
  - Insert rods anywhere
  - Computer finds each rod, identifies the material, and reports IVDT

Happy face = iodine
Scared face = adipose

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Automate CT to ED Tables for TPS with RapidCHECK version 2

1. Auto-detects slice with ID markers
2. Auto-detects HU analysis slice
3. Auto-generates physical & electron density tables for export

RapidCHECK analysis automatically compensates for mispositioned phantoms