

AAPM 2020

RapidCHECK 2.0 Software for Streamlined Diagnostic Image Analysis

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SunCHECK™ : A Comprehensive Analysis Software Platform for Radiotherapy QA/QC



SunCHECK™ Machine

Machine

SNC Routine™

- Comprehensive TG142
- Daily/Monthly/Annual
- Includes Imaging

SNC Machine™

- TG142 Imaging & MLC QA
- VMAT QA

SunCHECK™ Patient



Patient

PlanCHECK™

- Physician DVH Protocols
- Automated DVH Checks
- Initial Physics Checks

DoseCHECK™

- 3D Secondary Checks

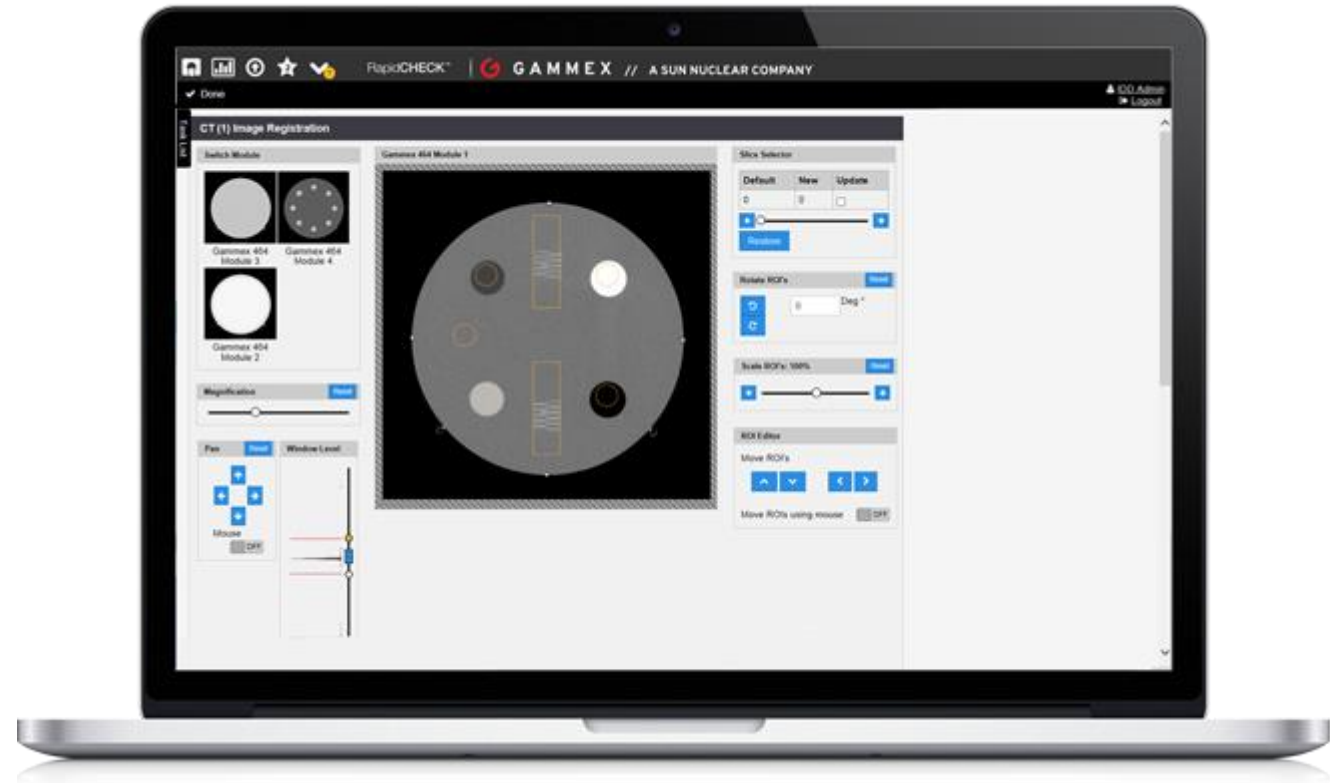
PerFRACTION™

- Pre-Treatment QA
- In-Vivo QA

RapidCHECK 2.0: Streamlined SunCHECK for Diagnostic Phantoms

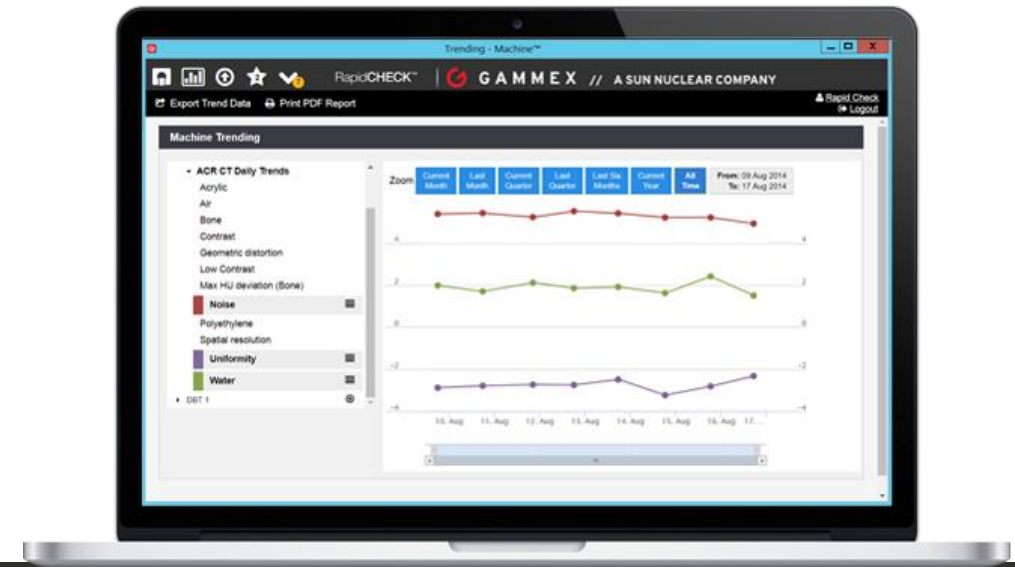
Key Tenets of RapidCHECK 2.0:

- 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



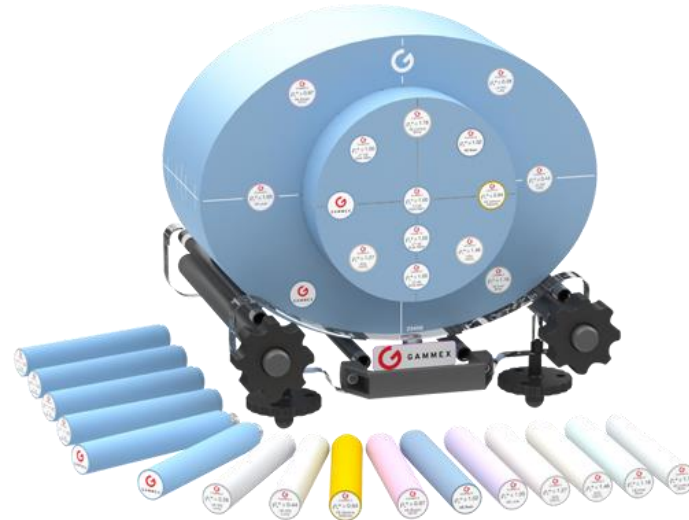
RapidCHECK 2.0 Workflow

- 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



For more complete coverage, please see full presentation at <https://www.sunnuclear.com/products/advanced-electron-density-phantom>



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

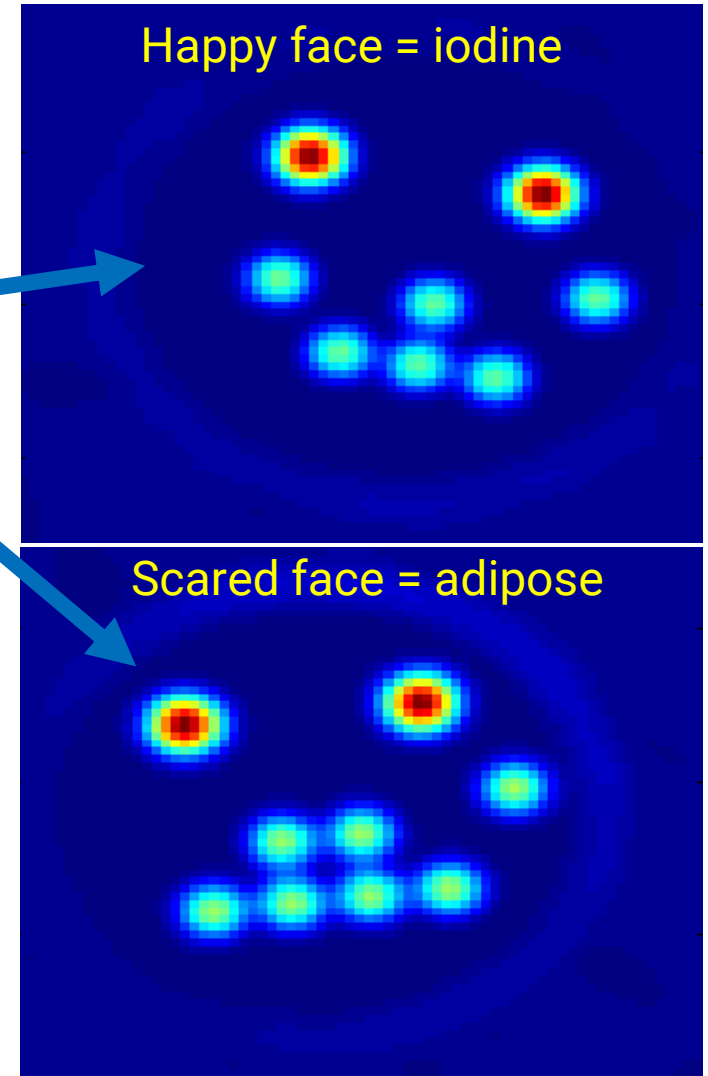
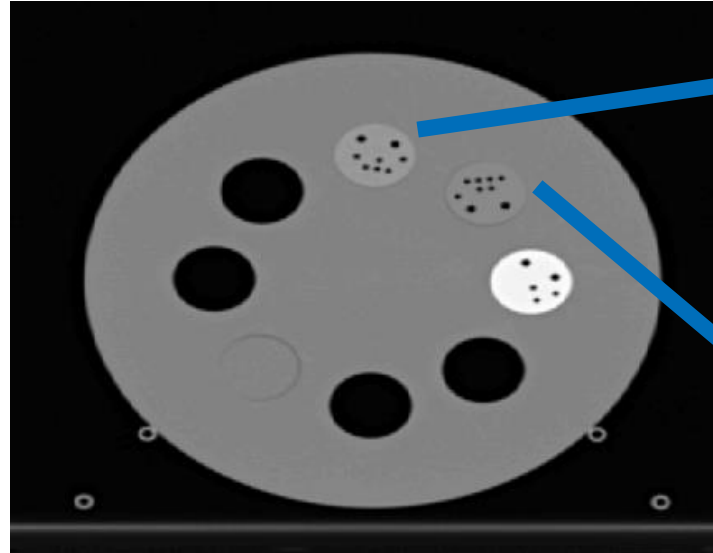
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Clinical Improvements

- 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)

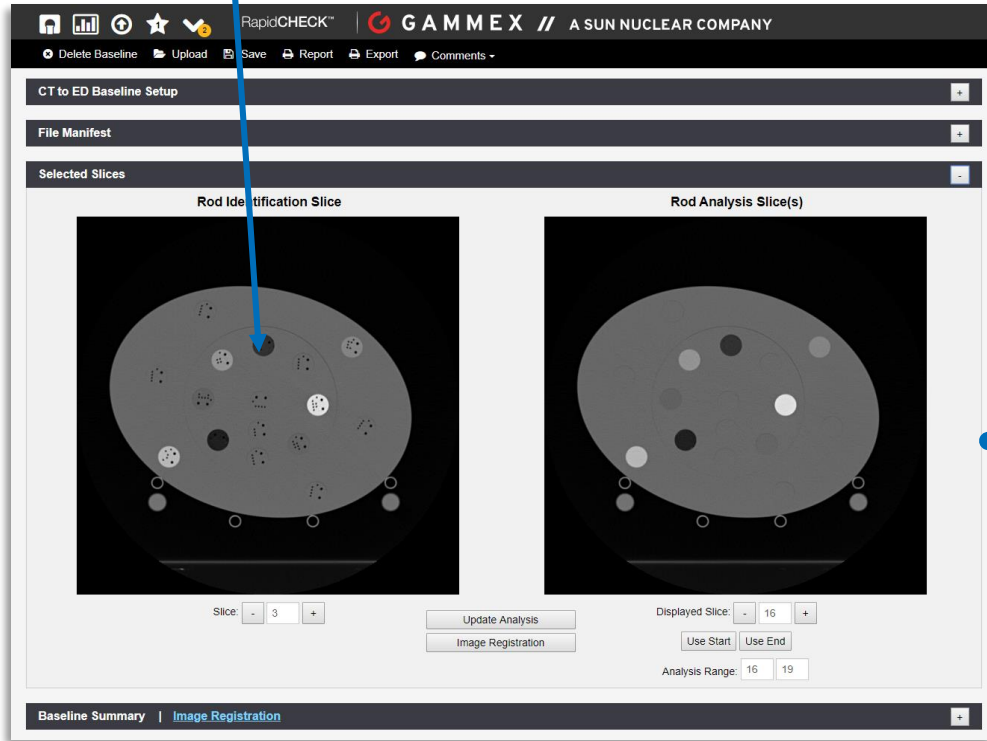
Improving Clinical Workflow

- 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





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

