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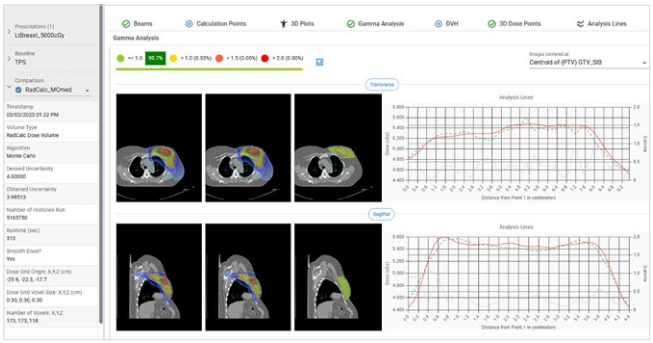
RadCalc Premium

Monte Carlo 3D volumetric dose comparisons

The RadCalc Premium Package performs independent Secondary Dose Checks with advanced Monte Carlo calculations for conventional and complex treatment plans, including Electrons and Photons. It allows radiation oncology professionals to quickly and accurately verify treatment doses, improving patient safety and reducing the chance of errors. The package can be expanded with additional functionalities with a range of add-on modules, enabling further customization to meet the needs of various clinical workflows.

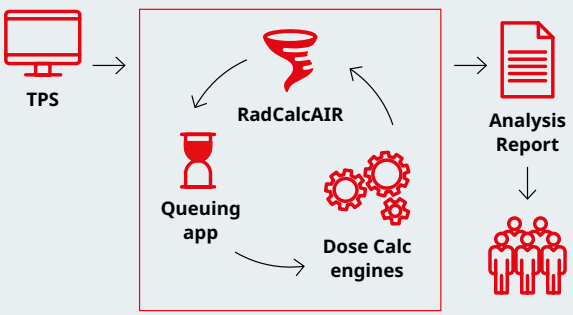


Features

- **Comprehensive treatment plan support**
  Handles a wide range of photon and electron treatment plans, including standard machines, Halcyon®, and TomoTherapy® (with add-on), with fast and accurate 3D volumetric dose calculations.
- **Advanced Monte Carlo calculations**
  RadCalc's Monte Carlo solution employs the most established Monte Carlo code line (BEAMnrc), providing the gold standard for dose calculations, ensuring confidence and precision for even the most challenging clinical cases delivering accuracy within ±1 % when compared to measurements. [1]
- **Seamless data transfer**
  Import and export features enable efficient data transfer to and from TPS and Record and Verify (R&V) systems, reducing manual data entry and minimizing errors. Scalable installations support multiple institutions from a centralized server by ushering dose volume calculations with the Queuing app and RadCalcAIR. [2]
- **Streamlined plan comparison and validation**
  The Plan Comparison Tool simplifies treatment plan validation eliminating unintentional changes or data transfer errors by allowing clinicians to compare intended plan from the TPS to the plan in the R&V. [3]
- **Automation with RadCalcAIR**
  RadCalcAIR enhances workflow efficiency by automating key tasks, immediately alerting to plans that fail to pass clinical criteria, pre-set Gamma analysis acceptance criteria and whether DVH objectives are met for critical structures using both the TPS and RadCalc's 3D dose.
- **Enhancing patient-centric quality**
  RadCalc's Monte Carlo enhances patient safety by verifying dose throughout the treatment volume, imperative for complex treatment plans. By reducing computation times, it also supports efficient online adaptive workflows, helping clinicians deliver timely, high-quality care.

Portal workflows

Secondary Dose Check (SDC): Users evaluate the results of the SDC performed via RadCalcAIR and review them in the RadCalc Portal. Additionally, users can compare the RadCalc 3D volumetric calculation using Gamma analysis, DVH protocols, dose analysis for points (0D) and lines (1D).



[1] RadCalc's 3D Monte Carlo and 3D Collapse Cone algorithms [2] Efficient Data Flow in RadCalc: Unraveling the Dynamics of 3D Dose Calculation [3] RadCalc Classic: The Original Comprehensive Secondary Dose Calculation Software for Radiation Therapy

Simply Precise

Components

Included modules

- **RadCalc base**
  The core module of RadCalc performs all calculation verifications, ensuring accurate Secondary Dose Checks for radiation therapy treatments. This module enable the use of TeleTherapy devices such as Cobalt, C-arm linacs, CyberKnife®, MR-Linacs and Halcyon®.
- **Treatment plan (RTP) import**
  This module allows for the seamless import of treatment plans directly from the primary treatment planning system, eliminating the need for manual data entry and reducing the potential for errors.
- **Verify and record export**
  RadCalc can export the verified radiation treatment plan to the Record and Verify (R&V) system, streamlining the workflow and ensuring consistency in treatment documentation.
- **IMRT module**
  This module verifies calculations for Intensity-Modulated Radiation Therapy (IMRT) treatments, ensuring precision in complex dose distributions and enhancing the accuracy of treatment delivery.
- **Regions of interest for 3D geometry**
  By importing regions of interest from the planning system via DICOM RT or Pinnacle, this module computes depths and effective depths to points of calculation, enhancing dose accuracy and ensuring precise treatment delivery.
- **Superficial module**
  RadCalc allows the definition of multiple energies with individual HVL values and energy specific parameters. Every energy can have a list of allowed SSDs, cones and measured backscatter factors.
- **Electron Monte Carlo (eMC)**
  3D fast electron Monte Carlo Module – RadCalc, using EGSnrc/BEAMnrc, precomputes particle track tables, used to perform a 3D dose calculation for electron treatment plans with Monte Carlo methods. The computed dose volume is received back and 3D analysis tools are used to compare against the treatment planning system.
- **3D fast Monte Carlo photon Module**
  RadCalc, using EGSnrc/BEAMnrc, precomputes particle track tables, used to perform a 3D dose calculation for photon treatment plans with Monte Carlo methods. The computed dose volume is received back and 3D analysis tools are used to compare against the treatment planning system.

Optional modules

- **Brachytherapy module**
  RadCalc performs independent dose verification calculations for brachytherapy treatments, supporting HDR, LDR, and permanent implants. It includes tools for 3D dose and Dose Volume Histogram (DVH) analysis, providing comprehensive verification.
- **TomoTherapy® module**
  RadCalc supports TomoHelical, TomoDirect™ and TomoEDGE™ and verifies the treatment time and dose to multiple calculation points. RadCalc can provide interoperability with the BEAMnrc/DOSExyz application by sending it plans so that it can perform a 3D dose calculation using the Monte Carlo algorithm. The computed dose volume is received back and 3D analysis tools are used to compare against the treatment planning system.
- **Gamma Knife® module**
  RadCalc performs point dose verification calculations for various Gamma Knife® versions and the Leksell GammaPlan® (LGP) planning system.
- **EPID Module**
  RadCalc processes EPID images by converting them to calibrated relative monitor units to be used with the DosimetryCheck dose engine where the scatter effects from the patient and the EPID are removed in order to convert them to incident fluences so they can be used to produce a 3D dose computation using the desired algorithm (only CC). Additionally, data from fractional log files can be convereted into incident fluences as well to be used for 3D dose computation using the desired algorithm.

Requirements

General hardware requirements for RadCalc (main program)

	Network install	Local install – not recommended
Operating System	Microsoft® Windows® Server 2016, 2019 or 2022	Microsoft® Windows® 10, and 11, 32-bit and 64-bit operating systems
Processor	8 Core or better	8 Core or better
RAM	16 GB or more	
Network	5 Gbps connection, bandwidth to the client should be 10 mbps with a latency not exceeding 50 ms	
Video	Minimum resolution 1024 × 768 px (scaling up to 125 %) and minimum 1 GB video memory (RAM)	
Graphics	OpenGL 1.1 support required	OpenGL 1.1 support required
Hard drive space	1TB SSD available, varies with quantity and type of patient data	512 GB available, varies with quantity and type of patient data

Dedicated RadCalc external calculation engine hardware

	Collapsed Cone Dose Engine	Monte Carlo Dose Engine	Fast Monte Carlo (Photon and Electron) Dose Engine
Operating System	Windows 64-Bit OS (10,11, Server 2012, 2016, 2019 or 2022)	Windows 64-Bit OS (10,11, Server 2016, 2019 or 2022)	Windows 64-Bit OS (10,11, Server 2016, 2019 or 2022)
GPU	NVIDIA GeForce RTX 2080 Ti, or similar (must be NVIDIA)		NVIDIA GeForce RTX 3080 Ti, or similar (must be NVIDIA with 12 GB or more)
CPU	Intel Core i7-9700, 8 Core, 12 MB cache, or better	Dual Intel Xeon Gold 5220, 2.2 GHz, 3.9 GHz Turbo, 18 Core, or better	Intel Core i7-9700, 8 Core, 12 MB cache, or better
RAM	16 GB or more	64 GB or more	32 GB or more
Disk	512 GB SSD or more	512 GB SSD or more	512 GB SSD or more

Contact us!

LifeLine Software, Inc.
102 N College Ave Ste 1014
75702-7287 Tyler, TX
United States of America
P +1 903 207 4298
E sales.radcalc@lap-laser.com

www.radcalc.com