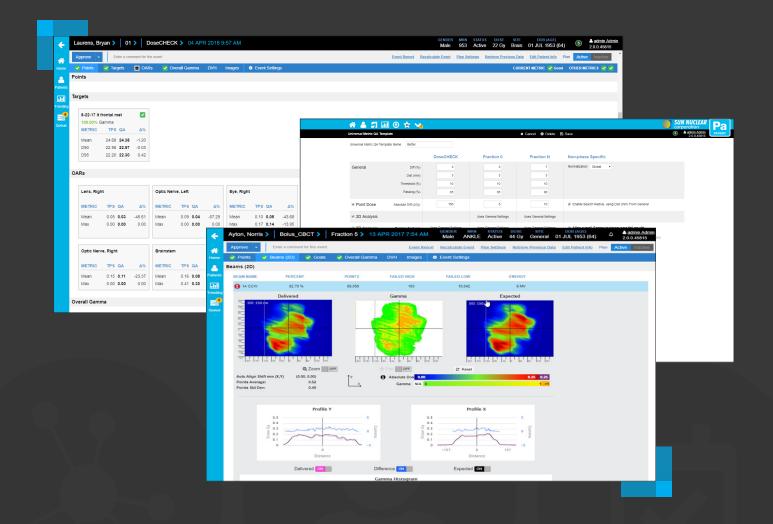
SunCHECK[™] Patient

Comprehensive Patient QA







Automate Your Patient QA

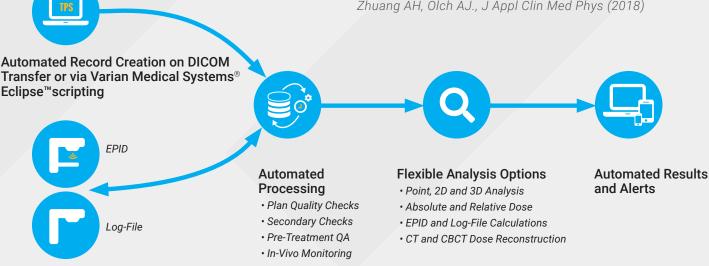
SunCHECK[™] Patient automates all your Patient QA needs - from Plan Checks and Secondary Checks to Pre-Treatment QA, and In-Vivo Monitoring.

Through a single web-based software application, all data and results are stored in the central SunCHECK database.

With SunCHECK Patient, all phases of Patient QA integrate into a flexible, automated and seamless workflow. Rather than spending time searching for data, you will spend more time enhancing treatment quality.

"Because this system is fully automated and no physics time is required for data acquisition and evaluation, daily patient treatment QA is feasible."

Zhuang AH, Olch AJ., J Appl Clin Med Phys (2018)



Automated Data Capture

6

FOUR CRITICAL PHASES. ONE WORKFLOW. COMMON ANALYSIS TOOLS.

Plan Quality Checks PlanCHECK[™]

Validate the treatment plan against departmental requirements, and automatically assess performance versus intent. Automating this time-consuming task for experienced medical physicists provides time to focus on other areas of quality management.

Phantomless and Array-Based Pre-Treatment QA PerFRACTION[™] Fraction 0

Choose from flexible options for pre-treatment QA using ArcCHECK[®], EPID and/or Log File data, or with EPID data alone for independent 2D planar analysis.*

* Features included in Advanced Dosimetry Package

Secondary Checks DoseCHECK[™]

Perform 3D secondary dose calculations for the systems your clinic uses – 3D, IMRT, VMAT, SRS, SBRT, bore-based, TomoTherapy® and HDR Brachytherapy treatment plans. Having an integrated system enables efficient planned vs. calculated dose comparison.

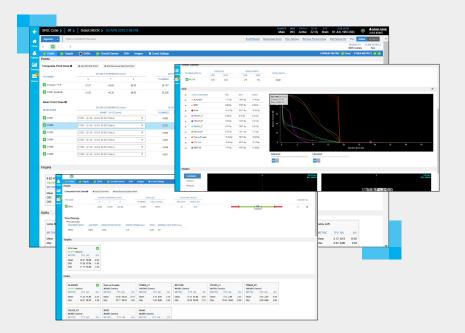
In-Vivo Monitoring PerFRACTION[™] Fraction n

Verify and track dose throughout the treatment course to catch the most common types of errors – those associated with the patient, as well as machine errors.

Plan Quality Checks

Plan checks often require significant experience, time and expertise to ensure treatment plans are created as intended. PlanCHECK™, the latest advancement of the SunCHECK Patient workflow, eases the burden of performing checks. It automatically loads data from Varian Medical Systems® Eclipse™ and other DICOM-compliant TPSs. It's designed to: compare dose/volume metrics to userdefined constraints (Dosimetric Checks), verify treatment and non-treatment beams, and validate image and contour data (Physics Checks).

Complete PlanCh	ECK IN	ter a comment for this e	-							RDQS 09 Adve 65 Cy CareenaUtespecified 11 SEP 1056 (S3 yrs) 22.0 12014
n										MONUTY PLAN DETAILS
Dosknetik DMI	79			00000	~ ~	0000				-O-O-O-O Ctter NA
Dosancere DW1	M H	VICS 0 EVEN	tortorgs		_	s, Dieon > PC_PROS				20403 Nex 2019 51 005-400
Plan Name P	C_PROST_	VMA7	Treatment Site	Prostate 🗲				Plancheco	() 2/198	M ROGS-00 Adve 68 Cy General/Inspected 11 SEP 185 (63 yrc)
Dosimetric						ngarie Fland HECK Erfer and nature (2004) (2) (Thypics				Sentired Americanity Park
Template Prostate G0	Gy			-		Re Name PC_PRONT_VALUE		Testher: Lis	Produte	Boar Preservation Does 41 Or Nonterry Visit Conterry Conterry Conterry Conterry
	\$11	OCTURE		_ 🖼	ONH					
TEMPLATE (50 Gy)	ing.	PLAN (55 Oy)	NO TYPE	1172		NOV-PTINE	1.040		MEAN HOM-Da	product lot / Served
PTV_68	0	PTV,55	Tarpet	Relative Volume at 0		PTZ M	1000		627.0	Date IE N G
PTV.68		PT7_55	Target	Done to Absolute Vo	8	PTV_56	6149.0	112-01	0.05	
PTV.58		P77_58	Tarpet	Min Date to Structure		PT/08-PT/08	52.00-0	10.06.05	6141-02	
E Baster		Baccer	CAR.	Peterber Volume al. 2		2001	1249		#150-Gp 11.44-Da	
Tatter			CAR	Relative Volume at 0		COT	1710		000	
	0	Biaccer				Contraction	11.10-2	16.16.0	64/10/09	
Cadoer Cadoer	0	Bludder	CAR	Relative Volume at 0		Partic July	480.0		640.05	
🛃 Badder	0	Bladder	048	Relative Volume at 5	_	· PORQUECTUM	129-8		34.00 %	'i bin in de de de de de de de de de AbesterBerCat
Pennebuts	0	Penieðub	OAR	Mean Dooe to Struct	×	10000.001	4675-0	24.8749	64.03	
Redum	8	Rectum	OAR	Relative Volume at Dose	V 68.00	0y + 5.00 %	+ 10-00-9		6.05%	2015 Cán
Radum		Return	CAR	Reative Volume at Dooe	V 68.00	0y 4 15.00 N	4 20 00 1		12.63 %	
Radum		Return	CAR	Relative Volume at Dooe	V 55.00	ay x 20.00 %	<25.02.9		15.84%	- 343
Madun .		Redum	ONR	Perative Volume at Door	V 58.00	ay x 25.00 N	+ 20 20 7		18.25 %	
2 800		RDDY		Done to Relative Volume	01.00	1% 2.0.01 Qv				



Secondary Checks

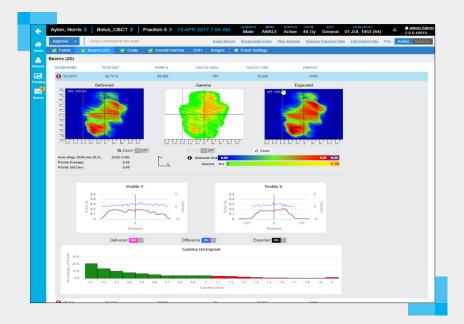
Automated, independent secondary checks create efficiencies, allowing you to focus on results and investigate point doses, calculated vs. planned MUs, and 3D dose displays. In addition to support for conventional MLCequipped linacs, secondary checks of Varian Medical Systems® Halcyon™ System, TomoTherapy®, HDR Brachytherapy and treatments using stereotactic cones can be automated within the SunCHECK workflow.

\mathbf{O}

Phantomless and Array-Based Pre-Treatment QA

SunCHECK Patient supports 3D CRT, IMRT/VMAT and SRS/SBRT calculation and delivery. Measurements can be analyzed in 3D using ArcCHECK®, EPID and/or Log File data, or by using the EPID for independent 2D planar analysis*.







74% of errors occur in first fraction Bojechko et al, Med Phys

In-Vivo Monitoring

Verify patient set up, first fraction, and intra-fraction motion against the treatment plan and each delivered fraction, either on the planning CT or daily CBCT* images. Results can be analyzed in 3D using EPID and/ or Log File data, or in 2D through the Transit Dosimetry* feature, with no additional time or effort required. Using calibrated EPID data, true dosimetric In-Vivo Monitoring is clinically feasible, creating a fully independent absolute dosimetric QA of patient treatments.

*Features included in Advanced Dosimetry Package

SunCHECK: Meaningful Metrics Faster

Universal Metrics: Set Criteria Relative to Approved Treatment Plans

Pre-set, yet customizable dose tolerances for each phase of Patient QA provide meaningful results. Instantly analyze the impact of different criteria sets, including dose deviations, and quickly switch criteria as needed.

Custom Metrics: Set Criteria for Structure-Specific Absolute Constraints

User-defined absolute limits for specific clinical dosimetric goals allow scoring of results relative to specific dose/volume constraints established by RTOG, QUANTEC, Emami or your own protocols.

Universit	Metric QA Temp	plate				X Cancel O Del	lete 🖸 Save					③ ▲ admin / 2.0.0.4	EAR Admin S015
Universa	al Metric QA Temp	plate Name Better											
			DoseC	HECK Fractic	on 0	Fraction N	Non	-phase Spi	ecific				
Gene	ral	Diff (%		3	3	1	Norm	alization GR	· Inde				
		Dist (mm		3	3	3							
		Threshold (%										D	
		Passing (%		Add Structure				w.				-4	
R Bol	int Dose	Absolute Diff (cGy)		STRUCTURE	METR			IDEAL G			ACCEPT	ABLE GOAL	
		Substant Cert (Coly	·	PTV65.6 (CTV_bed_65.0y)		ex Gy to Structure			70.00	Qy	4	72.00	Gy
× 2D	Analysis			PTV66.6 (CTV_bed_00 Oy)		64	Gv		95.00	5		93.00	
# 3D	Analysis	Gamma Analysis	Uses Ger	Recture (RECTO)		65		1	35.00	5		45.00	5
		Structure Tolerances					Gy						
		Torgets Diff (%)		Rectum (RECTO) FemoralHead_R (Right Femora		50	Gy	6	55.00	5	*	65.00	
		OARs DIF (%		Head: RightFerroralHead)		50	Gy	1	10.00	5	۲	15.00	5
				FerroralHead_L (Let/TerroralH Let/TerroralHead)	w Deer	50	Gy	4	10.00	5	<	15.00	5
Append 1	Unity a comment for the even								an and and an and an and an				
Append 1	Unity a comment for the even			Selling									
Average 1	(ner correct in to or Joans (X) 🔹 Cod	-		Selap									
Average 1	(ner correct in to or Joans (X) 🔹 Cod	-	t Inages Coart	900 Eac									
Reams (23) Dista State State	(nor a construction for the nor Second (23) 🕜 Conf	≕ b ¥ CuadiGunena (M	l Inges Ocort	900 Eac		Enclosed beat							
Content to a conte	(nor a constant for the sup Sector (S) of Conf (antis)	nt In 🕡 Dunal General – DM Norre	I kings Cost	OUX SHE REAL PLANED CAVELATED IN 2018 DT INN DT									
Appendix 1 Appendix 2 Appendix 2 Append	(an a series to the operation of the ope	н b v Onest Garens (19) валин 1910у 1910у 1910у 1910у 1910у 1910у	Images Proceed P	0005.000 PLANNED GALARIS E 20.01 07 GALARIS F 0.01 07 GALARIS F 5.01 07 GALARIS F	10 N								
August 1	(100 4 (100 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	40 v. Constituente de 19 Norme 710 7410 7410 7410 800	Images Images<	0000 550 REAL FLORED CALCULATE IN 2018 01 2440 01 C01 01 4440 01 E00 01 449 01 C01 01 449 01	10 N								
Annumeric	(an a series to the operation of the ope	н b v Onest Garens (19) валин 1910у 1910у 1910у 1910у 1910у 1910у	Images Count Product Gold Target Count Dock ALCOPS +6015 - +6015 - +2015 - +2015 - +2015 - +2015 - +2015 - +2015 - +2015 -	0000 556 0.0000 0 000000 0 0.0000 0 440 0 0.0000 440 0 0.000 440 0 0.000 440 0	10 N 00 N 00 N 00 N 00 N								
August 1	(100 4 (100 4) 200 4	н b d Constit Courses (24 мания 78 Co 7 4 Co 7 7 Co 7 Co 7 Co 7 Co 7 Co 7 Co 7 Co	Images Images<	0000 550 REAL FLORED CALCULATE IN 2018 01 2440 01 C01 01 4440 01 E00 01 449 01 C01 01 449 01	10 N								
Average A		н у Сонай Соннон. (94) моне 1760; 7460; 7	Images Images Images Images reaction Goal Response excerts excerts excerts reaction Goal Response excerts excerts excerts reaction Search excerts excerts excerts	900 Kini NA 1000 CANAN 1 2000 D CANAN 1 200	10 N 00 N 00 N 00 N 00 N								
Control C	(100 4 december 10 4 december		Images Images Images Images <	NUME NUM NUME NUME	100 N								
American	(00 2000) (0 10 200) (00 200) (0 10 200) (0 10 200)	None Performance Performance VEG VEG Performance VEG VEG Performance VEG Performance Performance VEG Performance Performance VEG Performance Performance Performance Performance Performance <td>Product of Engine ● Const Product of Engine 44.00170 VIDER 44.00170</td> <td>NUMBO OUTLONG NUMBO OUTLONG NUMBO 2018 CALLANCE NUMBO NUMBO NUMBO NUMBO 2018 CALLANCE NUMBO NUMBO<!--</td--><td>100 %</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td>	Product of Engine ● Const Product of Engine 44.00170 VIDER 44.00170	NUMBO OUTLONG NUMBO OUTLONG NUMBO 2018 CALLANCE NUMBO NUMBO NUMBO NUMBO 2018 CALLANCE NUMBO NUMBO </td <td>100 %</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	100 %								
Control Contro Control Control Control Control Control Control Control Control Co			Name O Control Name Accore With Control Accore With Contre Accore	Bit Dial	100 %		anis biate						
American	(00 2000) (0 10 200) (00 200) (0 10 200) (0 10 200)	None Performance Performance VEG VEG Performance VEG VEG Performance VEG Performance Performance VEG Performance Performance VEG Performance Performance Performance Performance Performance <td>Product of Engine ● Const Product of Engine 44.00170 VIDER 44.00170</td> <td>Bit Dial Bit Dial</td> <td>100 %</td> <td></td> <td>anis biate</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Product of Engine ● Const Product of Engine 44.00170 VIDER 44.00170	Bit Dial	100 %		anis biate						
Control Contro Control Control Control Control Control Control Control Control Co			Name O Control Name Accore With Control Accore With Contre Accore	Bit Dial	100 %		anis biate						

The SunCHECK Dashboard: Focus on What's Next

A single view presents all Patient and Machine-focused QA. Select an entry to see all results and analysis for a specific event. Use the same analyses for each phase.

					_							
	DoseCHECK™		Review all	Approve all								
	DATE	PATIENT	STATUS	ACTIONS								
	04 APR 2018	Bryan Laurens		Approve							SUN NUCLEAR corporation	PATIENT
	04 APR 2018	Geoffrey Enns		Approve	Review at	Approve all	Machine Tasks			SNC Routine Quick S		
	04 APR 2018	Geoffrey Enns		Approve	STATUS	ACTIONS	Due					
	03 APR 2018	Annette Choi		Approve		meanaA meanaA	DATE	MACHINE	TEMPLATE	STATE	ACTIONS	
	03 APR 2018	Annette Choi		Approve		Assess	 02 APR 2018 04 APR 2018 	SNC Routine GE Lightspeed	Monthly Daily	April In Process		
	Load next 10 results					Approx	04 APR 2018	HDR	Delly		***	
	Eodu Hext To Tesuits						04 APR 2018	SNC Routine Tomotherapy	Daily			
					Review all	Approve all	Load next 2 results	(one of a particular p	Cong			
	Fraction 0		Review all	Approve all	STATUS	ACTIONS						
						Approx	Pending Review			Review all	Approve all	
	DATE	PATIENT	STATUS	ACTIONS		Approve	DATE	MACHINE	TEMPLATE	STATE	ACTIONS	
	28 MAR 2017	Chance Garrett		Approve		Approve	O 03 APR 2018	GE Lightspeed	Daily	Completed		
	🕑 30 JAN 2017	Margaret Barton		Approve			🔒 04 APR 2018	Tomotherapy	Daily	Completed		
	🕑 10 JAN 2017	Miles Ebony		Approve	Review all	Approve all	Approved				Review all	
	💽 10 JAN 2017	Lorne Bristow		Approve	STATUS	ACTIONS	DATE	MACHINE	TEMPLATE	STATE	ACTIONS	
	💽 03 JAN 2017	Agnes Harrison		Approve		Access	🕑 02 APR 2018	SNC Routine	Daily	Completed	***	
	Load next 7 results					Assister						
iled						Assesse						
`\												
ssed	Fraction <i>n</i>		Review all	Approve all								
	DATE	PATIENT	STATUS	ACTIONS								
//		Gertrude Zimman		Approve								
·	🔮 14 NOV 2017	Gertrude Zimman		Approve								
	13 NOV 2017	Gertrude Zimman		Approve								

INDEPENDENT QA. YOUR WAY. The SunCHECK Platform provides flexible workflow automation for integrated and independent QA.

Combine SunCHECK Patient with SunCHECK Machine to realize the full power of the platform.

- One Solution for Radiation Therapy QA
- Speed and Efficiency through Automation
- Access from Anywhere
- Seamless Clinical Integration

Learn more: sunnuclear.com/suncheck

Varian Medical Systems[®] and TrueBeam[®] are registered trademarks, and Varian[™], and Halcyon[™] are trademarks, of Varian Medical Systems, Inc. Sun Nuclear Corporation is not affiliated with or sponsored by Varian Medical Systems, Inc.

SunCHECK Patient Specifications

Dose Calculation Algorithms:	Conventional Linacs: Collapsed Cone Convolution Superposition; TomoTherapy Systems: Monte Carlo*; HDR Brachytherapy: TG-43-compliant algorithm*								
Dose Reconstruction Method:	Forward projection (EPID and/or Log Files)								
Hardware Environment:	See "SunCHECK Server, Environmental and 3rd Party Pre-Requisites" Documents								
	Secondary Checks (DoseCHECK Module)								
Supported Systems:	Elekta and Varian Medical Sytems® linacs, including the Halcyon [™] system, TomoTherapy Hi-Art [®] and H-Series [™] Systems								
Available Analysis and Pass/Fail Criteria:	Composite and Beam Point Doses and MUs**; 3D Dosimetric Analysis for Photon plans; Beam Point Doses for Electron plans								
Supported Systems for HDR Brachytherapy Option :	Varian Medical Systems® and Elekta HDR Brachytherapy Systems								
Available Analysis and Pass/Fail Criteria for Option:	Composite Point Doses, Source Information, 3D Dosimetric Analysis								
Phantomless and Array-Based Pre-Treatment QA and In-Vivo Monitoring (PerFRACTION Module)									
Supported Systems:	Varian Medical Systems® and Elekta Linacs with MLCs								
Supported Treatment Modalities:	3D CRT, IMRT, VMAT, SRS and SBRT Photon Treatments								
Data Sources:	EPID and/or Log Files (dependent on Linac model and imaging type used in delivery), and/or ArcCHECK array								
	Pre-Treatment QA								
Available Analysis and Pass/Fail Criteria:	Composite and Beam Point Doses, 2D Absolute Dose Analysis (Fraction Zero Absolute Dose Option), 3D Dosimetric Analysis								
In-Vivo Monitoring									
Available Analysis and Pass/Fail Criteria:	Composite and Beam Point Doses, 2D Relative Dose Analysis, 2D Absolute Dose Analysis (Transit Dosimetry Option), 3D Dosimetric Analysis								
Dose Calculation Image Set:	Planning CT image set, Cone Beam CT image sets (CBCT Recalculation Option)								
PerFRACTION Dosimetry Package Option:	Includes: Fraction Zero Absolute Dose, Transit Dosimetry, CBCT Recalculation								
* Only Secondary Dose Calculation supported ** For V	arian Medical Systems® and Elekta Linac Plans Only – not applicable for TomoTherapy								

SunCHECK[™] Used by 800+ Clinical Sites Worldwide



sunnuclear.com



