



# IBA Dosimetry – Herramientas para el control de calidad en dosimetría

Jornada SARH – Antequera 25 de Noviembre 2017

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# IBA Dosimetry – rango de productos



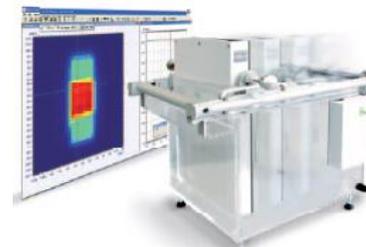
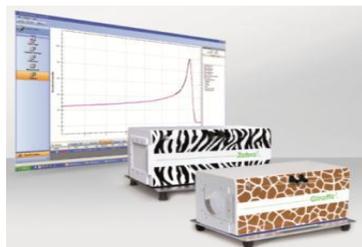
## Dosimetría para RT

Desde el comisionado del acelerador hasta la verificación de paciente



## Dosimetría para PT

Soluciones completas para el comisionado, test de aceptación y QA de PT



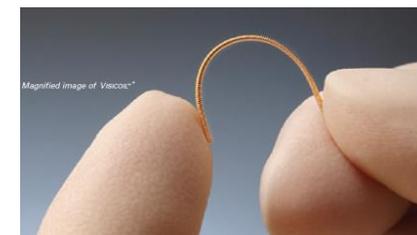
## Imagen médica

Soluciones para el control de calidad en imagen médica, para un mejor diagnóstico

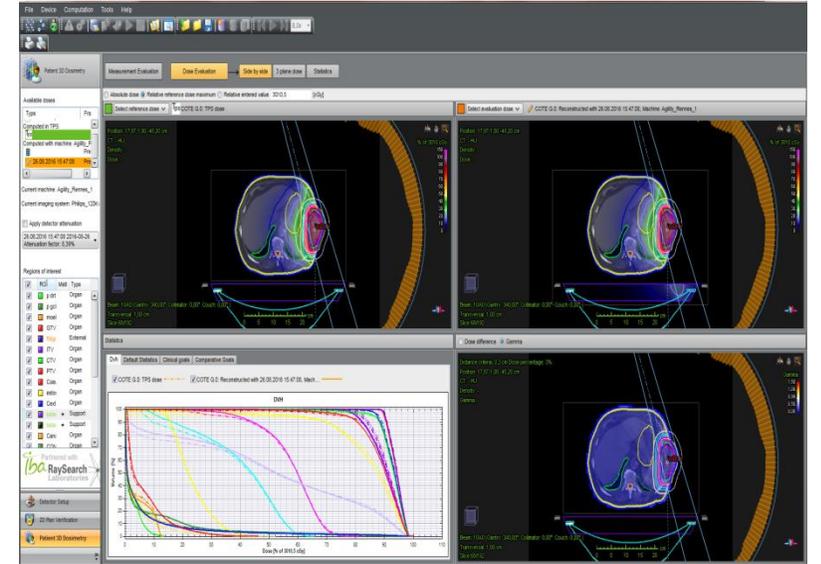


## Marcadores - VISICOIL

Fácil localización del tumor, para mayor precisión



- Herramientas 3D para verificación pacientes
  - COMPASS
  - MatriXX-Evolution o Dolphin



- myQA: Todo Conectado - Todo en 1 - Seguro



# ¿Qué es COMPASSPASS?



Compass: T HIRVENKIVI, MATTI KALEVI \*10.09.1947-T HIRVENKIVI, MATTI KALEVI

File Device Computation Tools Help

Patient 3D Dosimetry

Measurement Evaluation Dose Evaluation Side by side 3 plane dose Statistics

Absolute dose Relative reference dose maximum Relative entered value 6977.7 [cGy]

Select reference dose Tps 01\_HnN66vmat. TPS dose

Select evaluation dose 01\_HnN66vmat. Reconstructed with HM\_0, Machine: Clinac4\_Tallin\_2 NON-CLINICAL

Position: -14,33 0,23 -37,63 cm  
CT: - HU  
Density: -  
Dose: -

Position: -14,33 0,23 -37,63 cm  
CT: - HU  
Density: -  
Dose: -

Position: -14,33 0,23 -37,63 cm  
CT: - HU  
Density: -  
Dose difference: -

Beam: B1S1 (Gantry: 200,00° Collimator: 355,00° Couch: 0,032°)  
Transversal: 0,22 cm  
Slice 50/144

Beam: B1S1 (Gantry: 200,00° Collimator: 355,00° Couch: 0,032°)  
Transversal: 0,22 cm  
Slice 50/144

Beam: B1S1 (Gantry: 200,00° Collimator: 355,00° Couch: 0,032°)  
Transversal: 0,22 cm  
Slice 50/144

Available doses

Type	Fraction
Treatment plan: 01_HnN66vmat	
Computed in TPS	
Computed with machine: Clinac4_Tallin_2 - UNCOMMISSIONED	
HM_103 PreT	
HM_0 PreT	
HM_1 PreT	
HM_2 PreT	
HM_97 PreT	
PreT	

Current machine: Clinac4\_Tallin\_2  
Current imaging system: Generic CT

Regions of interest

ROI	Matl	Type
patient	External	Organ
artifact	Organ	Organ
Brain	Organ	Organ
sp cord	Organ	Organ
Ajutyvi	Organ	Organ
R gl.parotis	Organ	Organ
L gl.parotis	Organ	Organ
tumor	Organ	Organ
mts lymph node	Organ	Organ
RPS	Organ	Organ
II dex	Organ	Organ
III dex	Organ	Organ
IV dex	Organ	Organ
IV sin	Organ	Organ
Resets mts	Organ	Organ

Partnered with Iba RaySearch Laboratories

Detector Setup  
2D Plan Verification  
Patient 3D Dosimetry

Dvh Default Statistics Clinical goals Comparative Goals

01\_HnN66vmat. TPS dose 01\_HnN66vmat. Reconstructed with HM\_0, Machine: Clina...

DVH

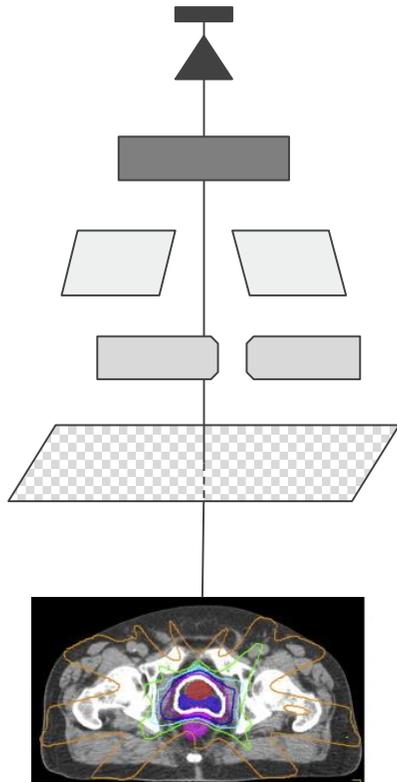
Volume [%]  
Dose [% of 6977.7 cGy]

Not connected Administrator, Administrator

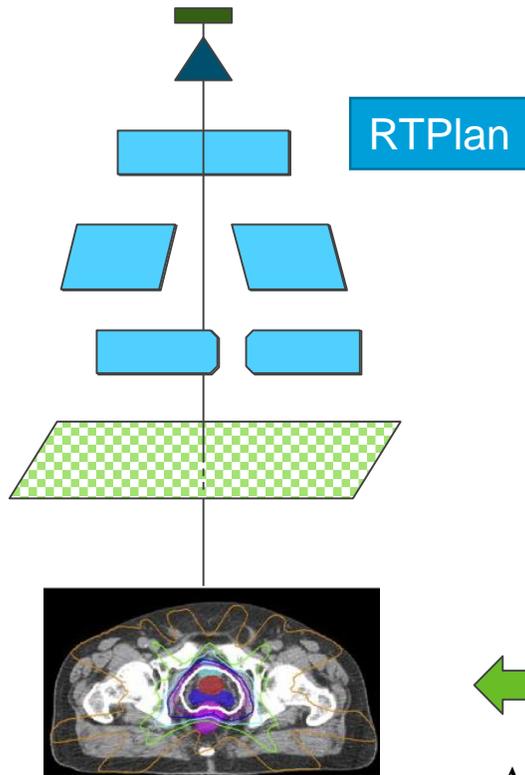
17:19  
07.05.2015

# Evaluación 3D DVH solución 2-1

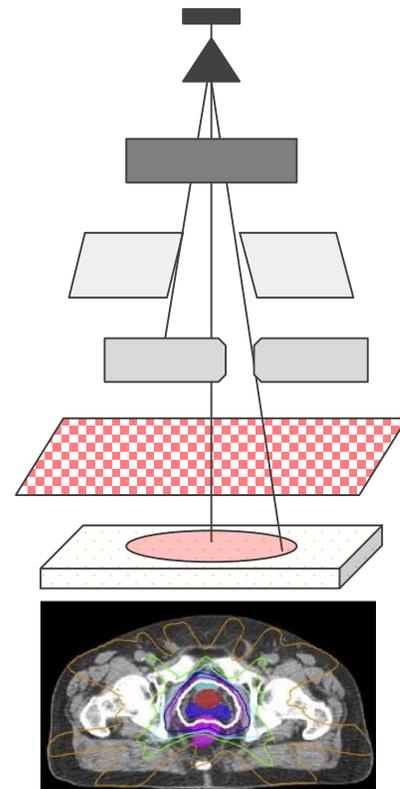
TPS



Compass  
Computed (CC)



Compass  
Reconstructed (CR)



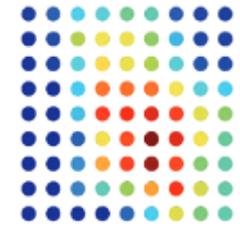
$\Delta, \gamma$



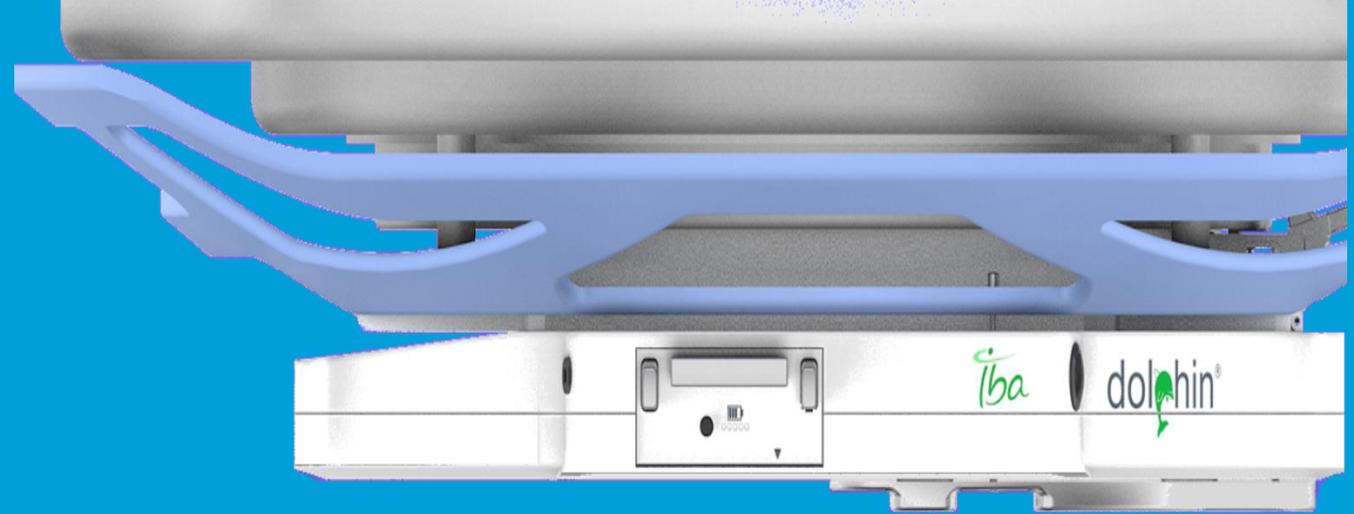
$\Delta, \gamma$

98% of beam information missed. Point measurements limit predictability\*

Dolphin  
MatriXX Ion Chamber



Accurate and high-sensitivity measurements



# MatriXX-Evolution & Dolphin®

---

Advanced Technology

- **Array 2D de cámaras de ionización**

- 1020 cámaras de ionización en una matriz de 32 × 32 cm
- Cámara de ionización ventilada al aire:  
 $\varnothing = 4.5 \text{ mm}$ ,  $d = 5 \text{ mm}$ ,  $V = 0.07 \text{ cm}^3$
- Lectura en paralelo, sin tiempo muerto en la lectura.

- **Acople al gantry a 100cm SSD**

- Área activa 24x24 cm

- **Acople al gantry a 76cm SSD**

- Área activa 32x32 cm



Fluencia adquirida perpendicularmente a los cámaras de ionización



- Sin dependencia angular en los detectores
- Permite medir independientemente de la posición de la mesa.
- Medida de campos no-coplanares
- Capacidad de detectar errores de Isocentro.

Capacidad de detectar errores de gantry (sensor con precisión 0,4°)





## Diseño compacto

- Máxima apertura
- Compatible con casos SRS / SBRT de haces no coplares
  - Independencia con la orientación de la mesa
  - Mayor rango que el EPID

## Sin cables

- Conexión inalámbrica
- Funcionamiento con batería
- Sensor de ángulos integrado y calibrado en fábrica

## Fácil montaje

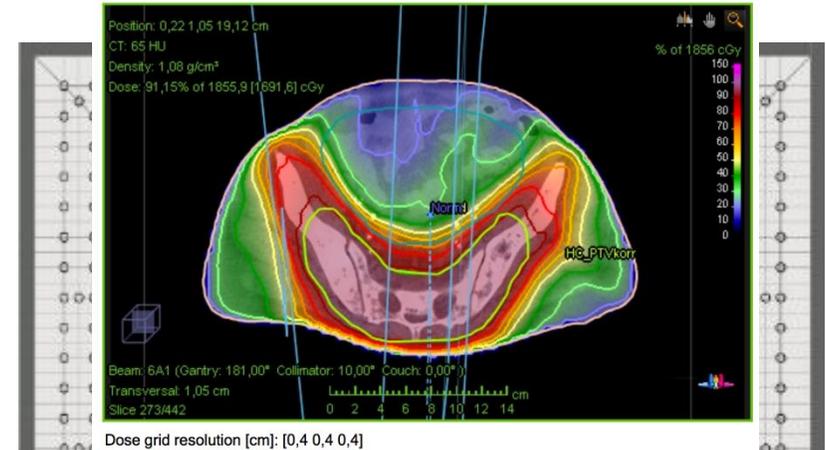
- Compatible con las bandejas de máquina
- Accesorio codificado
- Cierre doble para máxima seguridad



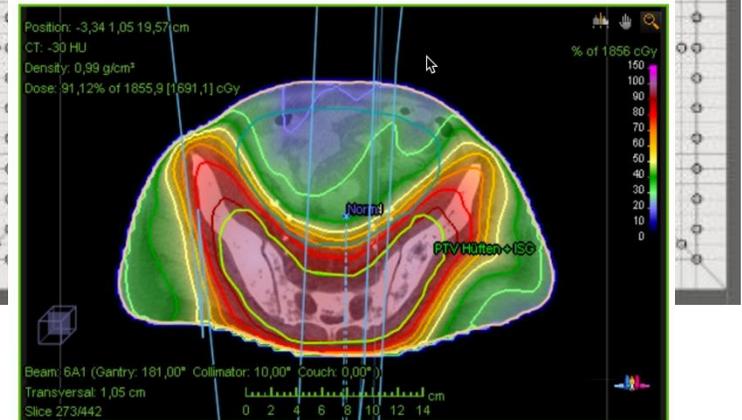
- 1513 cámaras de ionización plano-paralelas
- 5 mm de resolución espacial (15 x 15 cm<sup>2</sup> área central)
- Volumen de cámara reducido
  - 3.2 mm de diámetro, 2 mm gap de electrodos
- **Cubre todo el campo de tratamiento 40 x 40 cm<sup>2</sup>**
  
- Equipo preparado para medidas **online**.
  - Reducida atenuación
  - Aplicación factor de atenuación o re escalado de UM
  
  - Preparado para QA de máquina con myQA

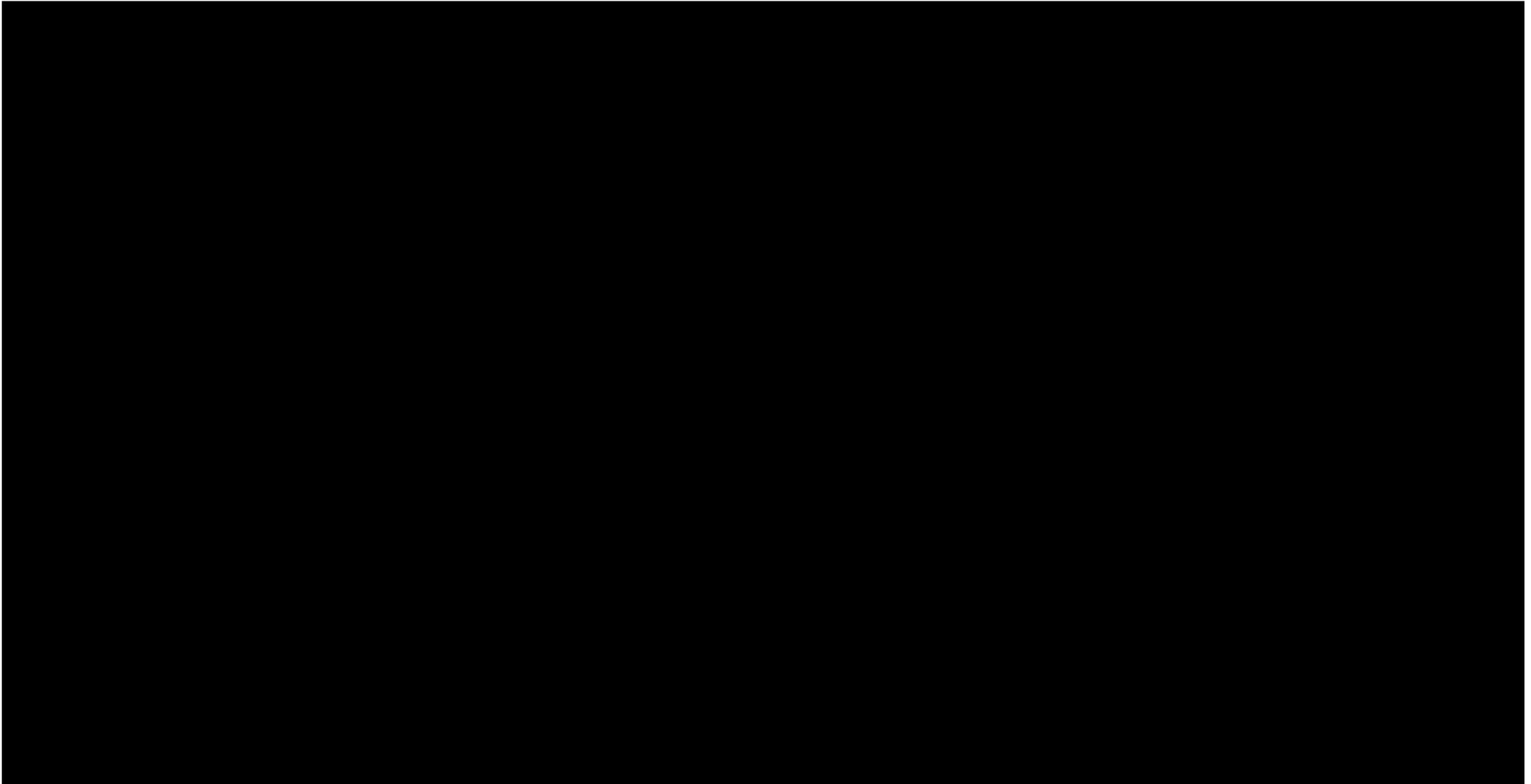
myQA®

LWS Beck VMAT.0: TPS dose



LWS Beck VMAT.0: Reconstructed with 18.01.2017 16:51:09, Machine: Versa26jul16





# Instant check on the actual delivered fluence

The screenshot displays the COMPASS software interface with several overlapping detector response histograms. Each histogram shows the 'Amount [%]' on the y-axis and 'Difference [%] of' on the x-axis. The histograms are color-coded, with red indicating higher differences and yellow/green indicating lower differences. A central dialog box titled 'QuickCheck evaluation completed' is overlaid on the interface. The dialog box contains a green checkmark icon and the text 'Overall evaluation status is Passed.' Below this, it asks 'Would you like to show detail results immediately?' with 'Yes' and 'No' buttons. At the bottom of the dialog, it says 'Time to close: 2 s'. In the background, a larger histogram titled 'Selected Pixel Count per Degree in S' is visible, showing 'Counts/Degree' on the y-axis and 'Degree' on the x-axis. This histogram compares 'Predicted' (blue line) and 'Measured' (red line) data. The predicted data shows a peak around 60 degrees, while the measured data shows a slightly higher peak. The background also shows various beam parameters such as 'Beam: ARC 1', 'Gantry: 37.23°', 'Measurement interval: 17.69', and 'Beam coordinate: 18.24-21.6 cm'.

# Evaluación dosis 3D (basado en la medida y chequeo TPS)



File Device Computation Tools Help

Patient 3D Dosimetry

Measurement Evaluation Dose Evaluation Side by side 3 plane dose Statistics

Absolute dose Relative reference dose maximum Relative entered value 3010.5 [cGy]

Select reference dose Tps COTE G.O: TPS dose

Select evaluation dose COTE G.O: Reconstructed with 26.08.2016 15:47:08, Machine: Agility\_Rennes\_1

Available doses

Type Fra

Computed in TPS

Tps

Computed with machine: Agility\_F

Pre

26.08.2016 15:47:08 Pre

Current machine: Agility\_Rennes\_1

Current imaging system: Philips\_120kV

Apply detector attenuation

26.08.2016 15:47:08 2016-08-26

Attenuation factor: 8.39%

Regions of interest

ROi	Matl	Type
<input checked="" type="checkbox"/>	p drt	Organ
<input checked="" type="checkbox"/>	p pcl	Organ
<input checked="" type="checkbox"/>	moel	Organ
<input checked="" type="checkbox"/>	GTV	Organ
<input checked="" type="checkbox"/>	Régl	External
<input checked="" type="checkbox"/>	ITV	Organ
<input checked="" type="checkbox"/>	PTV	Organ
<input checked="" type="checkbox"/>	Coel	Organ
<input checked="" type="checkbox"/>	estor	Organ
<input checked="" type="checkbox"/>	Cext	Organ
<input checked="" type="checkbox"/>	table	Support
<input checked="" type="checkbox"/>	table	Support
<input checked="" type="checkbox"/>	Can	Organ
<input checked="" type="checkbox"/>	CON	Organ

Position: 17,87 1,00 -45,20 cm  
CT: - HU  
Density: -  
Dose: -

Position: 17,87 1,00 -45,20 cm  
CT: - HU  
Density: -  
Dose: -

Position: 17,87 1,00 -45,20 cm  
CT: - HU  
Density: -  
Gamma: -

Beam: 10A0 (Gantry: 340,00° Collimator: 0,00° Couch: 0,00°)  
Transversal: 1,00 cm  
Slice 68/192

Beam: 10A0 (Gantry: 340,00° Collimator: 0,00° Couch: 0,00°)  
Transversal: 1,00 cm  
Slice 68/192

Beam: 10A0 (Gantry: 340,00° Collimator: 0,00° Couch: 0,00°)  
Transversal: 1,00 cm  
Slice 68/192

Statistics

Dvh Default Statistics Clinical goals Comparative Goals

COTE G.O: TPS dose  COTE G.O: Reconstructed with 26.08.2016 15:47:08, Mach...

DVH

Distance criteria: 0,3 cm Dose percentage: 3%

Position: 17,87 1,00 -45,20 cm  
CT: - HU  
Density: -  
Gamma: -

Beam: 10A0 (Gantry: 340,00° Collimator: 0,00° Couch: 0,00°)  
Transversal: 1,00 cm  
Slice 68/192

Partnered with Iba RaySearch Laboratories

Detector Setup

2D Plan Verification

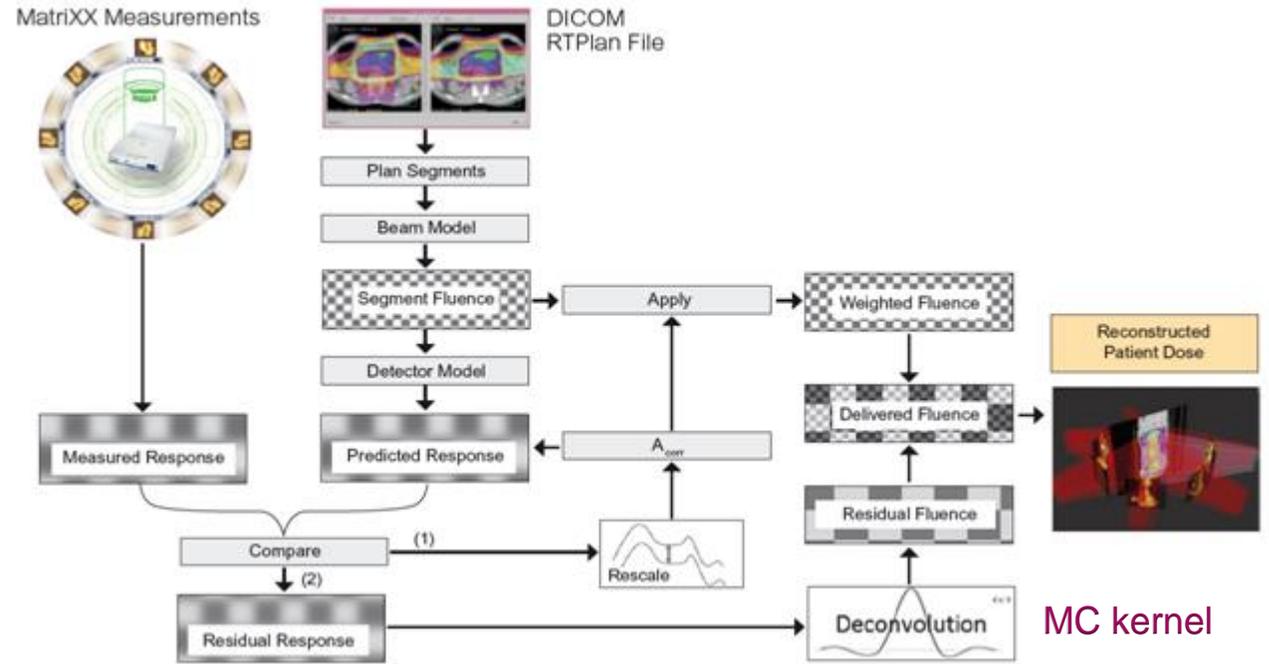
Patient 3D Dosimetry

# ¿Puedo medir campos pequeños?

**COMPASS** dispone de un kernel pre calculado realizado mediante Montecarlo que permite una deconvolución precisa de la respuesta de las cámaras.

De esta manera podemos detectar errores de posicionamiento en el **MLC** de hasta 1 mm y permitiéndonos medir campos de hasta  $3 \times 3 \text{cm}^2$

*Godart et al. Med. Phys. Biol, 56 (2011)*



*Implementation of Stereotactic Ablative Body Radiotherapy (SABR) for early stage medically inoperable lung cancer: An experience from a medium size clinical centre, UKRO conference 2015*

**Stereotactic Radiation Therapy (SRS/SBRT) pre-treatment QA: two different approaches, 3rd ESTRO Forum (Barcelona 2015).**

**Lung SBRT treatment verification with a transmission detector system, ESTRO2017**

■ ¿qué es myQA?

Agenda\_DS... Dropbox SaralC82 Bistromath MagicMax OmniPro Advance 1.2 SARRP presentation... expenses

DigiPhant Deskshare Bulk Rename Utility Lynx 2D QPimRT1.7 Siemens Artist Loca... PT Brochures.rar

HyperCam 2 - RadioModels Lynx2DIm... SCH\_Sales (SCHFILE1)... RE COMPA... Agenda\_DS... Template DIN protoc...

OmniProIn... OmniPro... 7.5 Microsoft Outlook 2010 ZETTERFAS... Clinical implement... folder.zip Template DIN protoc...

wetransfer... Treviso DOPA - Shortcut Clinical Analysis Kagoshima... DIN protocol for myQA...

Galway COMPASS AAPM\_Hig... Siemens\_O... PMB Copy of CCU 10FFF\_test...

AAPM characteriz... transmissio... COMPASS, KFMC wor... RT-BR-E-D... Copy of P1 Dosi Packa... Galaway.rs...

Poznan\_1\_... Neso\_Ennio... PT Brochures Workshop Final IBA.pdf DOSI\_PT\_P... Galaway\_s...

RT-BR-E-M... H+N LET protons.pdf HIN OTP.20151... P1 Dosi Package\_M... Treviso Agil\_S.rsbak

folder myQA versi... MRI linac.pdf Copy of CCU upgr. CUF... Service\_Trai...

myQA version ...

Template DIN protoc... CSPLicens... document...

intro.pptx

Open Compass... IBA\_emails - Shortcut

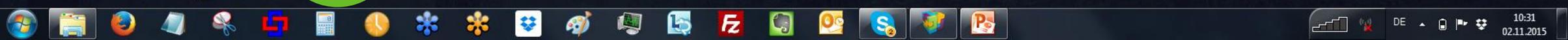
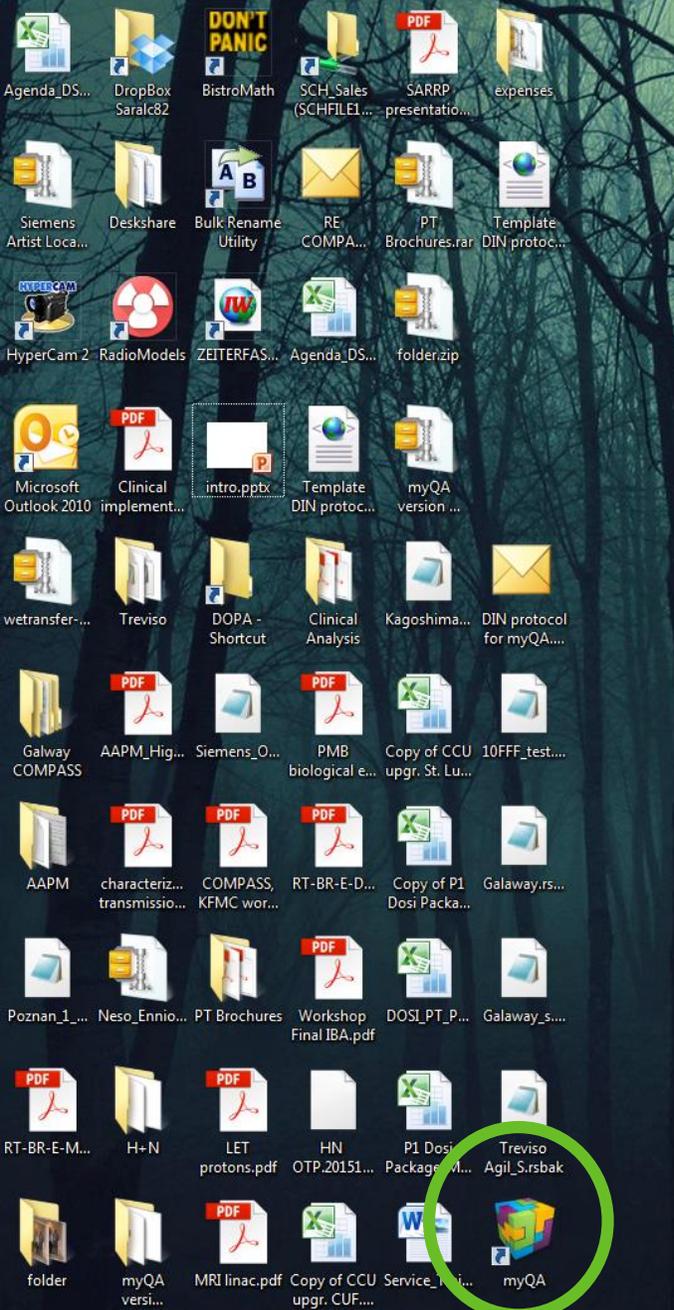
SCH\_Public (schfile1) ... Sara - Shortcut

Simulators work in progress

TeamCom... 3.16 Compa... 3.16

Sara (SC-R9010...)

Recycle Bin

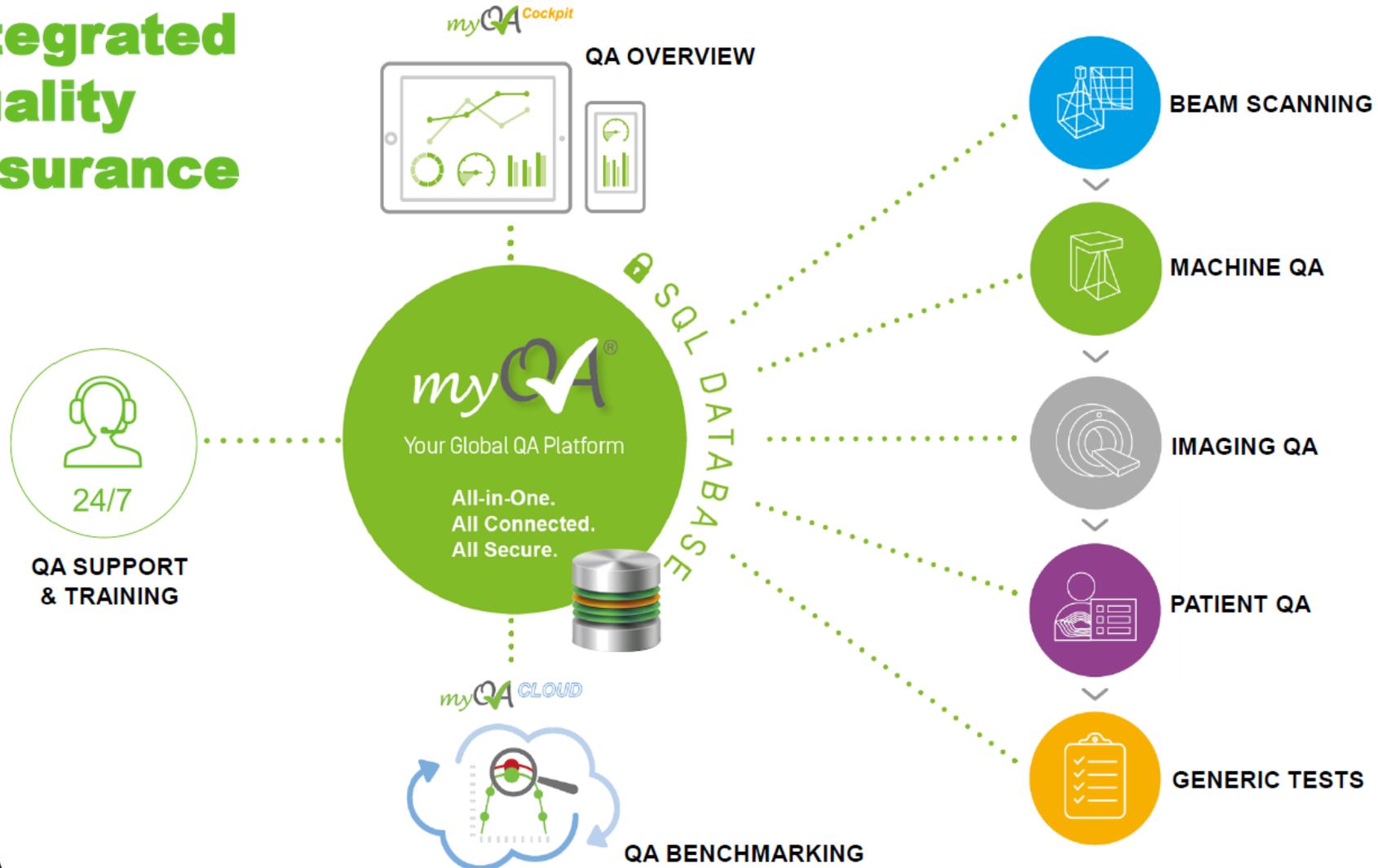


« ¿Qué hago con mi equipamiento existente? »

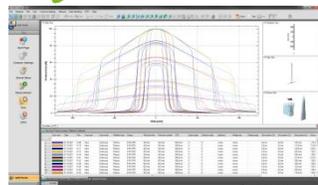
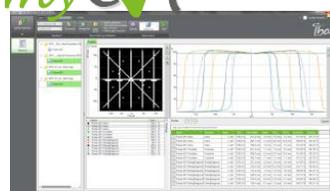
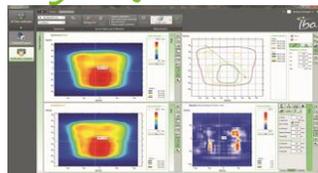


# myQA platform: control de calidad integrado

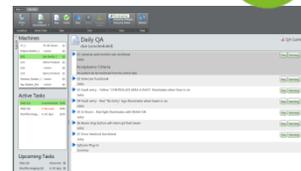
## Integrated Quality Assurance



# myQA Modules

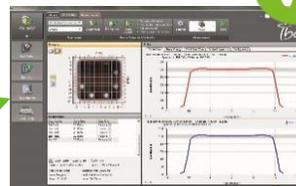


## Generic Tests

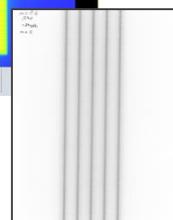
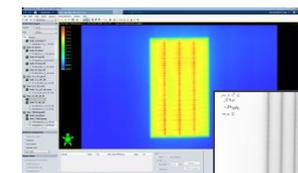
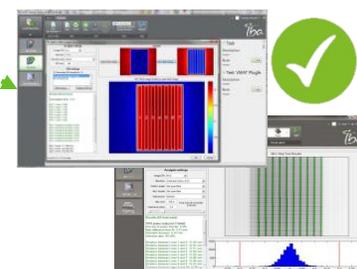


Check lists, pass/fail, functional tests, numeric tests...

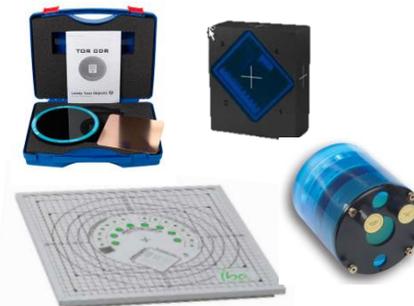
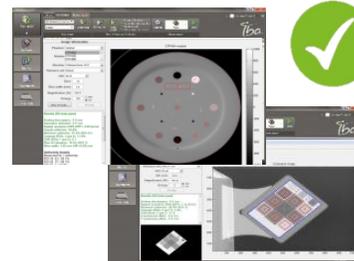
## Dosimetric Tests



## MLC/VMAT tests



## EPID/KV/CBCT Tests/WL test



## myQA Plug-ins

myQA Platform

- myQA Platform
- myQA Patients
- myQA Machines
- myQA FastTrack
- myQA Accept

- myQA Platform
- myQA Patients
- myQA Machines
- myQA FastTrack
- myQA Accept

Equipment Setup

User Administration

Options

Data Import

Compare

Welcome Poznan

You are assigned to Poznan Oncology Center



**myQA RSS Feed**

[Register now for myQA User Meeting on November 23+ 24 in Germany](#) 13.09.2017  
Register now for a myQA User Meeting on November 23 and 24 in our ICC in Schwarzenbruck, Germany. Want to learn more about this event? Then just click above link.

[myQA Patients - Technical Notes published on Support Portal](#) 05.09.2017  
Information for users of myQA Patients: two relevant technical notes have been published on our Support Portal. These are: "myQA Patients\_TN008\_170808 01\_myQA Patients\_Normalization lost" and "myQA Patients\_TN009\_170818 01\_Align Cube on Isocenter". The latter applies to OP-ImRT+ as well. The technical notes are available from the "Useful Technical Materials" and connected to the product "myQA Patients".

[Release of myQA 2017\\_001 - Distribution via Support Portal](#) 22.06.2017  
We are happy to announce the release of myQA<sup>®</sup> Version 2017-001 (Build 2.8.18). This version will be distributed via the IBA Support Portal. Eligible customers who have registered themselves in the portal will receive a download ticket in the coming days by email from mailer@iba-portal.com. Key features of this release include: Support of Windows 10 and Virtual Machines, simplified initial setup and significantly speed up "qoing"

**Training**

TRAINING COURSES FOR HEALTHCARE PROFESSIONALS

ICC [INTERNATIONAL COMPETENCE CENTER]

**Service**

SUPPORT PORTAL

Your 24/7 access to IBA service

**CAREprogram**



myQA Platform

Main

Start Page

Equipment Setup

User Administration

Options

Data Import

Compare

Welcome Pozna

- ▶ Demo Clinic\_1
  - ▶ Wielkopolskie Centrum Onkologii
    - ▶ Diagnostic Department\_Poznan
      - ▶ CT Room
        - ▶ CT Poznan
        - ▶ Ortodontic
          - ▶ Ortodontic\_PZ
      - ▶ RT Department\_Poznan
        - ▶ Cyber Knife Room
          - ▶ Cy PZ 01
        - ▶ GR Room
          - ▶ GR\_Lynx
          - ▶ GR1\_P1
        - ▶ Linac Room 1
          - ▶ TB01
        - ▶ Linac Room 2
          - ▶ Linac Room 2 ST
          - ▶ TB02
        - ▶ Room 3
          - ▶ R3 Halcyon
        - ▶ Tomo Room
          - ▶ Tomo
        - ▶ TPS room
          - ▶ RS

Edit



# Wielkopolskie Centrum Onkologii

## Details

Clinic code:

Address: Ul. Gabary 15  
61-866 Poznan, Poland

Operator:

Phone:

Description:

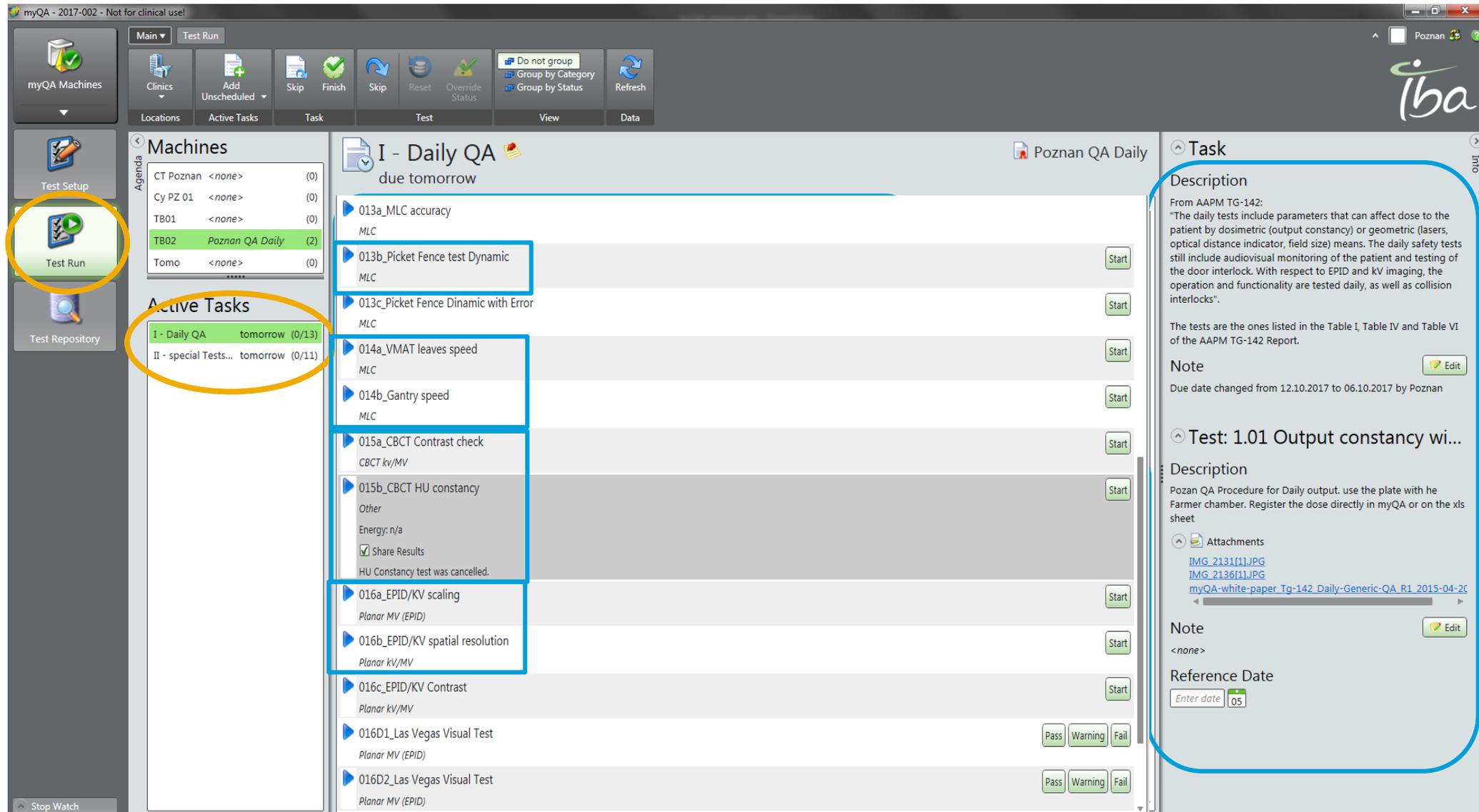
**myQA RSS Feed**

[Register now for myQA User M](#)  
Register now for a myQA User learn more about this event? TI

[myQA Patients - Technical Not](#)  
Information for users of myQA These are: "myQA Patients\_TNC Patients\_TN009\_170818 01\_Aliq are available from the "Useful 1

[Release of myQA 2017 001 - D](#)  
We are happy to announce the distributed via the IBA Support receive a download ticket in th include: Support of Windows 10 and virtual machines, simplified initial setup and significantly speed up...

# Agenda de controles de calidad



myQA - 2017-002 - Not for clinical use!

myQA Machines

Locations Active Tasks Task Test View Data

Agenda

Machines	Count
CT Poznan <none>	(0)
Cy PZ 01 <none>	(0)
TB01 <none>	(0)
TB02 Poznan QA Daily	(2)
Tomo <none>	(0)

Active Tasks

I - Daily QA	tomorrow (0/13)
II - special Tests...	tomorrow (0/11)

### I - Daily QA due tomorrow

Task	Action
013a_MLC accuracy MLC	Start
013b_Picket Fence test Dynamic MLC	Start
013c_Picket Fence Dinamic with Error MLC	Start
014a_VMAT leaves speed MLC	Start
014b_Gantry speed MLC	Start
015a_CBCT Contrast check CBCT kv/MV	Start
015b_CBCT HU constancy Other Energy: n/a <input checked="" type="checkbox"/> Share Results HU Constancy test was cancelled.	Start
016a_EPID/KV scaling Planar MV (EPID)	Start
016b_EPID/KV spatial resolution Planar kv/MV	Start
016c_EPID/KV Contrast Planar kv/MV	Start
016D1_Las Vegas Visual Test Planar MV (EPID)	Pass Warning Fail
016D2_Las Vegas Visual Test Planar MV (EPID)	Pass Warning Fail

### Task: Poznan QA Daily

Description

From AAPM TG-142:  
"The daily tests include parameters that can affect dose to the patient by dosimetric (output constancy) or geometric (lasers, optical distance indicator, field size) means. The daily safety tests still include audiovisual monitoring of the patient and testing of the door interlock. With respect to EPID and kV imaging, the operation and functionality are tested daily, as well as collision interlocks".

The tests are the ones listed in the Table I, Table IV and Table VI of the AAPM TG-142 Report.

Note

Due date changed from 12.10.2017 to 06.10.2017 by Poznan

Test: 1.01 Output constancy wi...

Description

Poznan QA Procedure for Daily output. use the plate with the Farmer chamber. Register the dose directly in myQA or on the xls sheet

Attachments

- [IMG\\_2131\[1\].JPG](#)
- [IMG\\_2136\[1\].JPG](#)
- [myQA-white-paper\\_Tg-142\\_Daily-Generic-QA\\_R1\\_2015-04-20](#)

Note

<none>

Reference Date

Enter date 05



# myQA: TG-66



myQA - 2016-002 - Not for clinical use!

Administrator

myQA Machines

Test Setup

Test Run

Test Repository

Locations Edit Clipboard Item Protocol Template Protocol Data View

Machines & Templates

- Protocol Templates
  - CT-dedicated <none>
  - Elekta Demo Protocol
  - P1 <none>

Protocols: CT-dedicated

- TG-66
  - Annual QA
    - 1.0 Gantry Tilt Accuracy (...)
    - 1.1 Table Indexing and Po...
    - 1.2 Scan Localization (Me...
    - 2.0 CTDI (Dosimetry)
  - Daily QA
  - Monthly QA

## Test Definition

Name: 1.0 Gantry Tilt Accuracy

Description: This test will verify the accuracy of the gantry tilt indicators

1. Setup gantry with digital level or inclinometer on face of gantry near control module
2. Tilt the gantry to the desired angle and record the reading
3. Bring the gantry back to 0 degrees and record the reading

\*\*If you lasers are mounted directly in front of the gantry that would inhibit gantry tilt do not proceed with this test\*\*  
 \*\*If you have a ceiling mounted power injector make sure it is clear of the gantry prior to start of test\*\*

Acceptance Criteria

Name	Expected / Ref	Warn	Fail	Type	Relative
10 degree Offset	10,0 °	± 0,5 °	± 1,0 °	Tolerance	No
20 degree offset	20,0 °	± 0,5 °	± 1,0 °	Tolerance	No
Return to 0 degree	0,0 °	± 0,5 °	± 1,0 °	Tolerance	No

Mechanical  
Numeric

Stop Watch

17:04  
29.08.2016

IBA Dosimetry - myQA Cockpit

http://localhost/#/

Meistbesucht

- Agility 4578
- I - Daily QA
- II - Weekly QA
- III - Monthly QA
- IV - Annual QA
- Artisle 123
- Task CBCT
- Task Dosi
- Task General
- Task MLC
- Task Planar
- Clinac 345
- Routine check
- Task CBCT
- Task Dosi
- Task General
- Task MLC
- Task Planar
- Clinac IX 34576
- TB STX 1023
- Dept Morning QA tests

Test Results Trend Analysis Patients Logoff

Last Refresh: 19.02.2015 00:36

Date	Status
19.02.2015 00:33	Failed

7 - Profile test All Patients

Filter By: Patient id or name

Sort By: Appr. Date

Patient ID	Family, First Name	Case	Type	Appr. Date	Approver	Appr. Status	Appr. Notes
35009170210	EYLANDT*BORIS	Unknown	2D PV MatriXX	10.02.2015 16:44	Darth Vader	Approved	
12345	the hutt Jabba	Unknown	2D PV MatriXX	04.02.2015 09:42	Darth Vader	Approved	
11111	Felt Bobba	Unknown	2D PV MatriXX	03.02.2015 10:24	Darth Vader	Approved	

0 - Check Server Status Darth Vader 19.02.2015 00:31 Passed

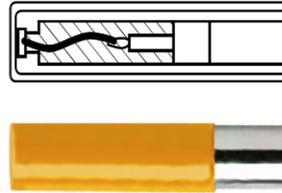
6 - Photon output test Darth Vader 19.02.2015 00:31 Warning

# Soluciones IBA para medida de campos pequeños

## RAZOR<sup>DETECTOR</sup>

### High-performance diode detector

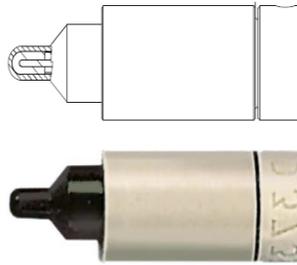
- ✓ Chip size: 0.95 x 0.95 mm; t = 0.5 mm
- ✓ Sensitive area:  $\varnothing$  0.6 mm
- ✓ For Photon and Electron beams in RT



## RAZOR<sup>CHAMBER</sup>

### Compact air ionization chamber

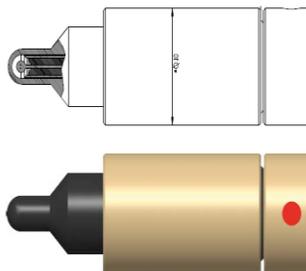
- ✓ Cavity volume: 0.01 ccm
- ✓ Central electrode material: graphite
- ✓ For Photon and Electron beams in RT



## RAZOR<sup>NANOCHAMBER</sup>

### Smallest available ionization chamber

- ✓ Cavity volume: 0.003 ccm
- ✓ Central electrode material: graphite
- ✓ For Photon and Electron beams in RT



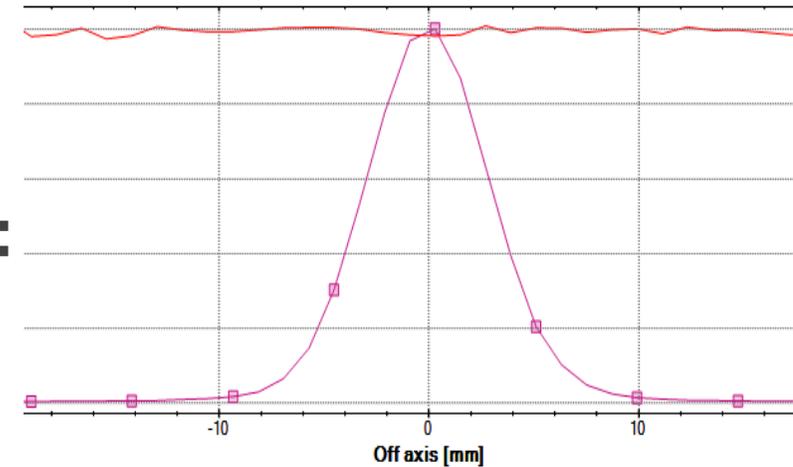
## Stealth<sup>Chamber</sup>

&



=

Tamaño de campo:  
5 mm x 5 mm, medido en modo  
continuo





BIOTERRA  
BIOLOGÍA Y TÉCNICA DE LA RADIACIÓN S.L.



¿Alguna pregunta?

GRACIAS