

# Dosisverifikation mit Delta<sup>4</sup> Discover während der Behandlung



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AK IMRT 2015 in Erlangen , March 19<sup>th</sup> 2015

# Agenda

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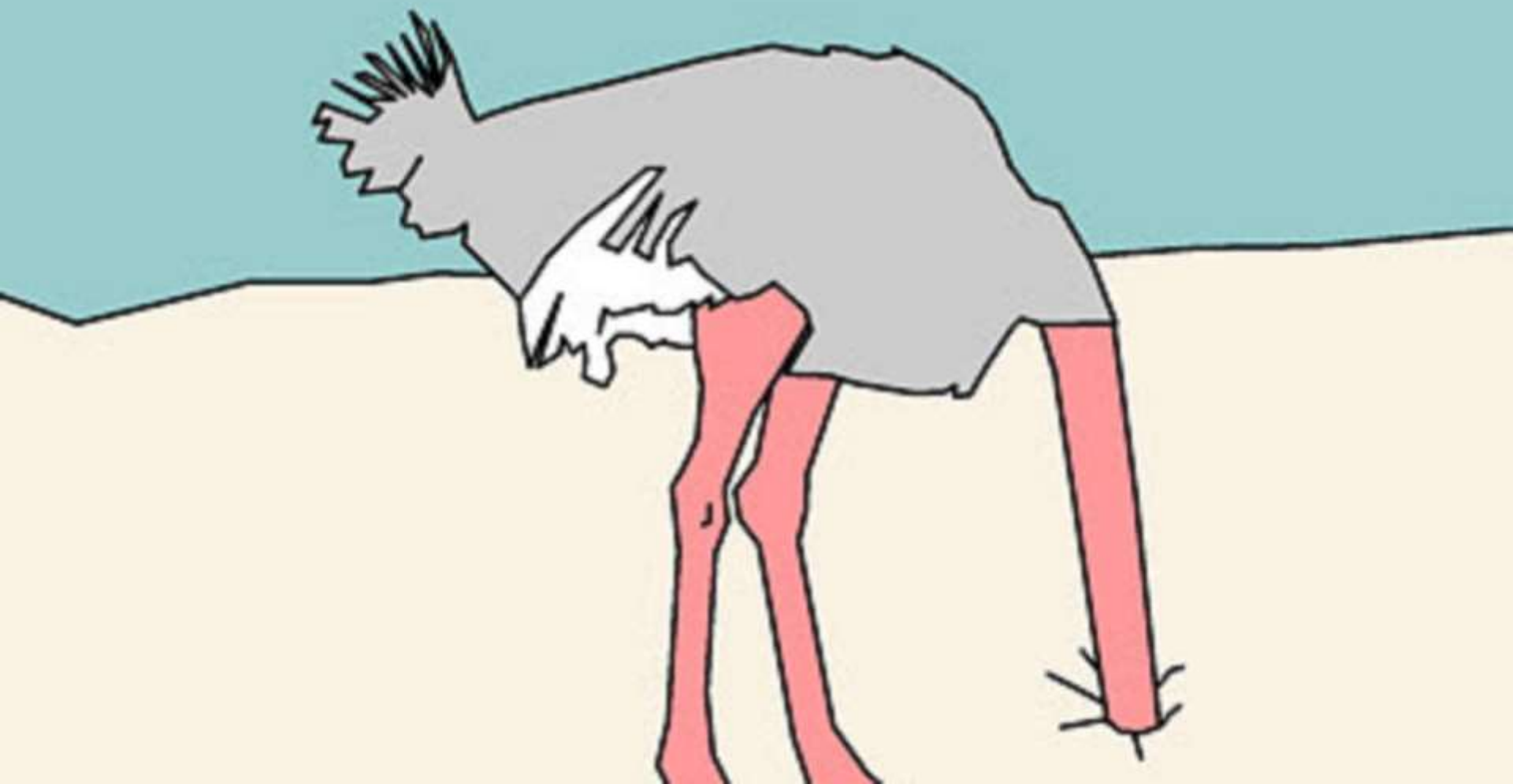
- Which problem does Delta<sup>4</sup> *Discover* solve?
- What does Delta<sup>4</sup> *Discover* do?
- Why is Delta<sup>4</sup> *Discover* better?

# Agenda

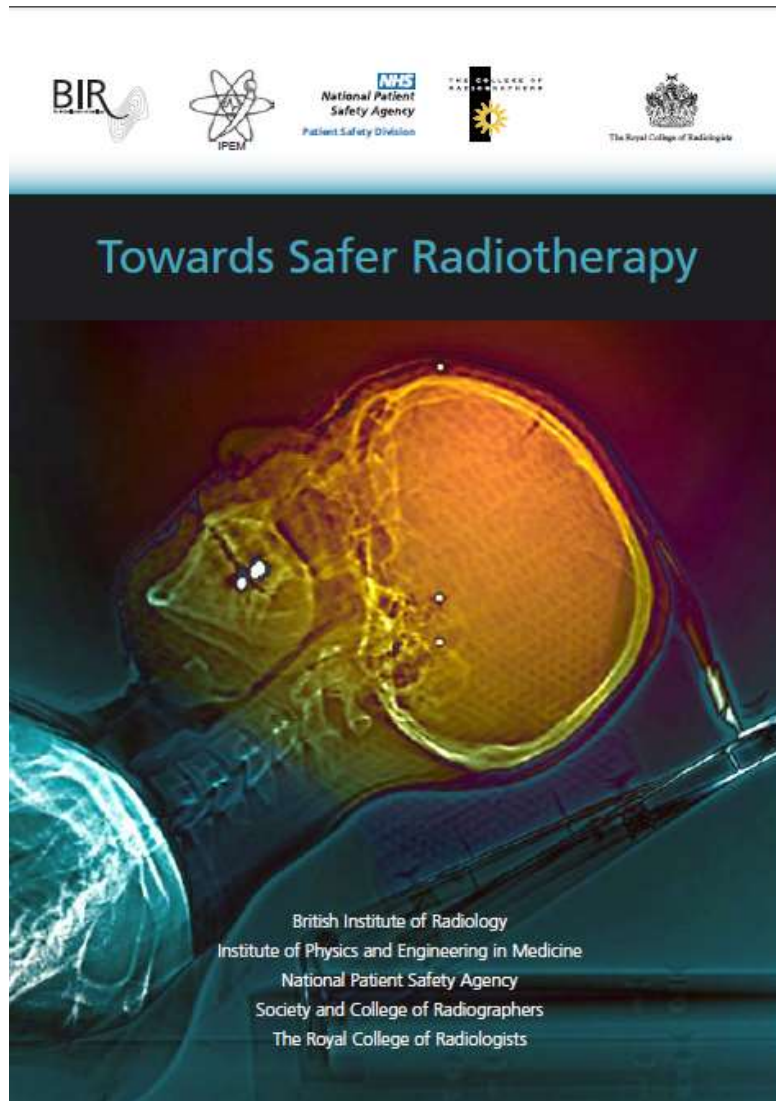
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**Everything is OK if I pretend it is.**



# Problem to be solved



# Problem to be solved

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- “Small irregularities are very frequent”  
(hundred(s)/year/clinic)
- Accidents occur
  - “An accident is the coincidence of very common irregularities”.

1432 radiotherapy errors and near misses were reported voluntarily by 49 NHS hospitals across the UK during three months. 2% of these were reportable events under the “The Ionising Radiation (Medical Exposure) Regulations” .i.e. in average 2 events/clinic/year.

Source: “The radiotherapy newsletter of Public Health England

Supplementary Data Analysis Issue 13 – Full quarterly radiotherapy error data analysis March 2014 to May 2014 - PHE publications gateway number: 2014180”

# Problem ~~to be~~ solved

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Delta<sup>4</sup> Discover

# Problem ~~to be~~ solved

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- Target in position
- Dose delivery correct



# Problem ~~to be~~ solved

- Target in position
- Dose delivery correct



# What is Delta<sup>4</sup> Discover?

## Transmission detector with 4040 p-type diodes

- Retains linac clearance<sup>1</sup>
- From first to last fraction<sup>2</sup>
- High operator satisfaction
  - No interaction required
  - Wireless
  - Retractable (to check light field)



<sup>1</sup> Delta4 Discover is within the protected zone of Varian's laser guard

<sup>2</sup> Beam attenuation: 1% (6MV)

Increase in surface dose : 1% for 10x10, 6MV

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# What does Delta<sup>4</sup> Discover do?

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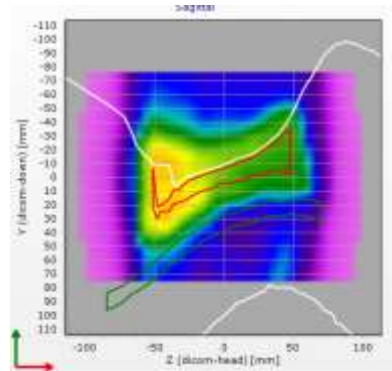
- Verify that dose delivery is correct



- Automatically in the background (alerts only if dose is outside user defined pass/fail criteria)

# Deviations?

- Where? (clinical significance!)



- Reason?

- MLC – submillimeter precision
- Output – 0.4% accuracy
- Gantry/collimator angle check



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# Why is Delta<sup>4</sup> Discover better?

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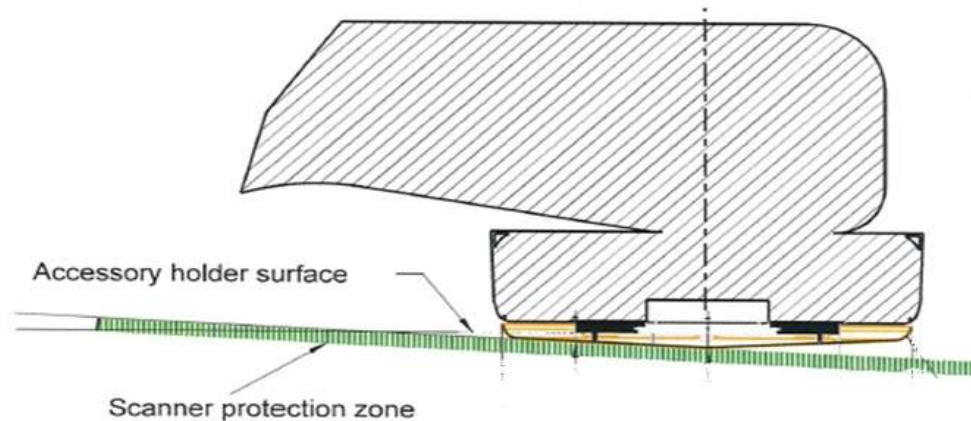


# Why is Delta<sup>4</sup> Discover better?

## Thin

No clearance reduction (Varian)

- Only 23 mm from front-surface of Varian-collimator
- Within Varian laser-guard



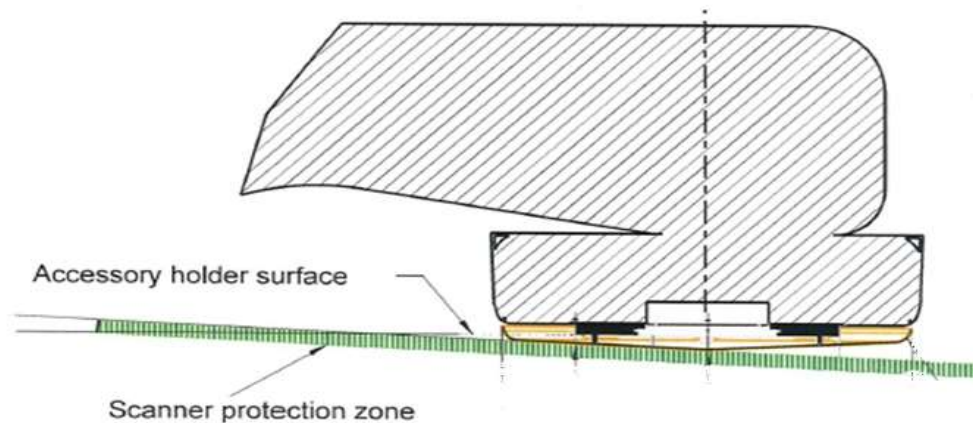


# Why is Delta<sup>4</sup> Discover better?

## Thin

(regarding beam absorption)

- Increase of skin dose ~1%
- Decrease of dose in Dmax ~1%



# Why is Delta<sup>4</sup> Discover better?

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## Tiny detectors

(1mm diameter)

- important for measuring in high gradients



# Why is Delta<sup>4</sup> Discover better?

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## High resolution

(2.5mm at isocenter)

- important for MLC determination



# Why is Delta<sup>4</sup> Discover better?

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## ODI + Lightfield

- Optical distance indicator visible all the time
- Detector can slide out to see the field light on the patient



# Why is Delta<sup>4</sup> Discover better?

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FFF

(and flattened beams, off course)

- Conformal, VMAT, IMRT,...



# Summary

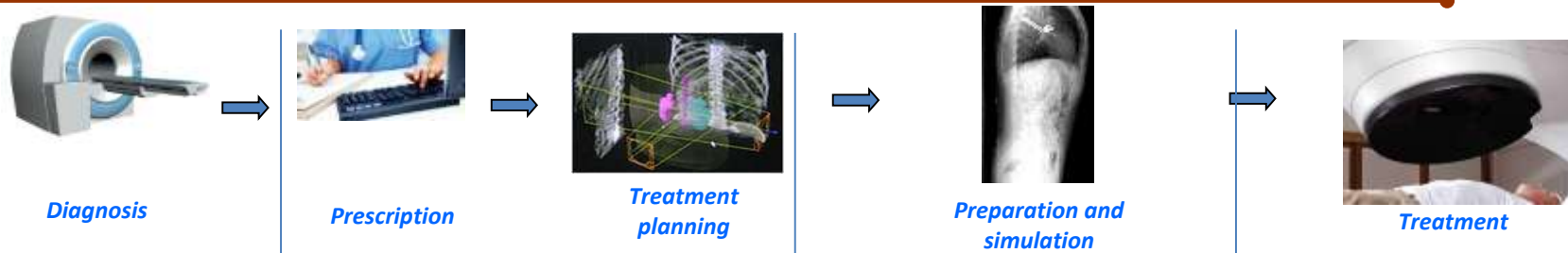
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- Yes: you have irregularities in your RT process
- Yes, there is a risk for accidents
- Yes, you can be confident that you deliver the correct dose:

**Delta<sup>4</sup> Discover**

# Treatment process

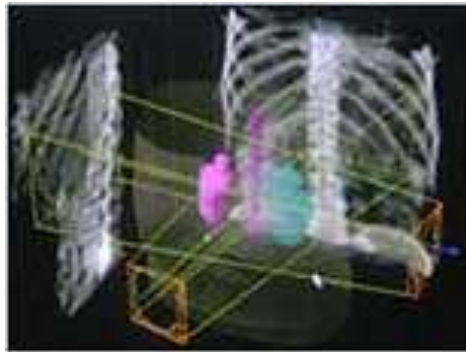


**Planning & Prescription**

**Preparations**

**Treatment**

**Treatment flow**



**TPS verification**



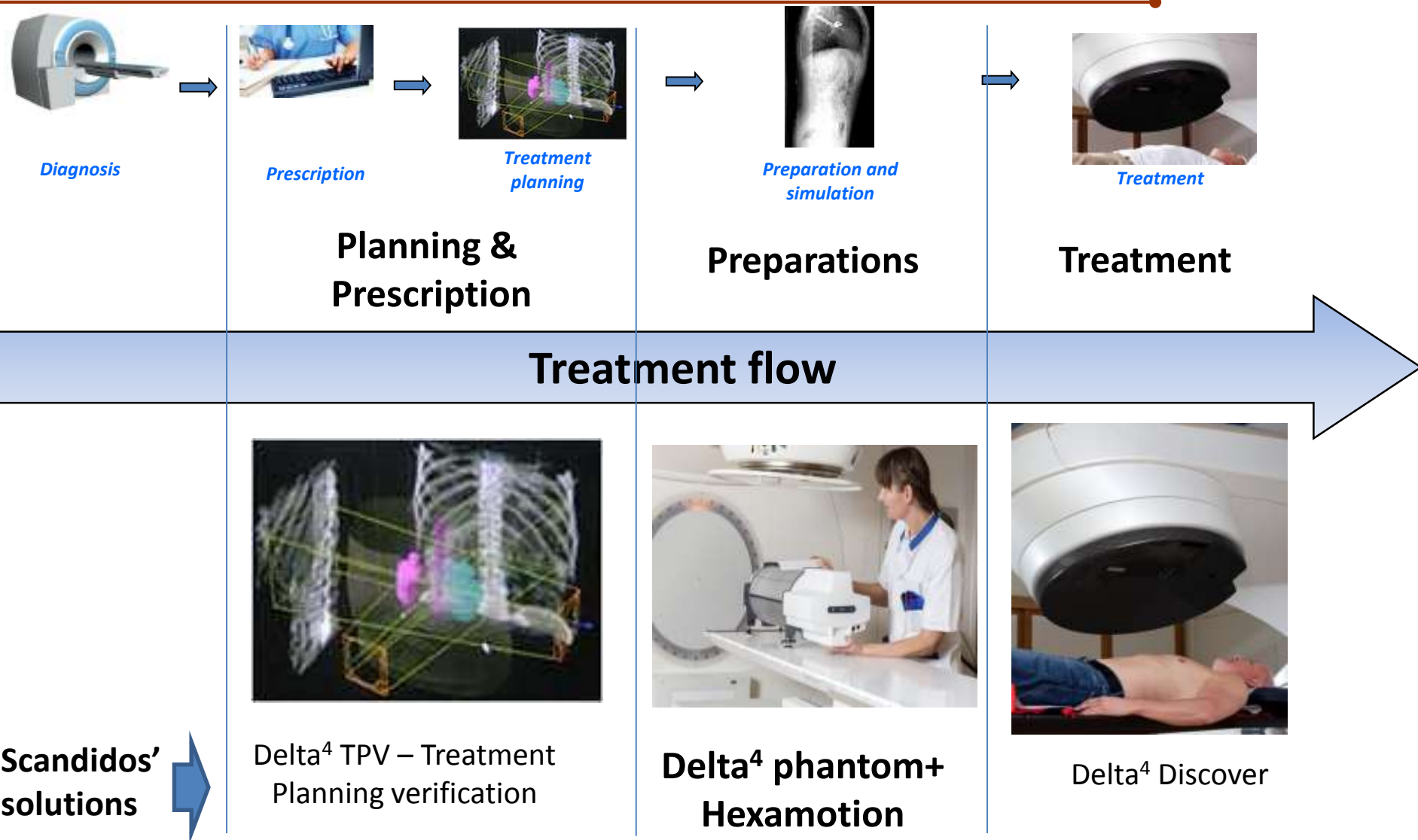
**Pre Treatment Verification**



**Patient Dosimetry**

**Quality assurance**

# Treatment process





Delta<sup>4</sup> Phantom+

For pre treatment verification

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# Completely Wireless



# Delta<sup>4</sup> Phantom+

## An improved Delta<sup>4PT</sup>, completely wireless

Now even more efficient...

- Completely wireless
- 5 years calibration interval
- Insert for ionization chamber

With retained benefits:

- No manual lifting
- True 3D measure where it really matters - in the target region
- Instant approval of plans



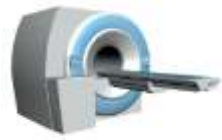
# HexaMotion – 6D Motion Management QA

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- What do I gain from tracking/gating?
- Do I hit the target?



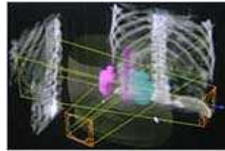
# Treatment process



Diagnosis



Prescription



Treatment planning



Preparation and simulation



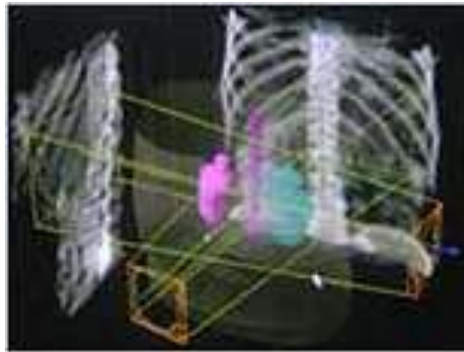
Treatment

**Planning & Prescription**

**Preparations**

**Treatment**

**Treatment flow**



**Delta<sup>4</sup> TPV – Treatment Planning verification**



**Delta<sup>4</sup> phantom+ Hexamotion**



**Delta<sup>4</sup> Discover**

**Scandidos' solutions**



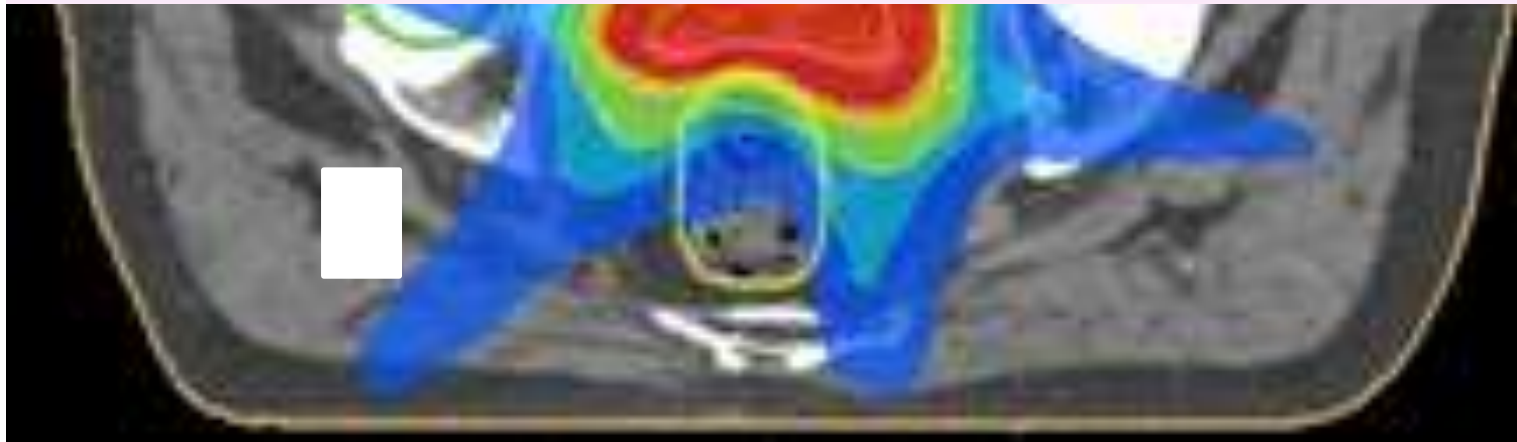
# What is Delta<sup>4</sup> TPV?

TPS plan good and correct?

Target covered?

Dose to OAR acceptable?

Dose calculation correct?



**THANK YOU!**

# From Prescription to final treatment fraction

