

# Planmed

**PLANMECA GROUP**

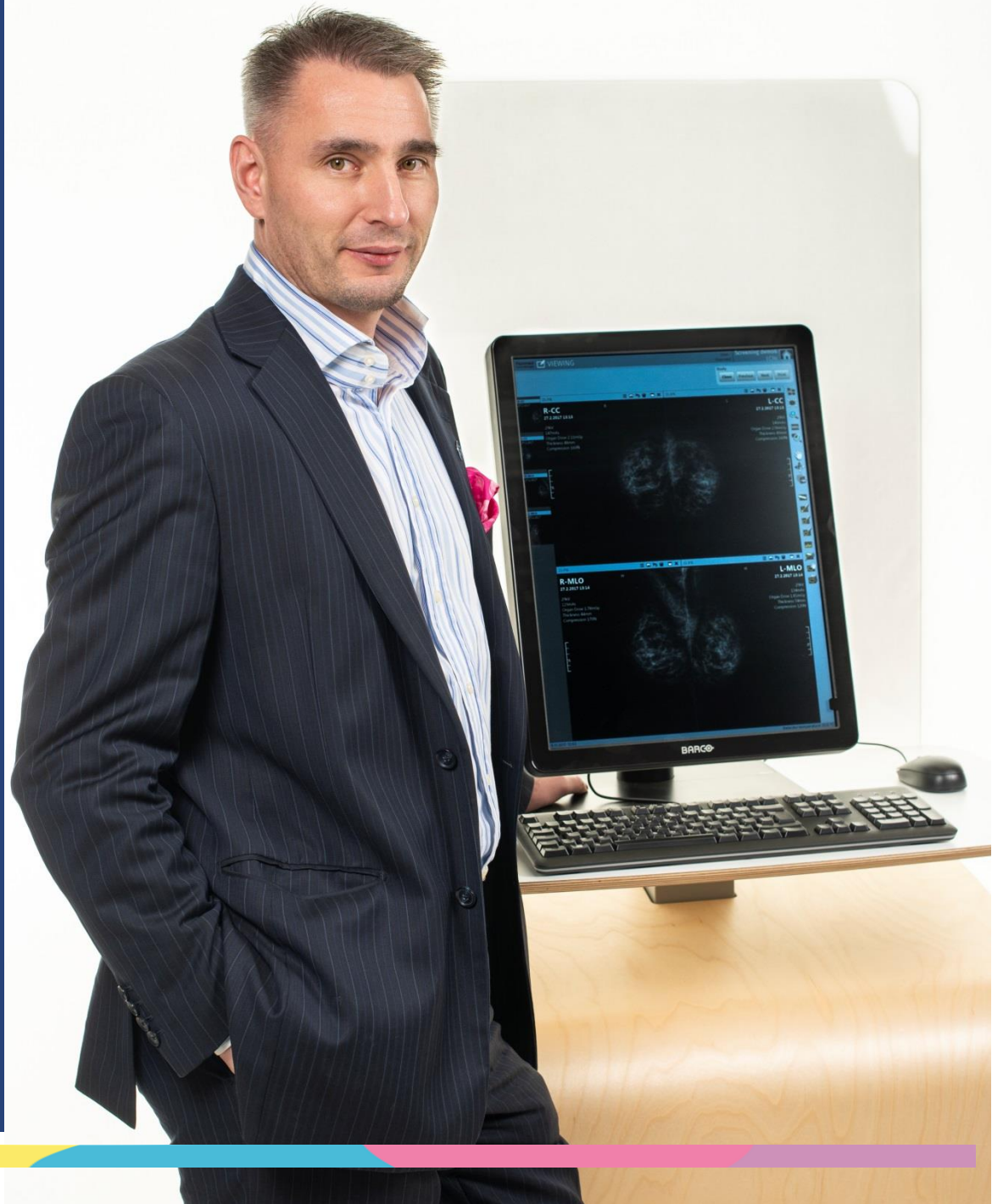
Better care through innovation

# Planned Verity<sup>TM</sup>

The original Weight Bearing CT

# Our Mission

Better patient care through  
pioneering health care solutions  
that improve the daily workflow  
of medical professionals around  
the world







# What we do

We Develop, Manufacture and Marketing  
advanced imaging equipment's as  
Mammography 2D & 3D



Accessories and Software



CBCT for Orthopedics & maxillofacial  
imaging

Accessories and Software

Education



What makes us successful

# Always one step ahead

In-house team of researchers  
and designers dedicated  
to emerging technologies





# What makes us successful

Design principles

Built and assembled  
under one roof for an unmatched  
attention to detail.

High Quality ★★★★★

Built using the latest technology

Efficient workflow

Healthy medical team

Relaxed patient

Long lasting aesthetics





# Industry Leading Imaging

Advanced and unique 3D imaging  
of extremities and head & neck

# Planmed Verity® Extremity and ENT CT scanner

- Either mobile or fixed configuration
- Plugs into a standard electric outlet
- Integrated workstation with touch screen
- Isotropic resolution of up to 0.2 mm
- Unique weight-bearing imaging
- Ultra Low Dose™ imaging
- Movement artefact correction with Planmeca CALM™



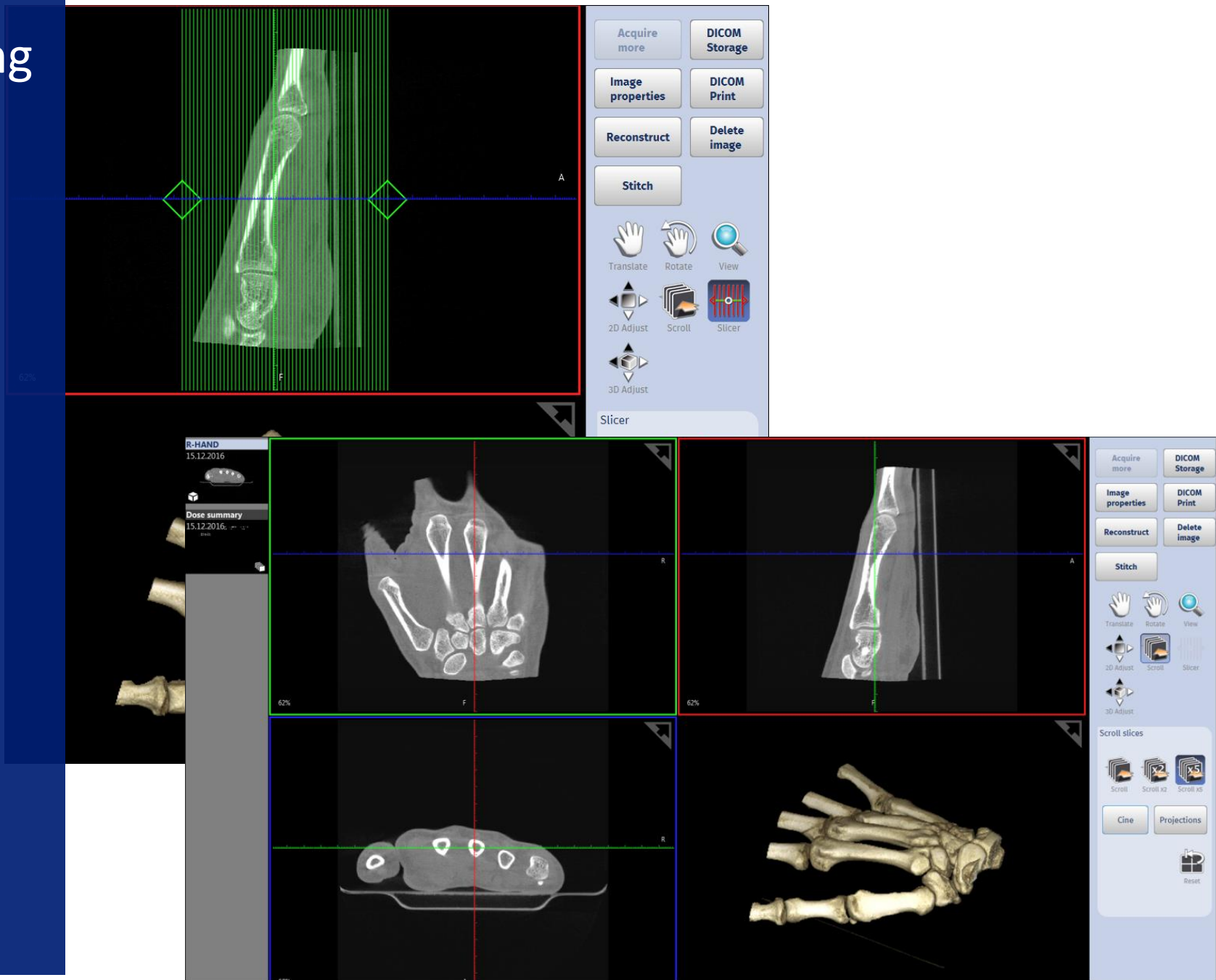


# Image Review and Archiving

Images are commonly viewed as 2D slices or 3D volume / surface rendering is not that common

Isotropic resolution of the CBCT image data enables generation of image slices in arbitrary angles  
(Multiplanar reconstruction, MPR) without loss of image quality

Commonly thicker slices of 1-3mm are generated from the thin-slice image data and archived to PACS



# Imaging protocols

- Detailed definition of the protocols are done from service settings.
- Use of protocols easier than before, now with improved image quality/dose
- Factory protocols include now  
**Ultra Low Dose**  
Standard  
High Definition

Planmed  
Service Manager

SERVICE & CONFIGURATION

User: sy

Device Diagnostics Motor tests Pre-set Imaging **Imaging Protocols** DICOM View Preferences Database Security Groups Users Transfer

Select Protocol  
**Standard**

Shared parameters

Exposure parameters

Resolution<sup>1</sup> **0.4 mm** <sup>1</sup> Smaller resolution will increase reconstruction time.

Projections<sup>2</sup> **400 pcs** <sup>2</sup> Increased number of projections and pulse length will increase image acquisition time and patient dose.

Pulse length<sup>2</sup> **20 ms**

Reconstruction parameters







Noise filter<sup>3</sup> **None** <sup>3</sup> Filter use will increase post-processing time. Medium noise filter should be used in ultra imaging protocols.

Kernel **Default** <sup>4</sup> Increases image quality by correcting beam hardening and cone beam artefact but increases reconstruction time as well.

HU Correction<sup>4</sup> **Off**

Target parameters

Ankle

			
kV	92 kV	96 kV	96 kV
mA	6.3 mA	6.3 mA	8.0 mA
Field of view:			
Dose (DAP):	1150 mGy×cm <sup>2</sup>	1330 mGy×cm <sup>2</sup>	1680 mGy×cm <sup>2</sup>
Dose (CTDIvol):	4.2 mGy	4.9 mGy	6.2 mGy
Dose (DLP):	54 mGy×cm	63 mGy×cm	81 mGy×cm
File size:	102 MB	102 MB	102 MB
Exposure time:	24.4 s	24.4 s	24.4 s
Reco time:	0-1 min	0-1 min	0-1 min

Remove

An imaging protocol is only available for anatomies with set target parameters.  
✓ = Set values

\*) Weight bearing and HoverTray positioning use different target parameters for FOOT and TOE anatomies due to alternative exposure directions.

# The original weight bearing CT



The original weight bearing CT that gives you realistic view on the anatomy under natural load. High Resolution 3D images with comfortable patient positioning.



# Weight Bearing Imaging

Superior tool for lower extremity diagnosis

- Foot and ankle problems
- Knee problems
- Surgery planning

Possibility to take also non weight bearing exams

- Post operative controls before allowing weight on the extremity



Sitting position



Weight Bearing

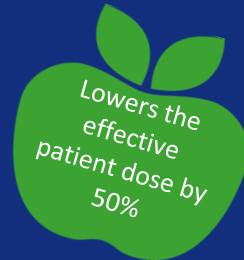


# Planmeca Ultra Low Dose™ imaging

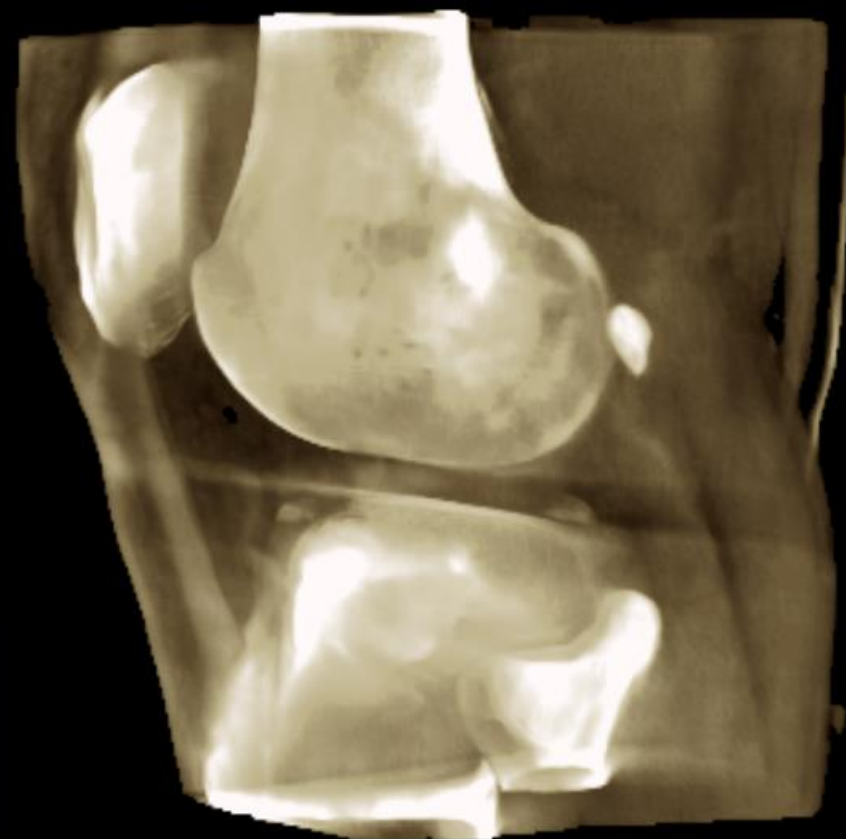
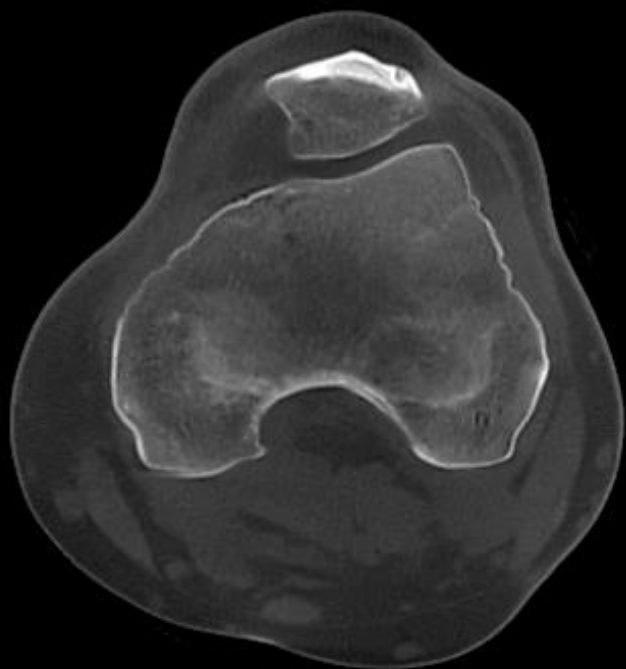
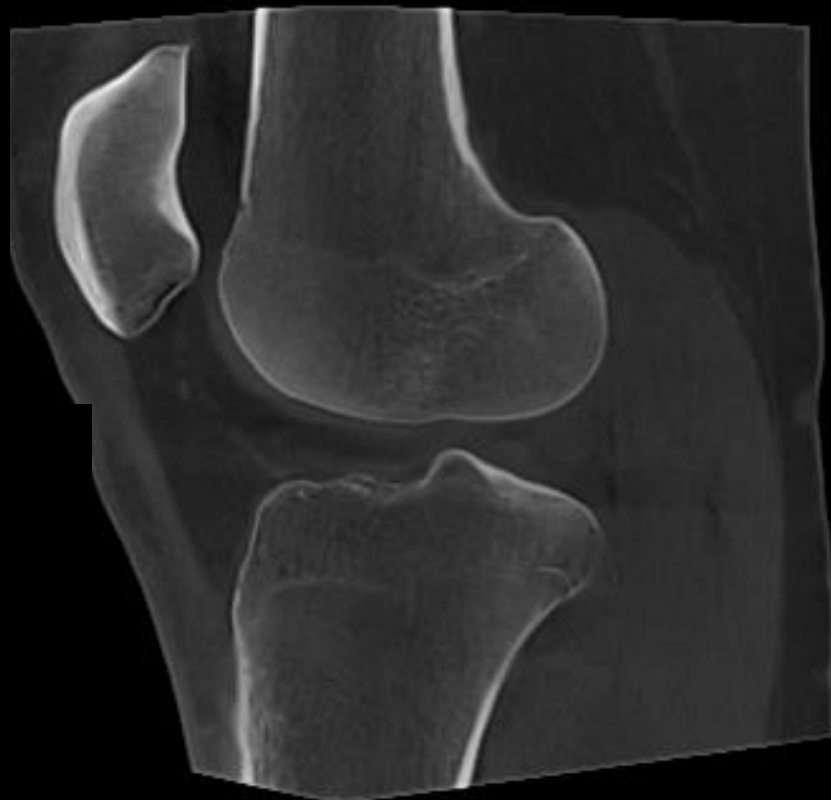
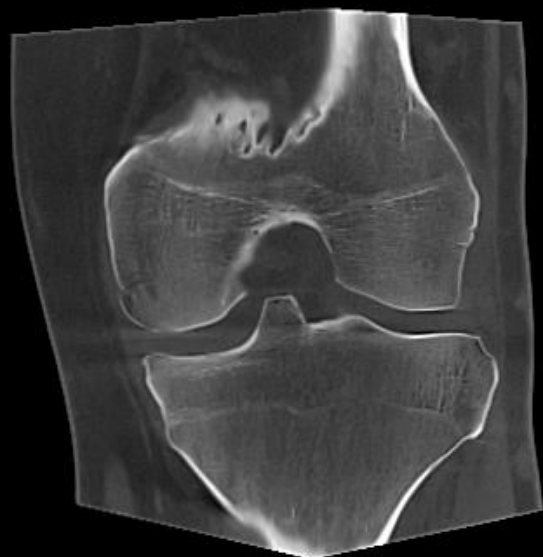
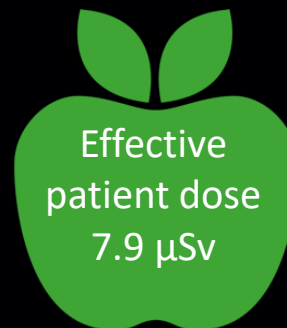
Imaging with effective patient doses close to 2D X-ray

Based on intelligent 3D algorithms

Available for all patients and anatomical areas within Verity use



Planmed Verity® FOV Ø 160 x 130 mm · Voxel size 400 µm





The background is a deep blue underwater scene. Sunlight rays penetrate the water from the top, creating a shimmering effect. The water surface is visible at the top with ripples and bubbles.

# PLANMECA CALM

Never miss a shot

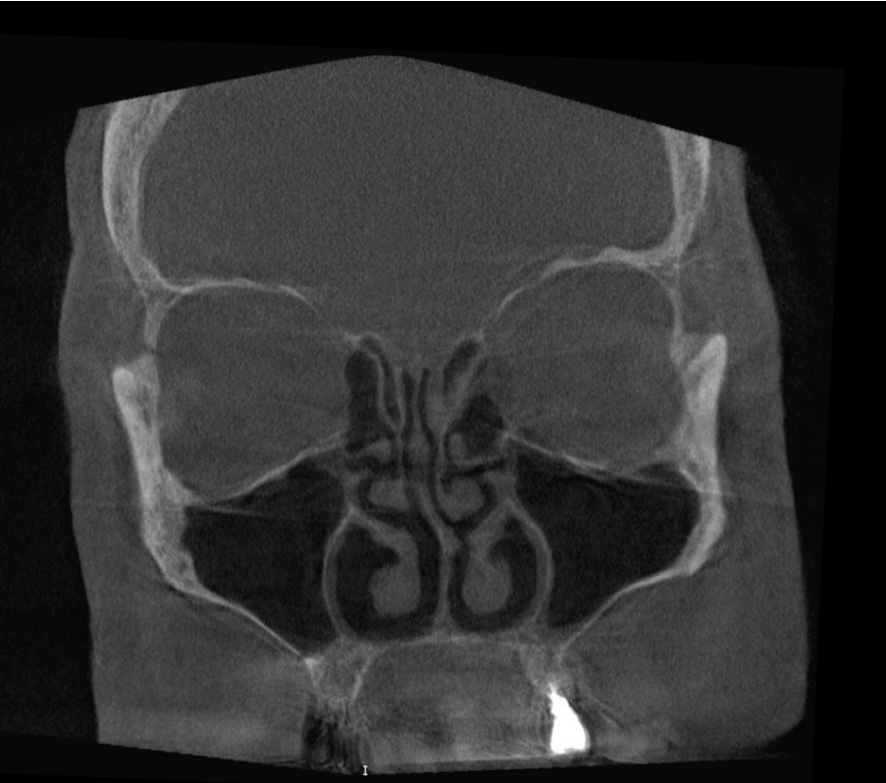
## Movement artefact correction with Planmeca CALM™

Iterative movement correction algorithm

Eliminates the need for retakes

Cancels the effects of patient movement

Excellent when imaging more lively patients



Without CALM



With CALM



# Planmeca CALM



Original



With CALM



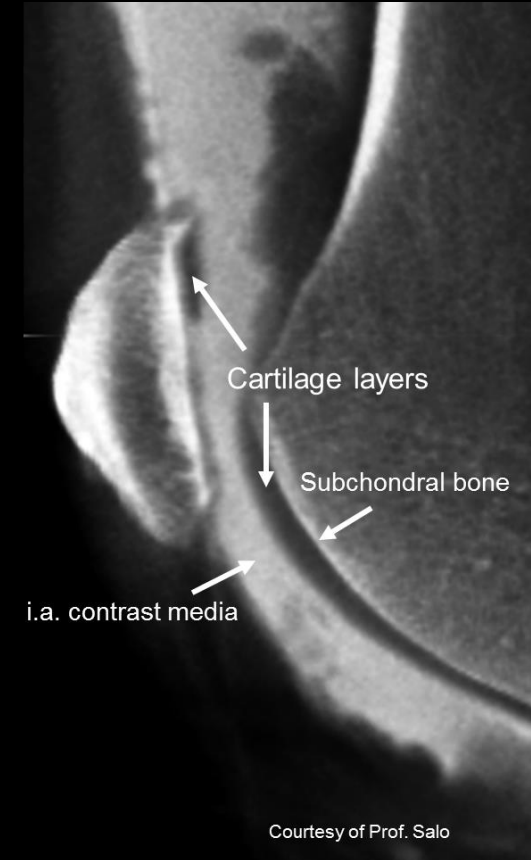
# Resolution of up to 200um for applications requiring visibility of details



Trauma

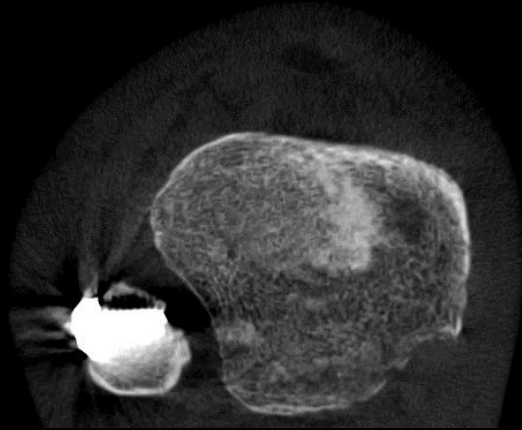


Post op



Arthrography

# Metal Suppression



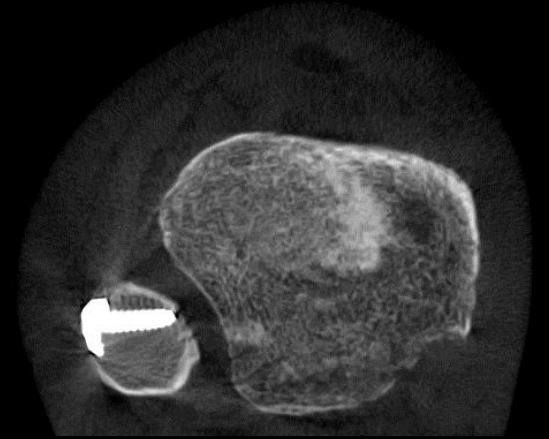
Clever algorithm to reduce artifacts caused by metal objects in the anatomy to be imaged

Can be selected before or after image acquisition

Fast calculation time



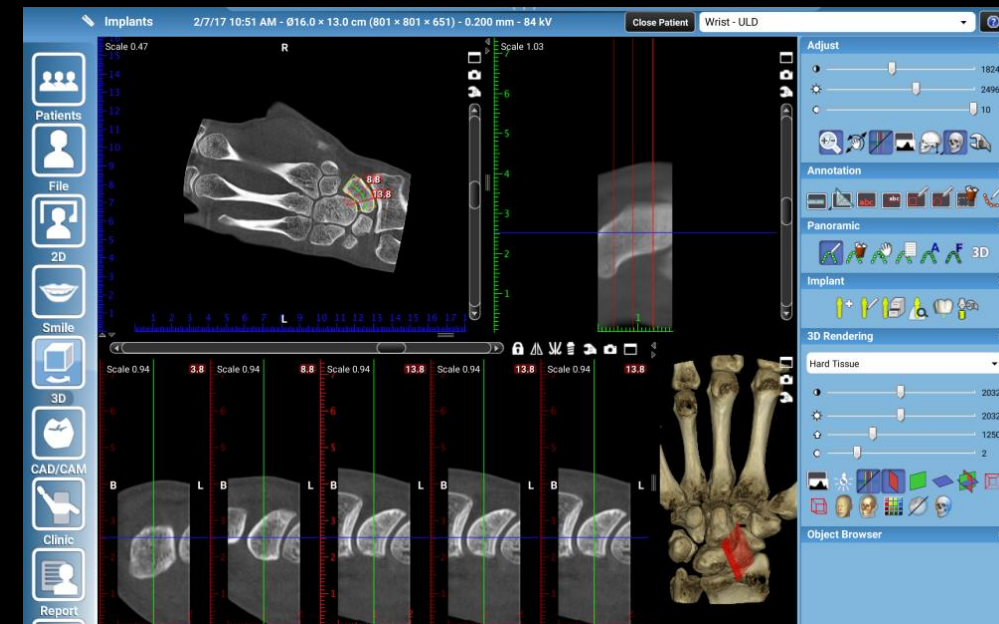
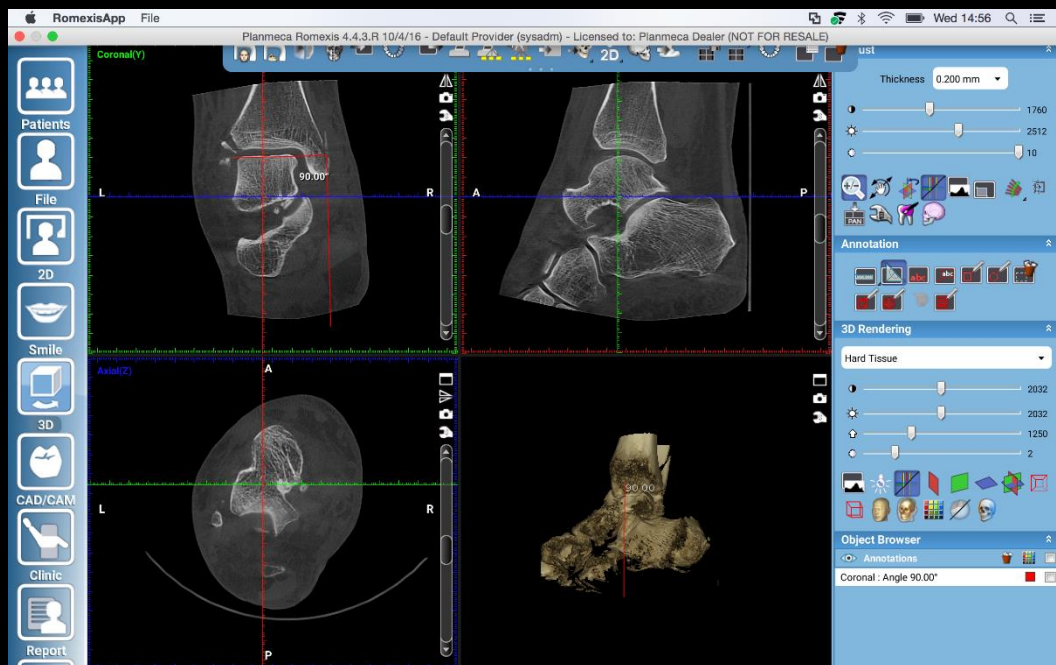
Original



Metal suppressed

# Image review – with Planmeca Romexis

- MPR review
- Image archiving
- 3D measurements
- Curved reformats
- 3D rendering
- Superimposition



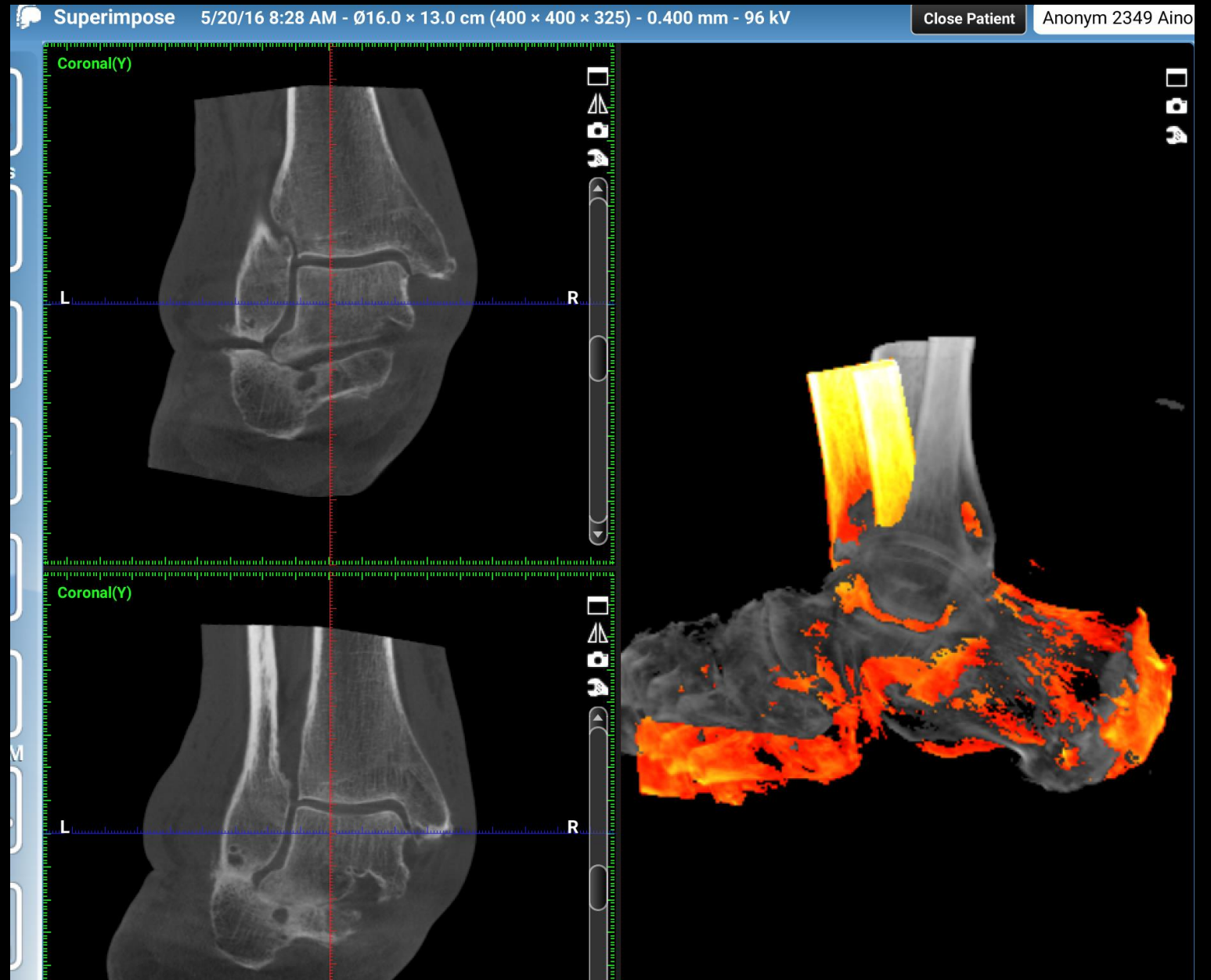


# Image review – with Planmeca Romexis

## Comparison of sitting and standing image with superimposition

Comparison of sitting and  
standing image with  
superimposition

Side by side review of both  
scenarios



## Head & Neck Imaging



**Two comfortable options for extending your equipment utilization**

**Head & Neck imaging to meet your ENT and basic 3D dental imaging needs. Good dose/image quality ratio**

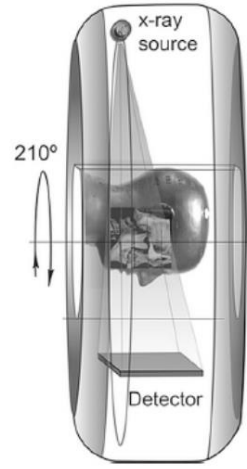
**MaxScan for sinus studies and maxillofacial traumas with easily approachable patient positioning**

## Maxillofacial Imaging

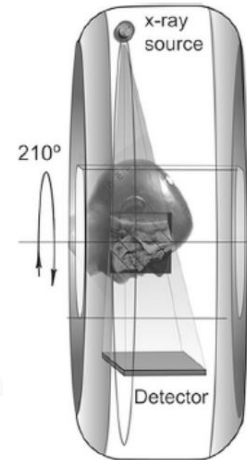




**Head & Neck Imaging**



**Maxillofacial Imaging**



**Effective patient dose (96kV/7.5mA)**

**Head&Neck: 151uSv**

**Maxillofacial imaging: 105uSv**

Image quality	Head&Neck	Maxillofacial
Sinus	Good	Adequate
Ear	Adequate	Adequate
Maxilla/teeth	Good	Good
Madible/teeth	Clear	Good

**In comparison:**

**MSCT effective patient dose 781uSv. Image quality adequate-good**

**Head&Neck (96kV/12mA) effective patient dose 256uSv. Image quality clear**

Koivisto J, van Eijnatten M, Järnstedt J, Holli-Helenius K, Dastidar P, Wolff J. Impact of prone, supine and oblique patient positioning on CBCT image quality, contrast-to-noise ratio and figure of merit value in the maxillofacial region. Dentomaxillofac Radiol 2017; 46: 20160418.



## Options for sinus studies



**MaxScan**

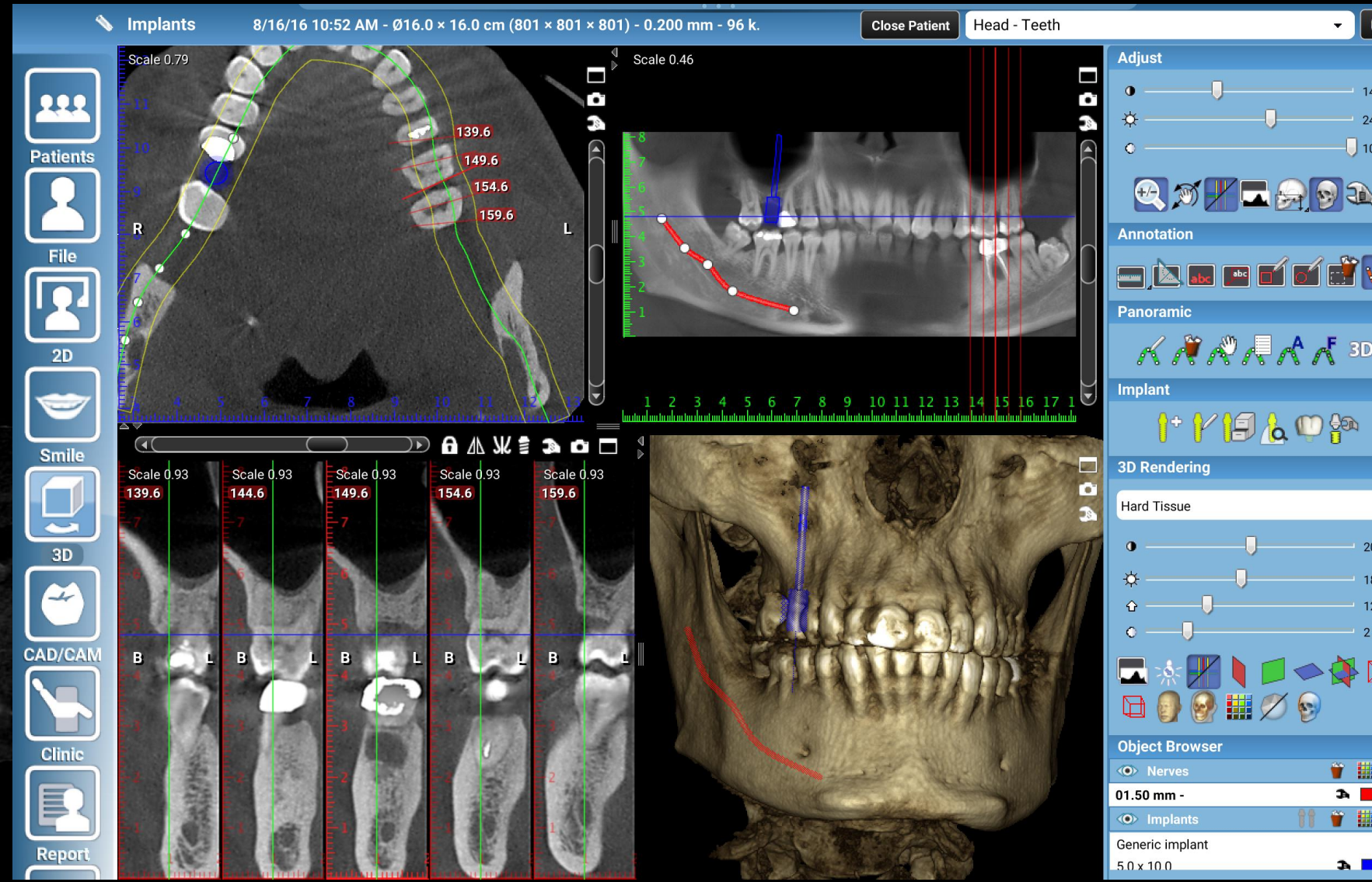
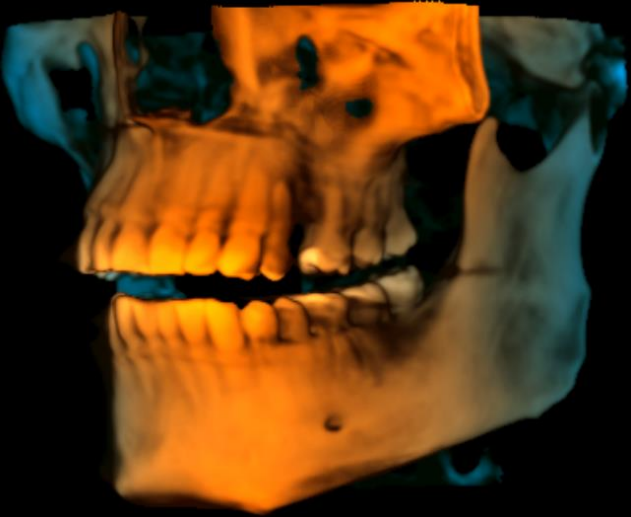
**96kV 72maS**



**Head&Neck**

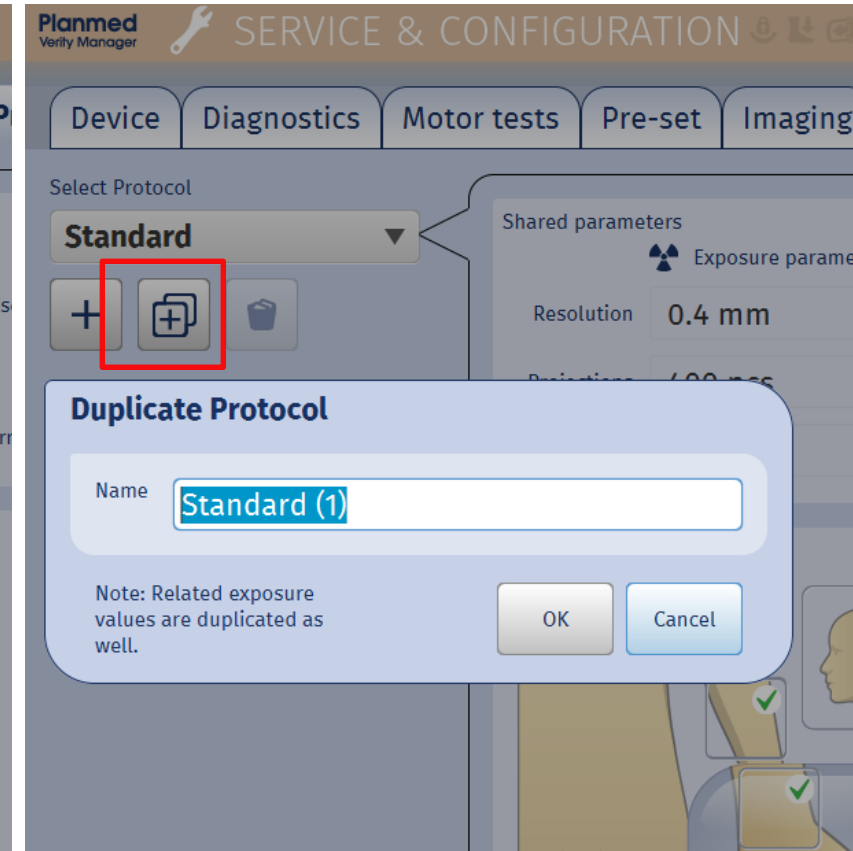
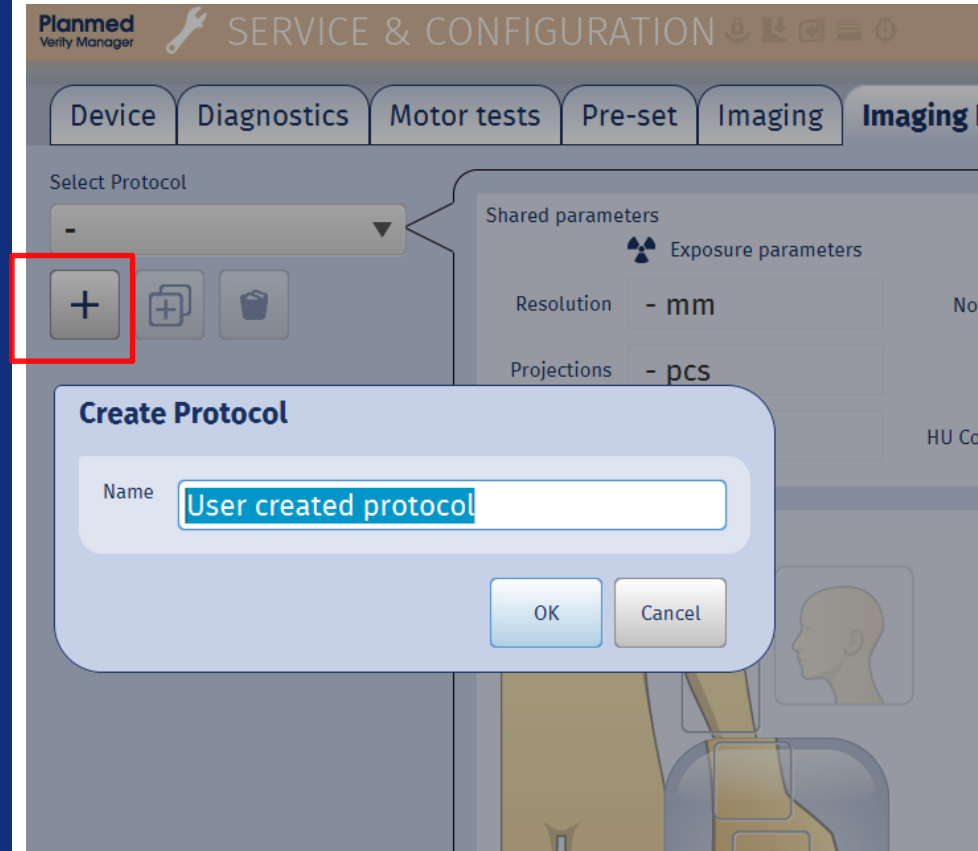
**96kV 36mAs**

# Dental imaging with head&neck option



# Imaging Protocols

- Create New Protocol
  - Exposure parameters
  - Reconstruction parameters
  - Optimise you dose/image quality
- Duplicate Protocols
  - High Definition
  - Standard
  - Ultra Low Dose

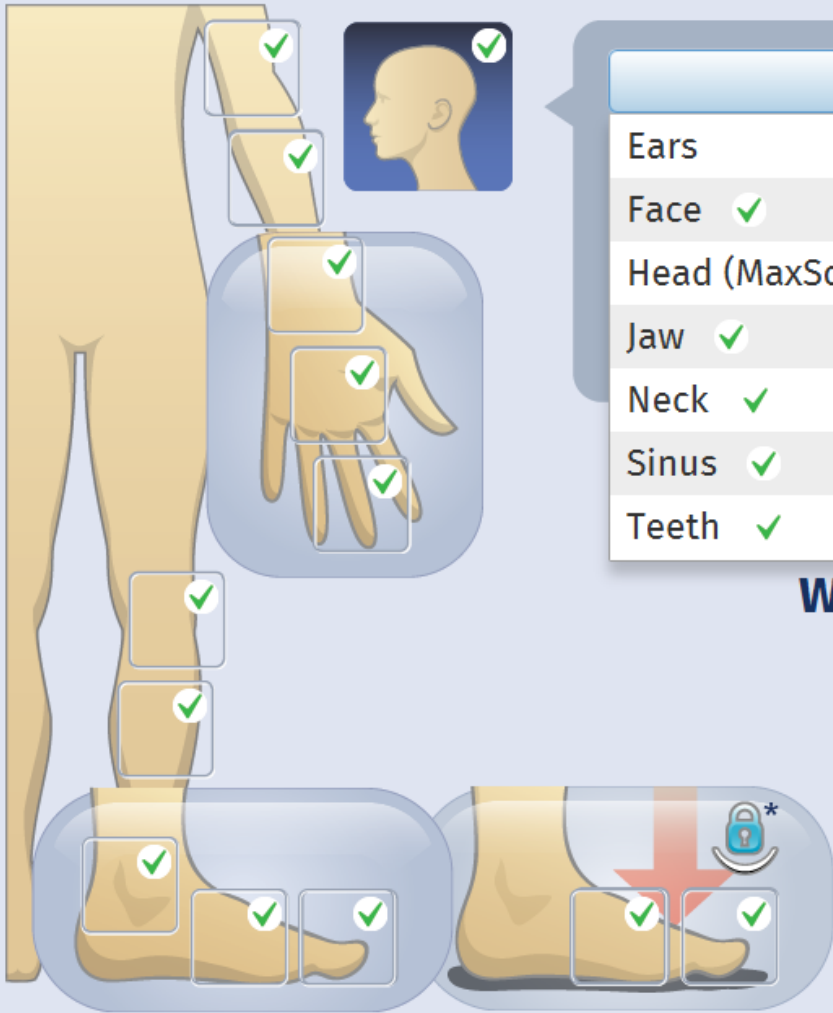


Shared parameters		Reconstruction parameters	
<p><b>Exposure parameters</b></p> <p>Resolution<sup>1</sup> <b>0.4 mm</b> ▼</p> <p>Projections<sup>2</sup> <b>400 pcs</b> ▼</p> <p>Pulse length<sup>2</sup> <b>20 ms</b> ▼</p>		<p><b>Noise filter<sup>3</sup></b> <b>None</b> ▼</p> <p><b>Kernel</b> <b>Default</b> ▼</p> <p><b>HU Correction<sup>4</sup></b> <b>Off</b> ▼</p>	
<p><sup>1</sup>) Smaller resolution will increase reconstruction time.</p> <p><sup>2</sup>) Increased number of projections and pulse length will increase image acquisition time and patient dose.</p>		<p><sup>3</sup>) Filter use will increase post-processing time. Medium noise filter should be used in ultra low dose imaging protocols.</p> <p><sup>4</sup>) Increases image quality by correcting beam hardening and cone beam artefact but increases reconstruction time as well.</p>	



# Modify Target Parameters

## Target parameters



- Ears
- Face ✓
- Head (MaxScan) ✓
- Jaw ✓
- Neck ✓
- Sinus ✓
- Teeth ✓

Wrist

	88 kV ▼	90 kV ▼	90 kV ▼
	5.0 mA ▼	5.0 mA ▼	6.3 mA ▼
Field of view:			
Dose (DAP):	<b>780 mGy×cm²</b>	<b>850 mGy×cm²</b>	<b>1070 mGy×cm²</b>
Dose (CTDIvol):	<b>2.8 mGy</b>	<b>3.0 mGy</b>	<b>3.8 mGy</b>
Dose (DLP):	<b>36 mGy×cm</b>	<b>39 mGy×cm</b>	<b>49 mGy×cm</b>
File size:	102 MB	102 MB	102 MB
Exposure time:	24.4 s	24.4 s	24.4 s
Reco time:	0-1 min	0-1 min	0-1 min
			<button>Remove</button>

An imaging protocol is only available for anatomies with set target parameters.

✓ =Set values

\*) Weight bearing and HoverTray positioning use different target parameters for FOOT and TOE anatomies due to alternative exposure directions.

Save Restore

Restore Default

# Create personal protocols

- Resolution
  - 0.4 or 0.2mm
- Projections
  - 300, 400, 500 and 600 pcs
- Pulse length
  - 15, 20, 25, 30, 35 and 40ms
- Noise filter
  - None, Light, Medium and Strong
- Kernel
  - Default, Soft and Sharp
- HU Correction
  - On or Off

Planmed Verity Manager SERVICE & CONFIGURATION User: sysadm

Device Diagnostics Motor tests Pre-set Imaging **Imaging Protocols** DICOM View Preferences Database Security Groups Users Transfer Packag

Select Protocol **User created protocol**

**Shared parameters**

**Exposure parameters**

Resolution<sup>1</sup> **0.4 mm** <sup>1</sup> Smaller resolution will increase reconstruction time.

Projections<sup>2</sup> **300 pcs** <sup>2</sup> Increased number of projections and pulse length will increase image acquisition time and patient dose.

Pulse length<sup>2</sup> **15 ms**

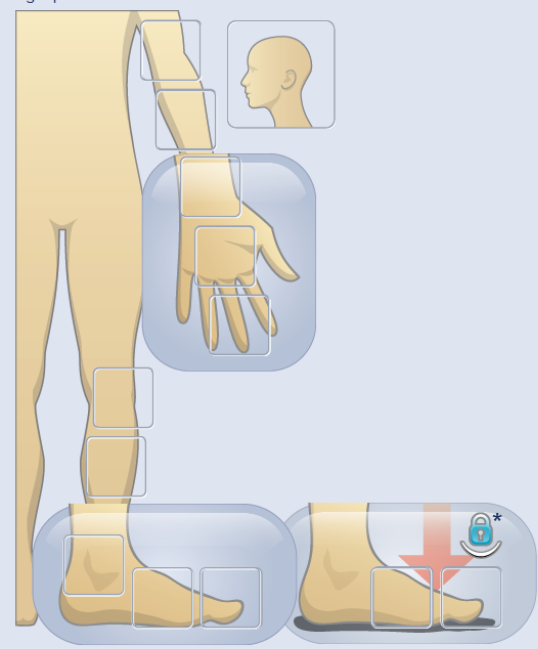
**Reconstruction parameters**


Noise filter<sup>3</sup> **None** <sup>3</sup> Filter use will increase post-processing time. Medium noise filter should be used in ultra low dose imaging protocols.

Kernel **Default** <sup>4</sup> Increases image quality by correcting beam hardening and cone beam artefact but increases reconstruction time as well.

HU Correction<sup>4</sup> **Off**

**Target parameters**



**Field of view:** 

**Dose (DAP):**

**Dose (CTDIvol):**

**Dose (DLP):**

**File size:**

**Exposure time:**

**Reco time:**

**Remove**

An imaging protocol is only available for anatomies with set target parameters.  
✓ =Set values

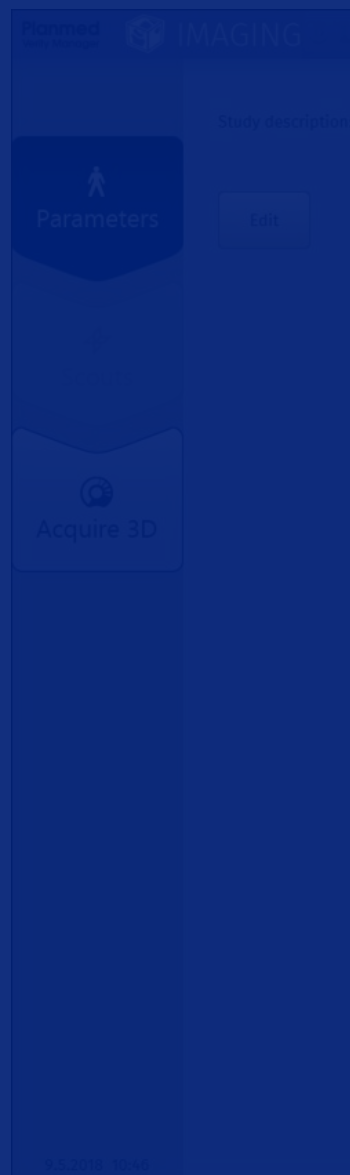
**Save**

**Restore Defa**

\*) Weight bearing and HoverTray positioning use different target parameters for FOOT and TOE anatomies due to alternative exposure directions.

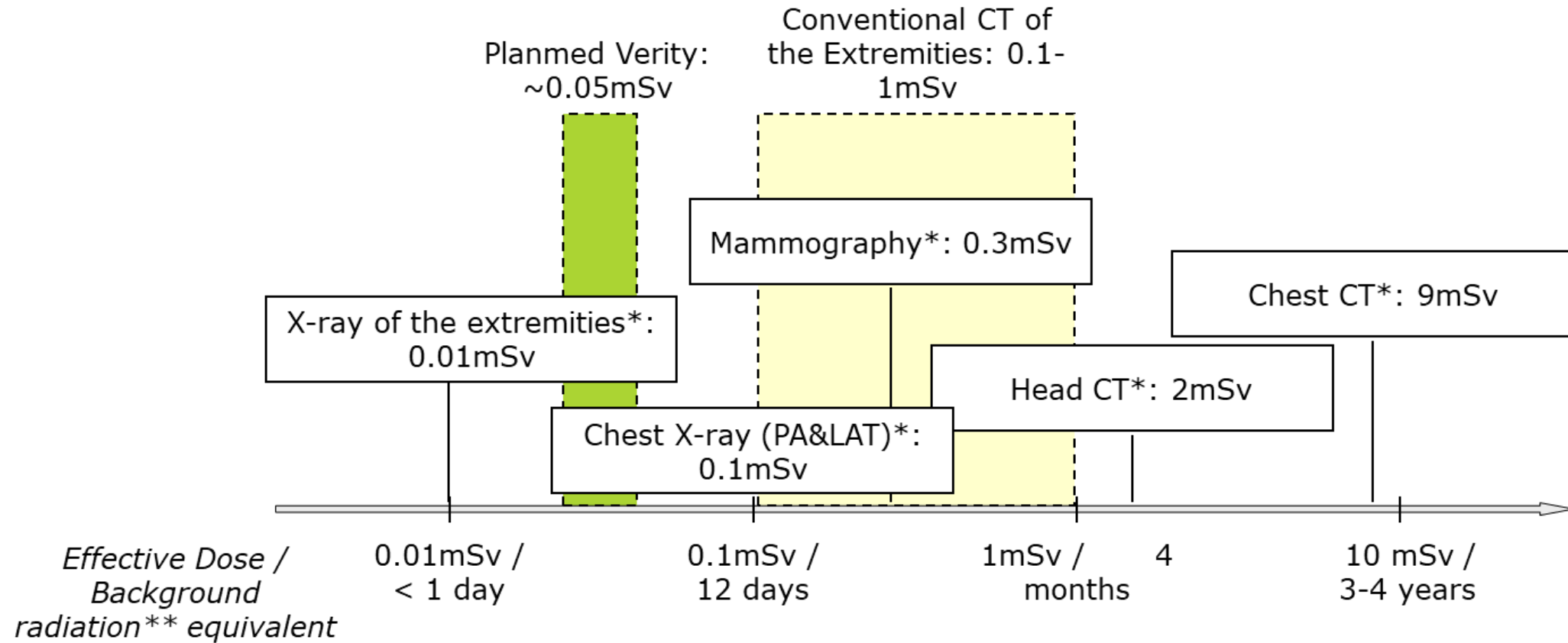
# Anatomy specific protocols and positions

- Standard
- High Definition
- **Ultra Low Dose**





# Typical Patient Doses in Medical Imaging



\* STUK (Finnish Radiation and Nuclear Safety Authority)

\*\* STUK, based on average radiation dose from background radiation in Finland

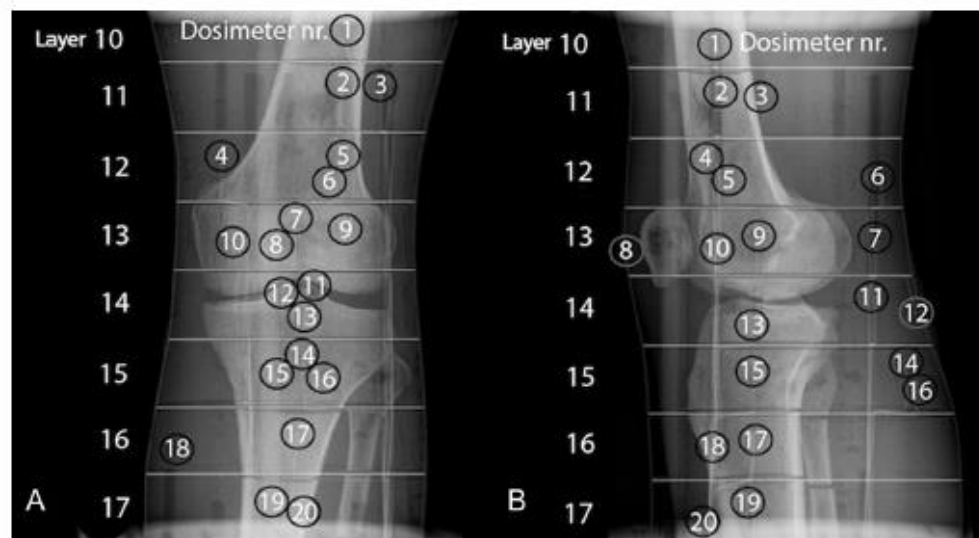
# Planned Verity dose compared to other modalities

## *EFFECTIVE DOSE FROM X RAY FOR KNEE USING MOSFETS*

**Table 4.** Equivalent and effective doses ( $\mu\text{Sv}$ ) for the imaging of a knee with MSCT, CBCT and conventional radiography examinations.

X-ray unit	Bone marrow	Bone surface	Skin	Remainder tissues		One knee effective dose
				Lymphatic nodes	Muscles	
Siemens Sensation Open	29.8	5.7	4.5	0.6	7.3	48.0
GE Lightspeed VCT	19.7	4.1	3.3	0.5	4.9	32.4
Siemens Somatom Definition AS+	17.2	3.2	2.8	0.4	3.7	27.3
Planned Verity	7.4	2.3	1.2	0.1	1.6	12.6
Shimadzu LD 150	1.7	0.5	0.3	0.0	0.4	3.0

Dosemeter no.	Layer	Location	Tissue
1	10	Femur	Bone marrow
2	11	Femur	Bone marrow
3	11	Vastus lateralis	Muscle
4	12	Vastus medialis	Muscle
5	12	Femur	Bone marrow
6	12	Biceps femoris	Muscle
7	13	Popliteal fossa	Lymphatic nodes
8	13	Patellar tendon	Skin
9	13	Internal condyle	Bone marrow
10	13	Medial condyle	Bone surface
11	14	Popliteal fossa	Lymphatic nodes
12	14	Back of knee	Skin
13	14	Internal tuberosity	Bone marrow
14	15	Popliteal fossa	Lymphatic nodes
15	15	Internal tuberosity	Bone marrow
16	15	Gastrocnemius	Muscle
17	16	Tibia	Bone marrow
18	16	Peroneus longus	Muscle
19	17	Tibia	Bone marrow
20	17	Tibialis anterior	Muscle



Koivisto, J, Kiljunen, T, Wolff, J, and Kortenesniemi, M:  
Assessment of effective radiation dose of an extremity  
CBCT, MSCT and conventional x ray for knee area using  
MOSFET dosimeters. Radiat. Prot Dosimetry Advance  
Access published July 3, 2013, doi: 10.1093/rpd/nct162

# Planmed

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Better care through innovation