

SIEMENS



ITEM2016最新情報

第8回九州CT研究会様

シーメンスヘルスケア 大西哲夫

SOMATOM CT at RSNA 2015

“ 40 Years of SOMATOM CT ”

“ 10 Years of Dual Source CT ”



SOMATOM CT at RSNA 2015

◆ Innovation

1975 SIRETOM

An actual head start with the SIRETOM:
Siemens' first CT head scanner

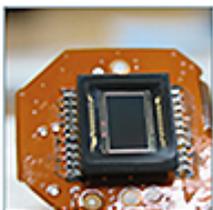


For the very first time, physicians are able to detect and localize brain injuries without causing the patient pain and multi-day hospital stays for just diagnosis alone. The SIRETOM proves itself to be a game changer for operation planning as well.



The first production model allows looks inside the human head at a remarkable 128 by 128 pixels. For this, two adjoining detectors move around the patient's head in 180 degree steps for approximately five minutes.

Events of the day 1975



While at Kodak, Steven J. Sasson developed the very first camera with CCD sensor and invented digital photography. However, the capturing and saving of data took an unbelievable 23 seconds. That same year the very first portable computer came onto the market: the IBM 5100.

2005 SOMATOM Definition

With the power of two sources Dual Source CT technology redefines imaging quality and speed



Going against the trend of increasing the number of rows in the detector, Siemens successfully ventures towards a second x-ray source. Still today the portfolio includes everything from economical entry-level models all the way up to high end scanners with two x-ray tubes. 2009 SOMATOM Definition Flash – once again the fastest CT scanner in the world at the time with the second generation of dual source technology – brilliance in assessing hearts or complex trauma cases.



The use of dual sources makes it possible to capture a beating heart in a fraction of a second at a minimal dose. Two other clinical fields are able to benefit from this grade high-quality imaging modality.

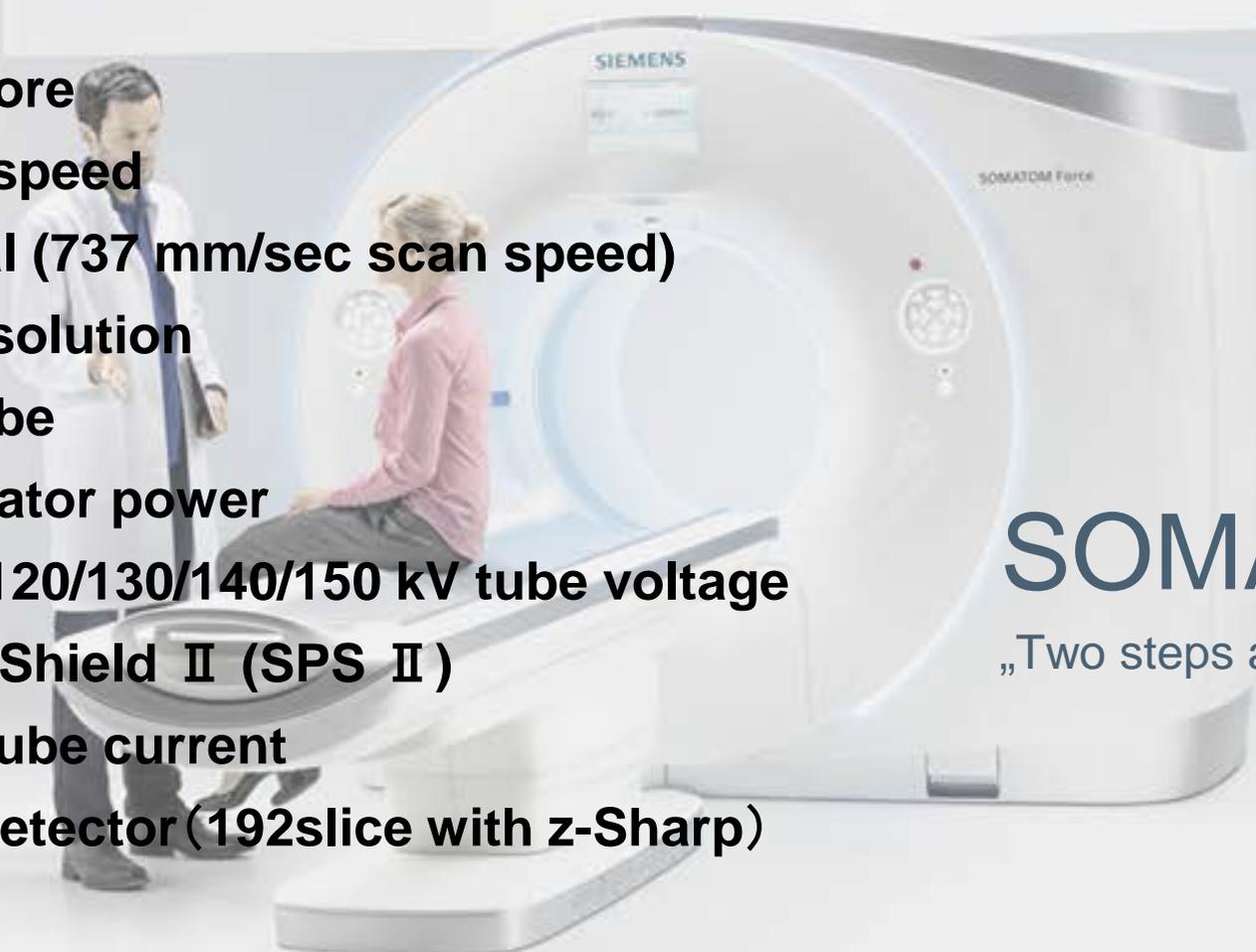
Events of the day 2005



Barack Obama is the first US president of African-American origin – and on the cinema screen, skin color is a topic as well. The blue-skinned Na'vi help make Avatar the most successful movie of today.

„Two steps ahead“ VS. „Trying to keep up“

- 780 mm Gantry Bore
- 0.25 sec rotation speed
- Turbo Flash Spiral (737 mm/sec scan speed)
- 66 msec temp. resolution
- 2 × VECTRON tube
- 2 × 120kW generator power
- 70/80/90/100/110/120/130/140/150 kV tube voltage
- Selective Photon Shield II (SPS II)
- 2 × 1.3 A = 2.6A tube current
- 2 × Stellar^{Infinity} Detector (192slice with z-Sharp)



SOMATOM Force

„Two steps ahead“ VS. „Trying to keep up“

Two steps ahead in Computed Tomography

Minimally Invasive

- ・ 更なる被ばく低減、Right Doseの実践
- ・ 造影剤使用量の低減

Freezing Motion

- ・ 更なる時間分解能の向上
- ・ 更なる撮影速度の向上

Decision Making

- ・ DE imagingの精度向上
- ・ X線スペクトラム最適化により画質向上

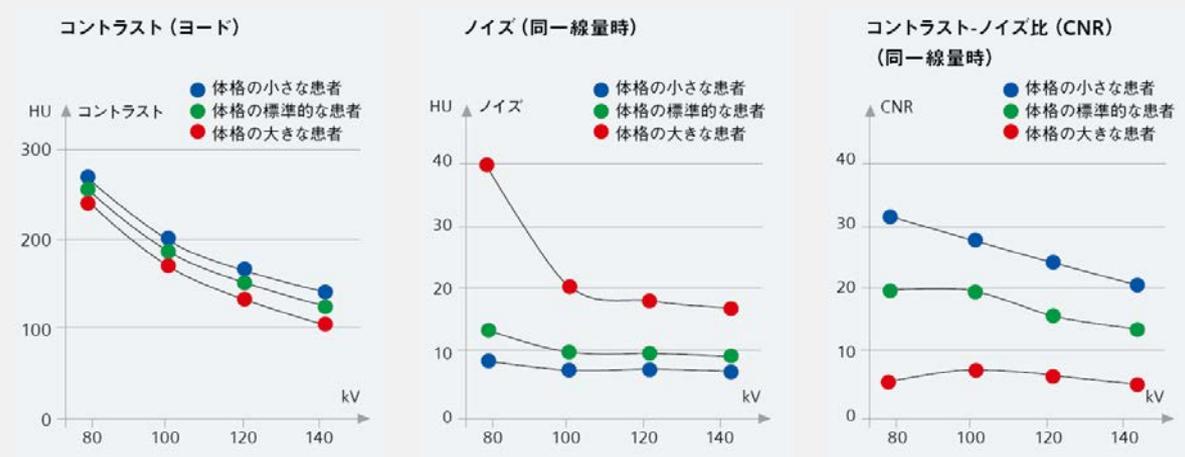
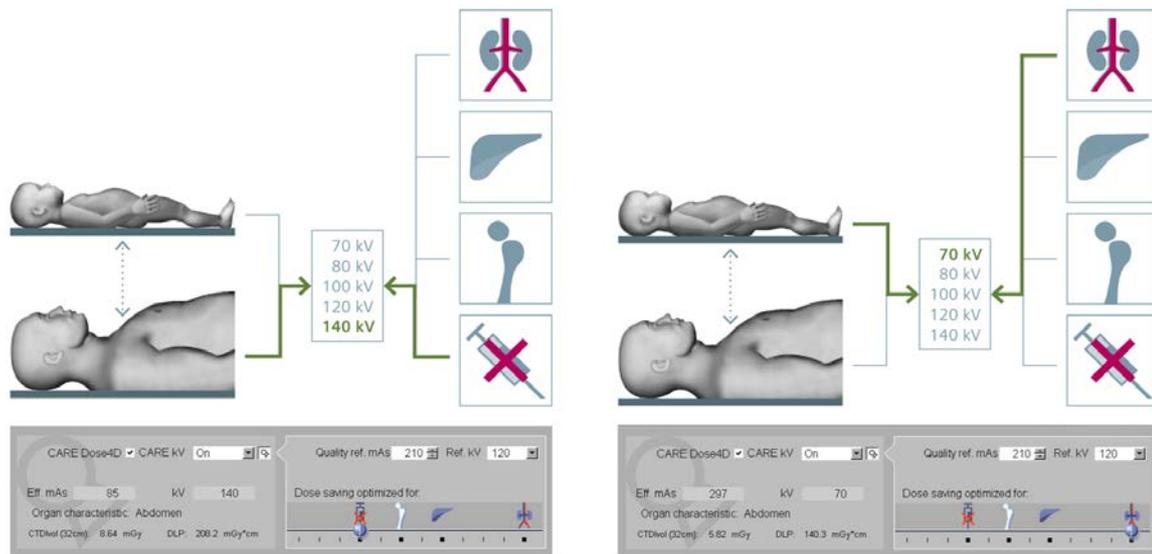


Two steps ahead in Minimally Invasive

Low kV撮影による被ばく低減効果

「CARE kV」機能による被ばく低減技術

- 最適な管電圧を自動選択し撮影
- 被写体サイズ・撮影方法に応じて最適管電圧を設定



kV	mAs	Pitch	CTDI
80	462	1.00	-
100	297	1.00	-20%
120	210	1.00	11.00
140	147	1.00	+5%

- CNR一定にさせるために管電流も同時に自動設定
- 管電圧の調整による被ばく低減は大きい

Two steps ahead in Minimally Invasive

■ Low kV撮影の積極的な活用

- 更なる被ばく低減
- 造影剤使用量の低減
- 検査を問わないスキャンプロトコール

kV	mAs	Pitch	CTDI
80	462	1.00	-
100	297	1.00	-20%
120	210	1.00	11.00
140	147	1.00	+5%



Two steps ahead in Minimally Invasive

■ VECTRON tube

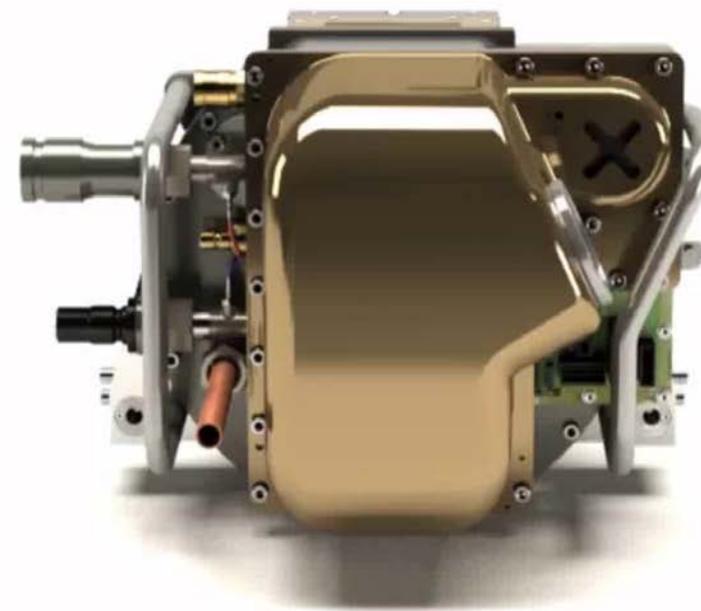
- ハイパワー : $2 \times 120\text{kW} = 240\text{kW}$ 出力
- 大管電流 : $2 \times 1.3\text{A} = 2.6\text{A}$ 最大管電流
- スモールフォーカス : $0.4 \times 0.5\text{mm}$
- 豊富な管電圧設定 : $70 - 150\text{kV}$ (10kV step)
- 焦点偏向機能 : XY / Z - Flying Focal

- 設定可能管電圧

70 / 80 / 90 / 100 / 110 / 120 / 130 / 140 / 150kV

- X線のスペクトラムを最適化

Selective Photon Shield II



VECTRON

Two steps ahead in Minimally Invasive

■ Selective Photon Shield II (SPS II)

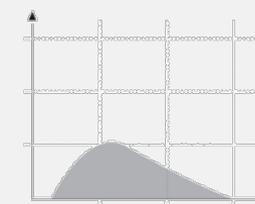
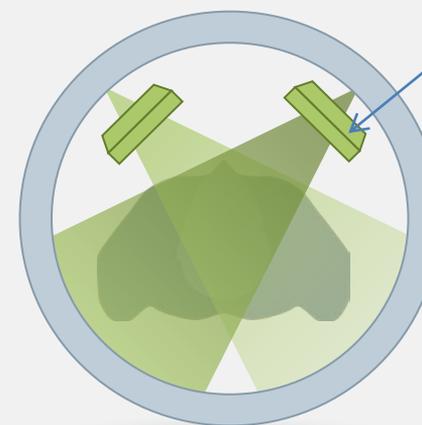
物質分離の精度・画質の向上や被ばく低減の目的で、
X線のスペクトラムを最適化することが可能

- ▶ 線質の調整 (Snフィルター) を可能
- ▶ 画像上におけるCNR向上
- ▶ SnフィルターによるNarrowな線質によりビームハードニングを抑えた撮影が可能です。

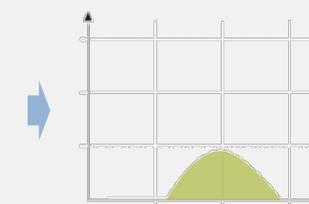
SPS II によって、30~50%の被ばく低減が可能



Selective photon shield II
(SPS II)



SPSなし



SPSあり

Two steps ahead in Computed Tomography

Minimally Invasive

- ・ 更なる被ばく低減、Right Doseの実践
- ・ 造影剤使用量の低減

Freezing Motion

- ・ 更なる時間分解能の向上
- ・ 更なる撮影速度の向上

Decision Making

- ・ DE imagingの精度向上
- ・ X線スペクトラム最適化により画質向上

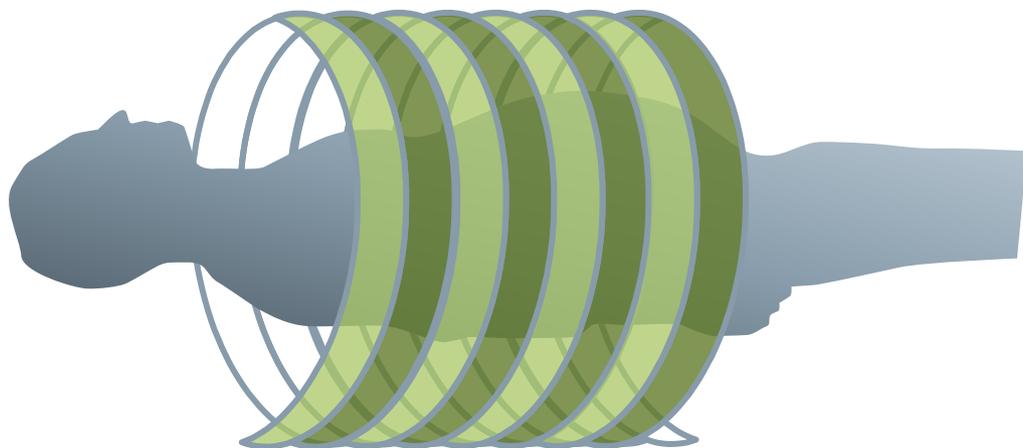


Two steps ahead in Freezing Motion

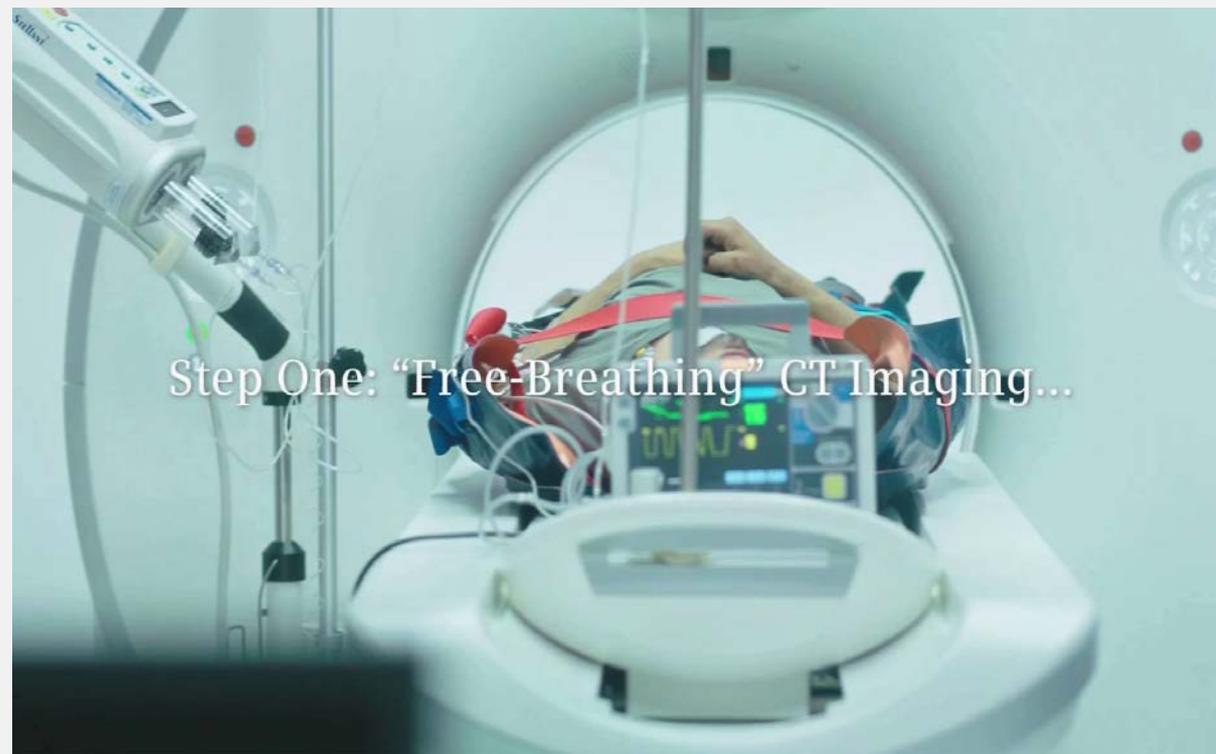
■ 更なる高速回転・高速2重螺旋撮影

SOMATOM Force

- ▶ ガントリ回転速度 0.25秒/回転
- ▶ Turbo Flash Spiral 737mm/sec
- ▶ 時間分解能 66msec (ハーフリコン)



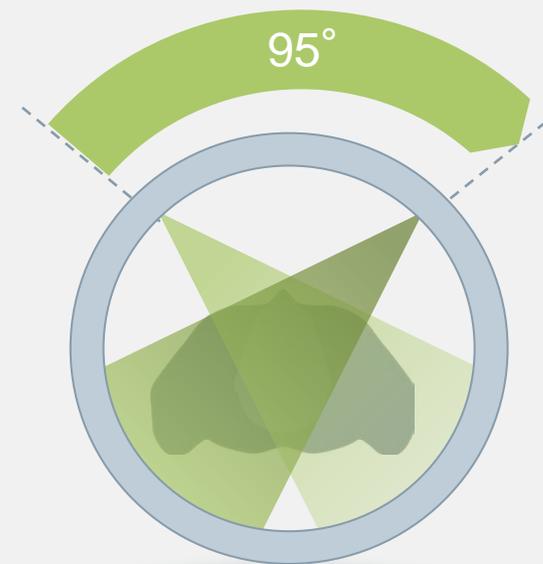
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Two steps ahead in Freezing Motion

■ 新型 Stellar^{Infinity} Detector 搭載

- ▶ 192DAS収集 (発光素子列 96)
- ▶ 1840ch データ収集 (実装 920ch)
- ▶ 空間分解能 22lp/cm(0.24mm)を実現



- 2 x VECTRON tubes
- 2 x Stellar^{Infinity} Detector
- 2 x 120kW generators



- ◆ 737mm/sec 撮影
- ◆ 66msec 時間分解能
- ◆ 220kg 寝台

Two steps ahead in Computed Tomography

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- ・ X線スペクトラム最適化により画質向上



Two steps ahead in Decision Making

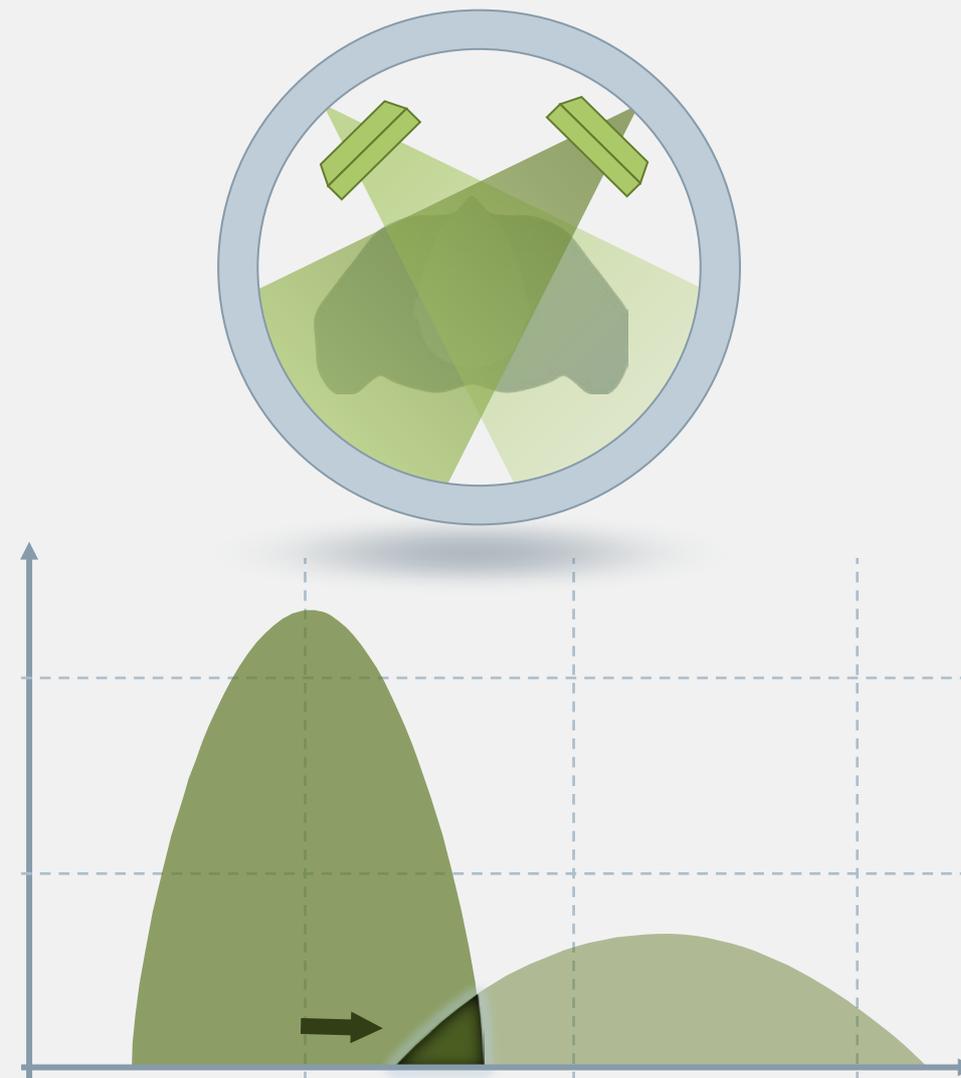
■ Dual Energy Imageの診断向上

- ▶ 2 x Selective Photon Shield II
- ▶ High kV & Low kVのX線スペクトラムの最適化
- ▶ 新しい管電圧の組み合わせが可能

Dual Energy scan

- 350 mm FOV (解析範囲、画像表示 500mm FOV)
- 258 mm/秒 DE 撮影速度 (時間分解能向上)

Up to 30%* increased energy separation for better DE imaging outcomes



Yes, DS .

