



Inspiring clinical confidence





New levels of precision and accuracy

Tumor target motion is a significant factor in inhibiting increasing levels of accuracy. The development of X-ray volume imaging (XVI) and its suite of imaging tools was driven by the need to visualize internal structures within the reference frame of the treatment system in order to reduce geometric uncertainties. The ability to image at the point of treatment and in the treatment position reduces issues relating to organ movement and inspires clinical confidence to pursue IMRT delivery.

Imaging at the time of treatment

XVI acquires and reconstructs the 3D image data simultaneously with low imaging doses. This precision can be repeated accurately with image quality that has isotropic sub-millimeter resolution.

XVI does this by using an innovative XVI technology that is integrated directly onto the treatment system itself. This means that routine 3D volume imaging of a tumor can now be performed immediately prior to treatment. This decreases the risk of target positioning error or geographical miss due to tumor or internal organ motion. In addition, since the patient doesn't have to be moved from an imaging device (eg. MR, CT) to the radiation therapy treatment machine, the risk of errors from re-positioning the patient will also be reduced.

Using 3D VolumeView™, clinicians can visualize soft tissue detail in any area of the body. This unique functionality offers potential benefits.

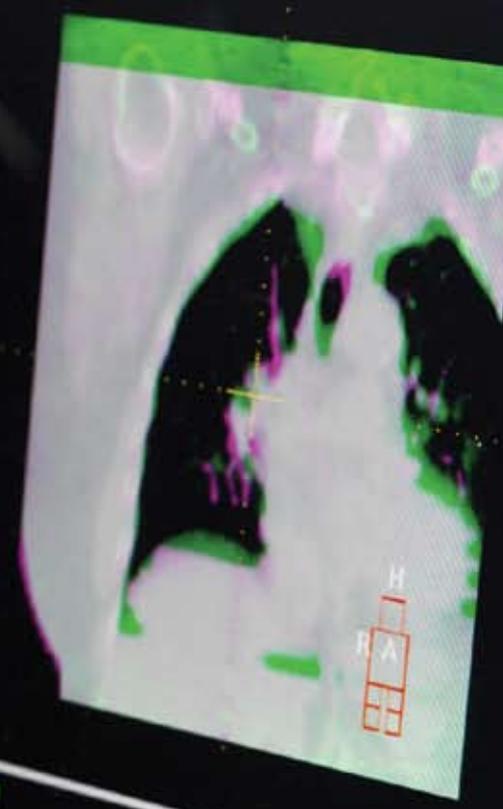
- advanced treatment delivery requires increased confidence in the position of target anatomy and proximity of critical structures only 3D imaging can provide this confidence
- the ability to minimize side effects of radiation therapy by reducing the margins previously set to account for uncertainties of target dimensions, location and movement and improve patient outcomes
- the potential to adopt dose escalation and hypofractionation regimes with the confidence that a 3D plan will be delivered as an accurately targeted 3D treatment.

Clinical collaboration

XVI was developed by Elekta in close collaboration with clinical partners, ensuring the features, functionality and efficiency meet the needs of all modern clinics. Working closely with the Elekta Synergy Research Group, Elekta became the first company to support research on IGRT, the first to bring 3D volumetric imaging into clinical use and the first to bring these solutions to the wider market.



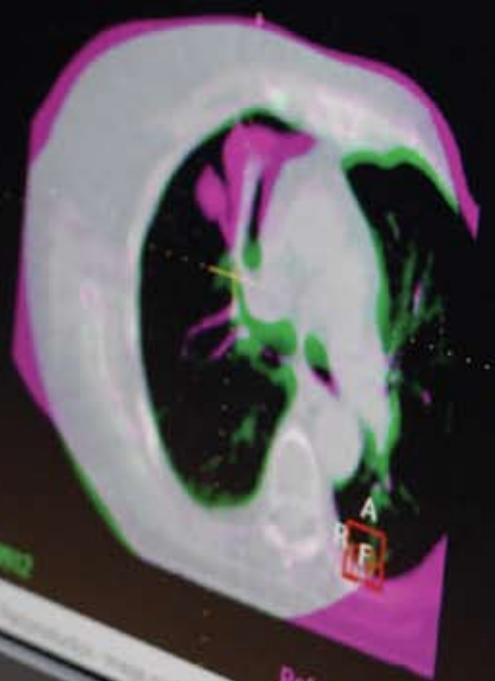
Coronal



Slice 128

Transversal

Slice 128



Volume: 2000002

Reference: [xvi]6200145.X01

Bringing vision to radiation therapy

XVI imaging technology

Planning and treating in 3D requires verification in 3D. The 3D imaging capability of XVI enables the clinician to take full advantage of complex technique dose delivery without the need for implanted target surrogate markers to visualize soft tissue structures, target volume and critical structure position. It allows precise registration of the reconstructed image data with the historical CT planning data as a non-invasive procedure.

XVI offers a variety of image guided options to suit the individual needs of the patient and the clinic.

3D volumetric imaging

XVI provides low dose volumetric 3D data sets with submillimeter isotropic resolution, acquired with the patient in the treatment position. The system can acquire a complete 3D volume in a partial or complete gantry revolution, with reconstruction taking place simultaneously.

The 3D reconstructed VolumeView image is available for review and registration immediately following acquisition. Comprehensive workflow tools support the acquisition and subsequent review of the 3D volume images. Advanced automated registration tools allow rapid registration against the CT treatment plan image. This allows for optimization of the treatment plan and correction for target shifts due to organ motion and deformation.

The XVI software offers the flexibility to vary the dosage necessary to acquire a VolumeView image, depending on the level of contrast required.

Key visualization advantages offered by VolumeView imaging at the time of treatment include:

- soft tissue size, shape and position
- critical organs and tumors
- bony anatomy and alignment in 3D
- eliminate the need for surrogate markers
- ability to minimize the imaging dose
- overlay of structures defined in treatment planning system
- large field-of-view
- simultaneous acquisition and reconstruction



MotionView™

2D fluoroscopic-like imaging, MotionView™ helps locate targets that move on a high frequency basis. Like fluoroscopy, MotionView allows evaluation of patient motion while the patient is in the treatment position for optimum treatment delivery.

Developed to address intrafractional organ motion, MotionView allows the clinician to visualize patient organ motion for evaluation of field coverage for optimum treatment delivery. Even when a device such as the Active Breathing Coordinator™ is being employed, MotionView is useful for monitoring other motion in the thorax or upper abdomen (cardiac rhythms). The key visualization advantages offered by MotionView imaging at the time of treatment include:

- real-time movement of dense features
- lung tumors (high contrast to air)
- bony landmarks
- implanted markers in soft tissue targets

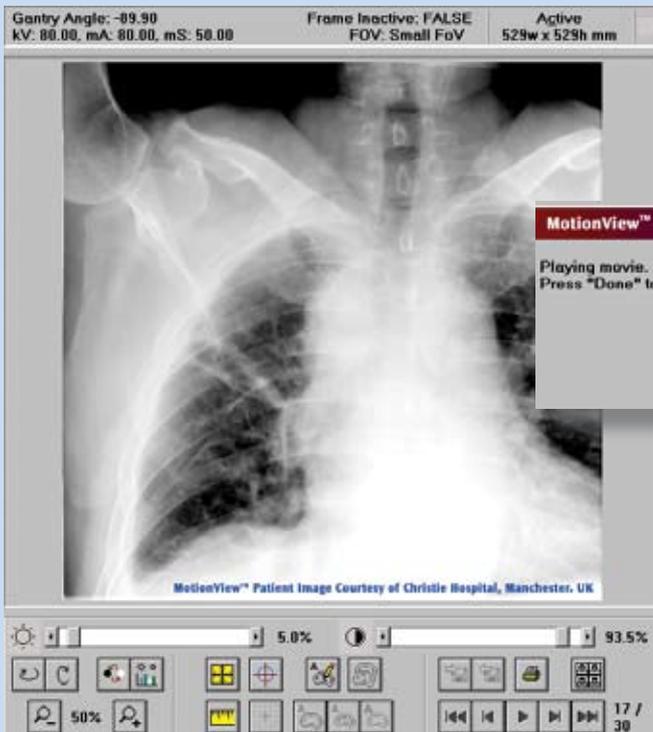


Elekta PlanarView™

XVI also provides the capability for stereoscopic images for initial patient set-up. The X-rays of PlanarView™ in the kV energy range produce high quality images at very low doses (0.2cGy).

Where MotionView is useful for uncertainties relating to intrafraction movement, PlanarView more specifically addresses interfraction movement of the bony anatomy, or implanted surrogate markers. The key visualization advantages offered by PlanarView imaging at the time of treatment include:

- quick, low-dose, snapshot images showing dense features
- lung tumors (high contrast to air)
- bony landmarks
- implanted markers in soft tissue targets
- allowance for a derived 3D localization through stereoscopic or orthogonal imaging



*MotionView™ image of the chest
as seen on the XVI workstation*



PlanarView™, AP and lateral images of head-and-neck taken using Elekta Synergy®



Designed to ensure workflow efficiency

Just as the requirements for treatment of each patient vary, so do the needs of clinics and clinicians. The unmatched capabilities of XVI provide a high degree of flexibility, allowing each clinic to establish their own protocols and determine how they can best use the system to advance their practice of radiation therapy. XVI was developed by Elekta in close collaboration with clinical partners, ensuring the features, functionality and efficiency meet the needs of clinics. This is demonstrated by the large amount of XVI users with an IGRT program that is now part of their day to day routine.

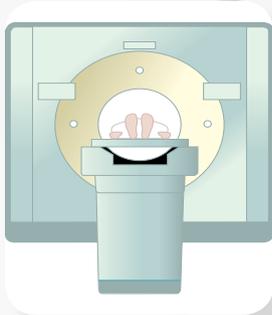
These workflow oriented features mean XVI can be easily integrated into the working practices of the clinic, so achieving the benefits of enhanced accuracy provided by the 3D imaging capabilities of Elekta XVI.

Whether on-line or off-line image guidance workflows are used, clinics have a wide range of clinically developed and proven options that can be selected and customized based upon the demands of the individual patient and facility requirements.

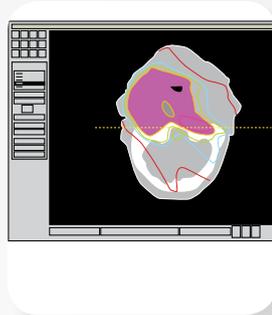
See Elekta IGRT clinical case studies www.elekta.com.

On-line image review workflow: XVI

4D Adaptive^M IGRT



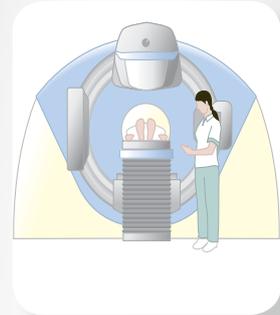
Patient has a CT scan



Treatment is planned



Data is exported to XVI and IMPAC MOSAIQTM



Patient is set-up on for IGRT



Image and simulation reconstruction

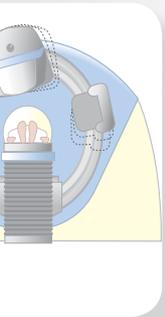
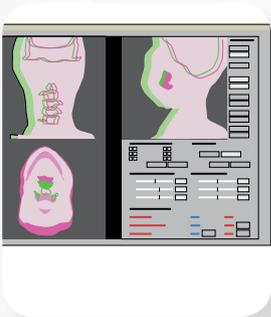


Image is acquired
simultaneously
and treated – time ≈
1 min.



VolumeView™ image analysis
and automatic registration at
XVI workstation
– time ≈ 2 min.

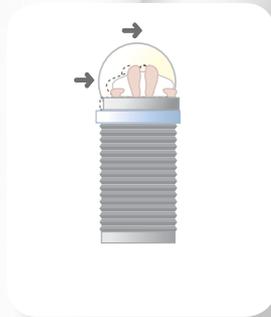
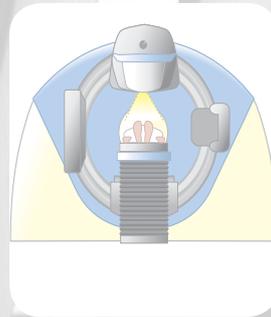


Table correction is made using
table displacement values from
VolumeView image registration
and remote automatic table
movement – time ≈ 5 secs.



Patient is treated with
new isocenter position



Patient goes home

Elekta – delivering solutions

With decades of experience in supporting clinicians in their battle against serious disease, Elekta has an in-depth understanding of the needs and requirements of medical treatment centers. Elekta is committed to helping customers maximize the potential of their Elekta medical equipment by providing:

Applications training

The Elekta Radiotherapy Applications Group provides clinical applications training tailored to meet the specific needs of each customer. To enable the customer to become familiar with the set-up and configuration of their own machine, specialists in the UK, USA, Germany and Hong Kong deliver training on the customer's own equipment.

Clinical education

To inspire and provide confidence in the clinical use of XVI, Elekta offers clinical education courses at specified training centers both in Europe and the USA. These courses teach our customers the advantages of this new methodology of IGRT and treatment procedure, seen from the clinical perspective. The courses are conducted by experienced clinicians and physicists.

Technical service

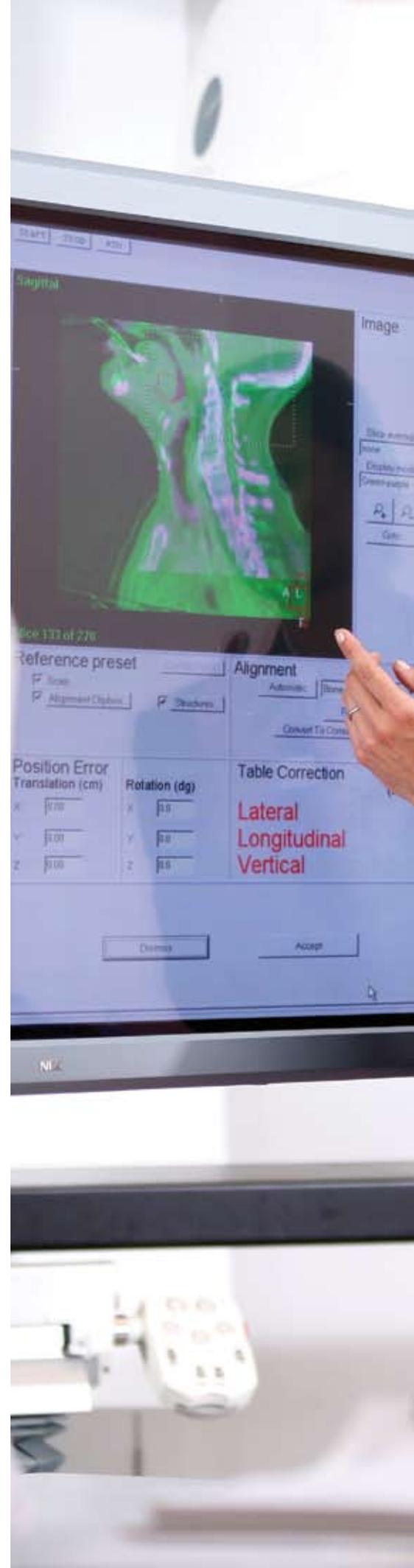
With XVI in clinical development and research use since 1997, Elekta has been able to incorporate valuable years of service experience into the manufacture and support of the product.

Elekta provides fourth level technical expertise to customers on-site as well as a range of remote support. Experienced help-desk engineers work closely with Research & Development and manufacturing teams to provide a dynamic and timely response to high-level queries as they occur.

Lifecycle support

The Elekta customer support philosophy is driven by a commitment to building and maintaining long-term customer relationships, driven by the following objectives:

- design and development of products with a long-term upgrade path
- increase in up-time and improved patient flow
- facilitation of customer networking with the support of societies and research groups
- proactive prevention of unplanned down-time
- rapid resolution of problems if they occur







Fighting serious disease

www.elekta.com

Corporate Head Office, Stockholm, Sweden Tel +46 8 587 254 00 Fax +46 8 587 255 00 info@elekta.com

Regional Head Offices for Sales, Marketing & Service

North America,
Atlanta, GA
Tel +1 770 300 9725
Fax +1 770 448 6338
info.america@elekta.com

Europe, South & Central America,
Africa, Middle East & India
Tel +44 1293 654068
Fax +44 1293 654655
info.europe@elekta.com

Japan,
Kobe
Tel +81 78 241 7100
Fax +81 78 271 7823
info.japan@elekta.com

China,
Beijing
Tel +86 10 8012 5012
Fax +86 10 8012 5000
info.china@elekta.com

Asia-Pacific,
Hong Kong, SAR China
Tel +852 2891 2208
Fax +852 2575 7133
info.asia@elekta.com