

Proton Therapy



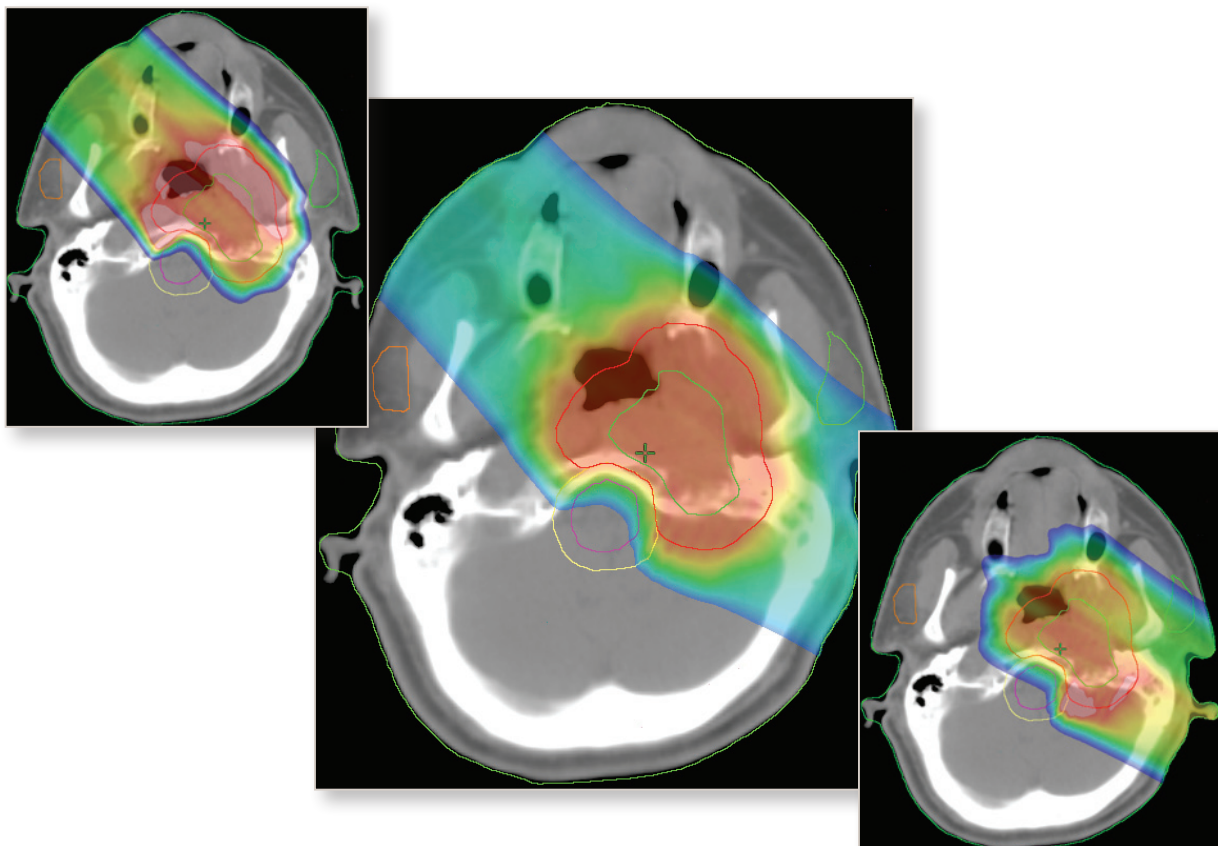
VARIAN
medical systems
A partner for **life**

The Advantage of Protons and Proton Medical Applications

Established many years ago as a viable treatment option, Proton Therapy has become the most common form of particle therapy in the world.

As charged particles, protons have a unique property. Based on their initial energy, most of the dose to a patient is delivered at a well known distance in tissue, called the “Bragg Peak”. Almost no dose that would otherwise be harmful to healthy tissue is deposited past this peak.

Clinicians are able to treat tumors surrounded by critical, healthy tissue and organs with increased control, or conformity, of the dose. Sparing these healthy tissues and organs can often reduce the impact of side effects common in conventional radiotherapy or allow for treatment of a tumor in difficult locations in the body.

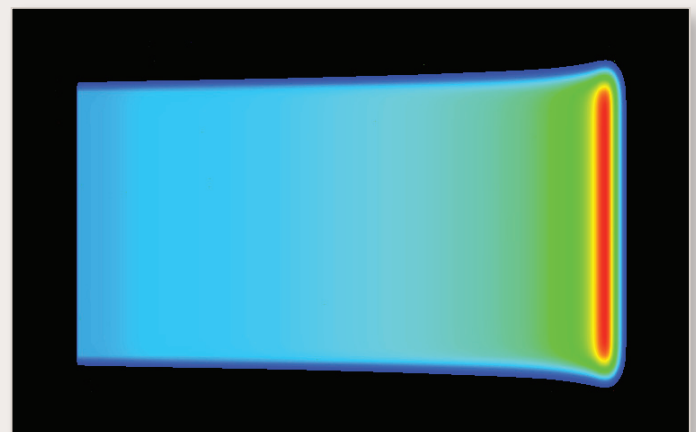
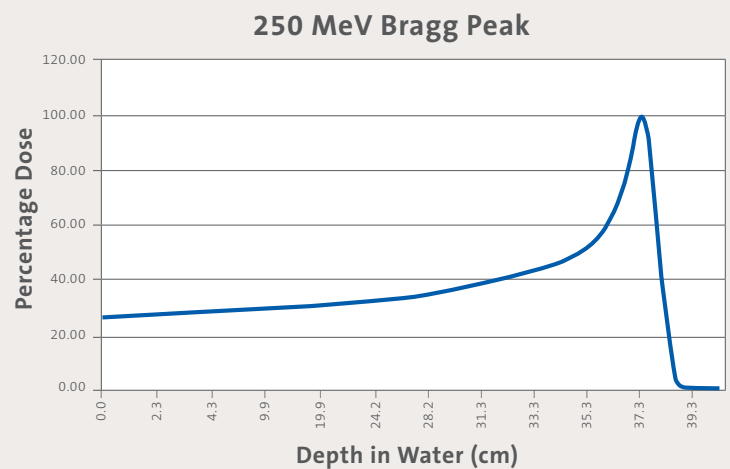


Some examples of cancers for which proton therapy has been used around the world:

- Pediatric tumors
- Ocular
- Lung
- Breast
- Gastrointestinal malignancies
- Prostate
- Central nervous system lesions (benign and malignant)
- Skull base and cervical spine
- Bone and soft tissue
- Head and neck
- Gynecologic carcinoma
- Lymphoma

Varian Medical Systems, with its leading position in developing advanced clinical oncology technologies such as image guided radiotherapy and respiratory gating, looks to provide clinicians with tools to expand the scope of proton therapy applications.

Bragg Peak



As the proton travels, very little dose is delivered along its path. The point at which the proton delivers most of its dose is called the “Bragg Peak”.

The Varian Proton Therapy Delivery System

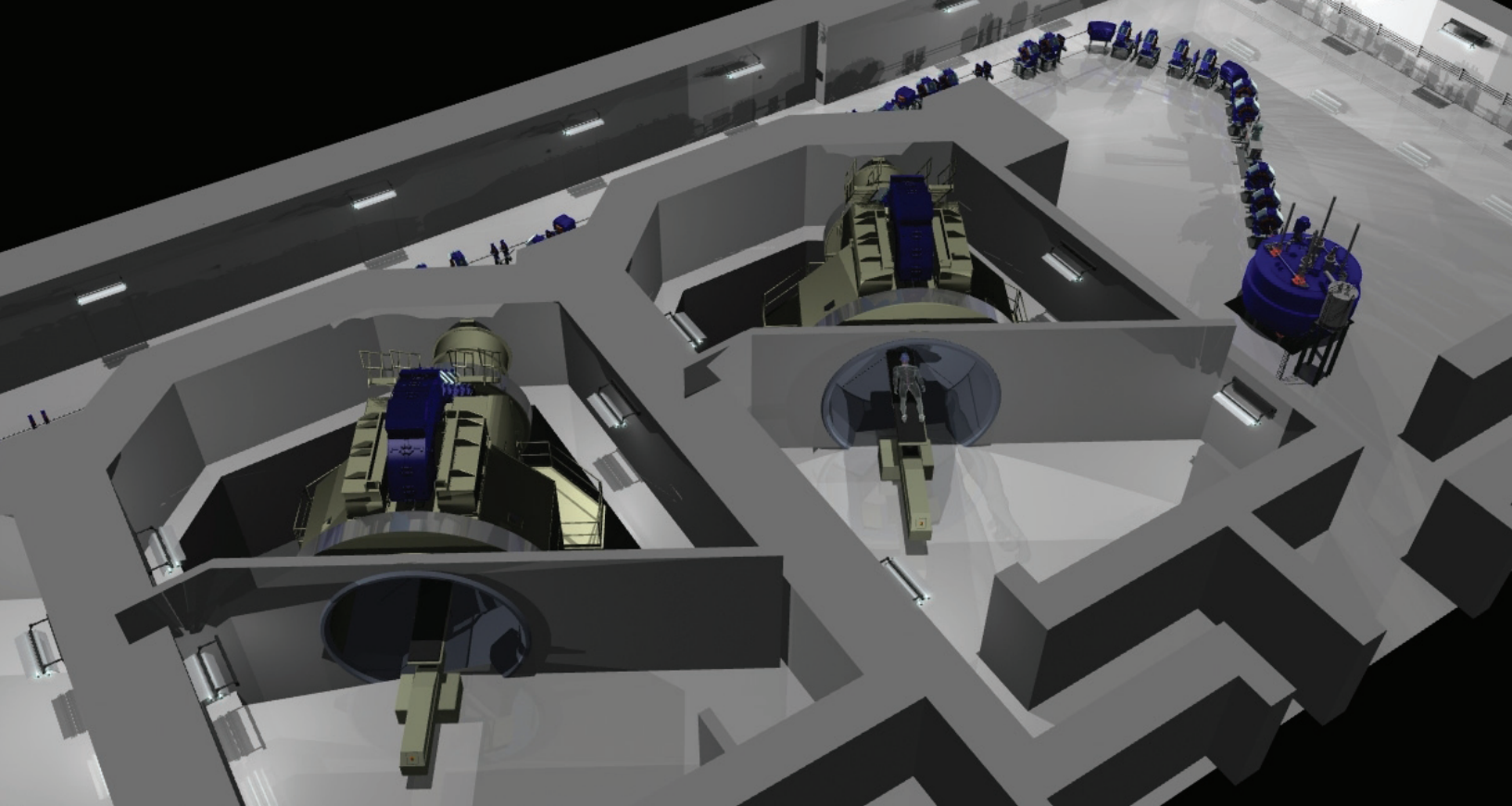
Proton therapy systems are generally installed in specially constructed facilities, sized according to customer requirements. A system consists of the superconducting cyclotron, energy selection system (ESS), the beam transport system (BTS), and a combination of rotational gantry or horizontal fixed beam treatment rooms. Based on customer needs, other areas may be defined, such as clinical oncology services (i.e. conventional radiotherapy, medical oncology or imaging), research, and administrative space that allow our customers to develop a proton therapy facility completely integrated with their oncology services strategy.

Cyclotron and Energy Selection System

- A superconducting cyclotron is the heart of the Varian Proton Therapy System. It uses powerful magnetic and electrical fields of alternating polarity to create an accelerated beam of protons.
- The energy selection system adjusts the proton's beam energy to the amount prescribed in the treatment plan.

Beam Transport System

- The beam transport system consists of a series of bending and focusing magnets, as well as diagnostic measurement tools, used to transport the proton beam from the cyclotron to the desired treatment room.



Treatment Delivery Rooms

- A rotational gantry is a rigid steel structure that houses a section of the beam transport system, the Dynamic Peak™ integrated scanning technology delivery nozzle, and is designed to accommodate imaging and treatment delivery technologies.
- These gantries provide 360° coverage around the patient to deliver the treatment, in combination with a 6 degree of freedom patient positioning system.
- Horizontal fixed beam rooms feature the same robotic patient positioning couch and Dynamic Peak treatment delivery nozzle.

The Varian Advantage

- Modularity allows for configurations customized for each customer's needs
- Multiple treatment rooms allow customers to take advantage of increases in capacity over the life of the system without further capital outlays
- True systems integration with the Varian suite of advanced technology for cancer therapy



Varian's Proton Therapy Technology

The Varian Advantage: Cyclotron

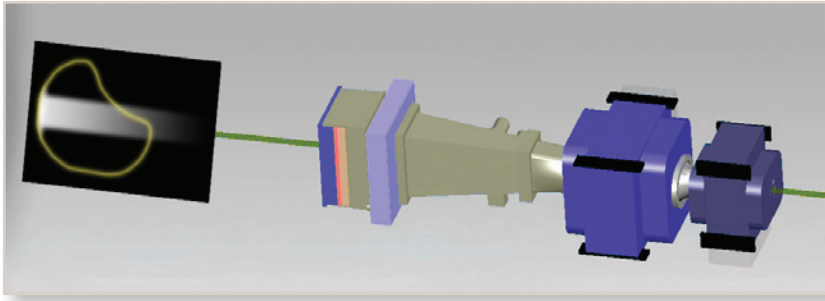
- 250 MeV proton therapy energies allow for delivery of dose to deep seated tumors
- Excellent reliability maximizes operating availability and uptime confidence
- Greater control of beam properties for Dynamic Peak treatment delivery

Proton accelerator: 250 MeV Isochronous Superconducting Cyclotron

The 250 MeV Isochronous Superconducting Cyclotron is designed to generate powerful magnetic fields without the high power consumption and heat dissipation associated with room temperature electromagnets. With a stronger magnetic field the size of the cyclotron can be substantially reduced as the proton requires a smaller radius to reach its maximum energy.

The primary benefit of Varian's Superconducting Cyclotron is a continuous and stable proton beam for greater dose delivery rates and more precise control of the beam to the patient.

Another benefit of Varian's Superconducting Cyclotron is a high beam extraction rate. Since we extract nearly 80% of the beam from our cyclotron, less activation of cyclotron components is induced, crucial for reliable performance. And because less activation is induced, the cyclotron can be accessed more quickly for preventive maintenance.



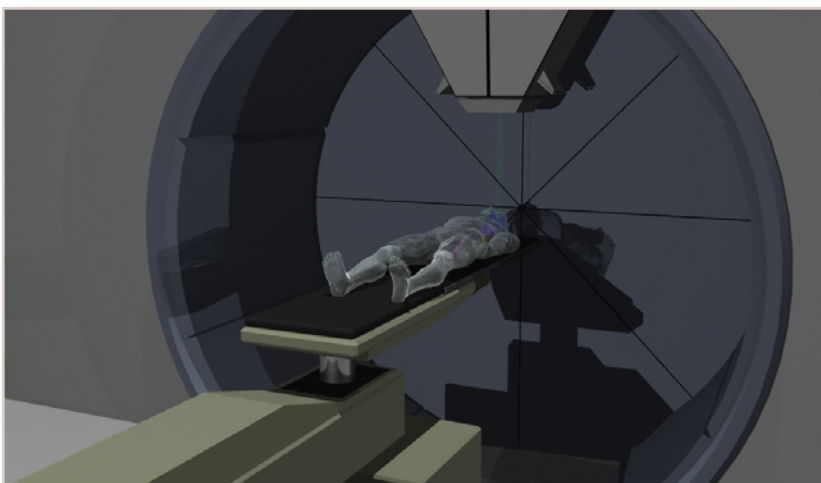
Dynamic Peak integrated scanning technology

Based on the active scanning treatment delivery technique, Dynamic Peak enables precise control of the proton beam, using magnets in the treatment nozzle to steer the positively charged proton therapy beam to the shape and size of the desired layer of the tumor target volume.

This means Dynamic Peak treatment delivery does not require the use of a custom milled compensator and heavy brass apertures. This greatly reduces the cost and complexity of the clinical workflow. The absence of compensators or apertures reduces the risk associated with neutron radiation exposure normally associated with these patient specific devices.

The Varian Advantage: Dynamic Peak Treatment Delivery

- Large field size of 30x40cm
- Delivers a 2 Gy per liter per minute dose
- Dynamic Peak technology accommodates all scanning options





An Integrated Proton Therapy Solution

Varian provides a truly integrated, end-to-end solution that synchronizes all proton therapy activities, including fully compatible software solutions, imaging enabled by the ARIA® oncology information system, and sophisticated patient positioning, safety and control systems.

Two core components of our integrated system are Varian's unique solutions for information system management and treatment planning. First, the ARIA® oncology information system aggregates up-to-the-minute digital images and patient data into a single, organized oncology-specific electronic medical record (EMR) – the emerging standard for managing patient information across networked treatment environments. Secondly, our Eclipse™ proton planning combines the latest in fast, accurate proton calculation algorithms with the power of the Eclipse™ treatment planning system to create a single system for proton, photon, electron, and brachytherapy planning.

Eclipse

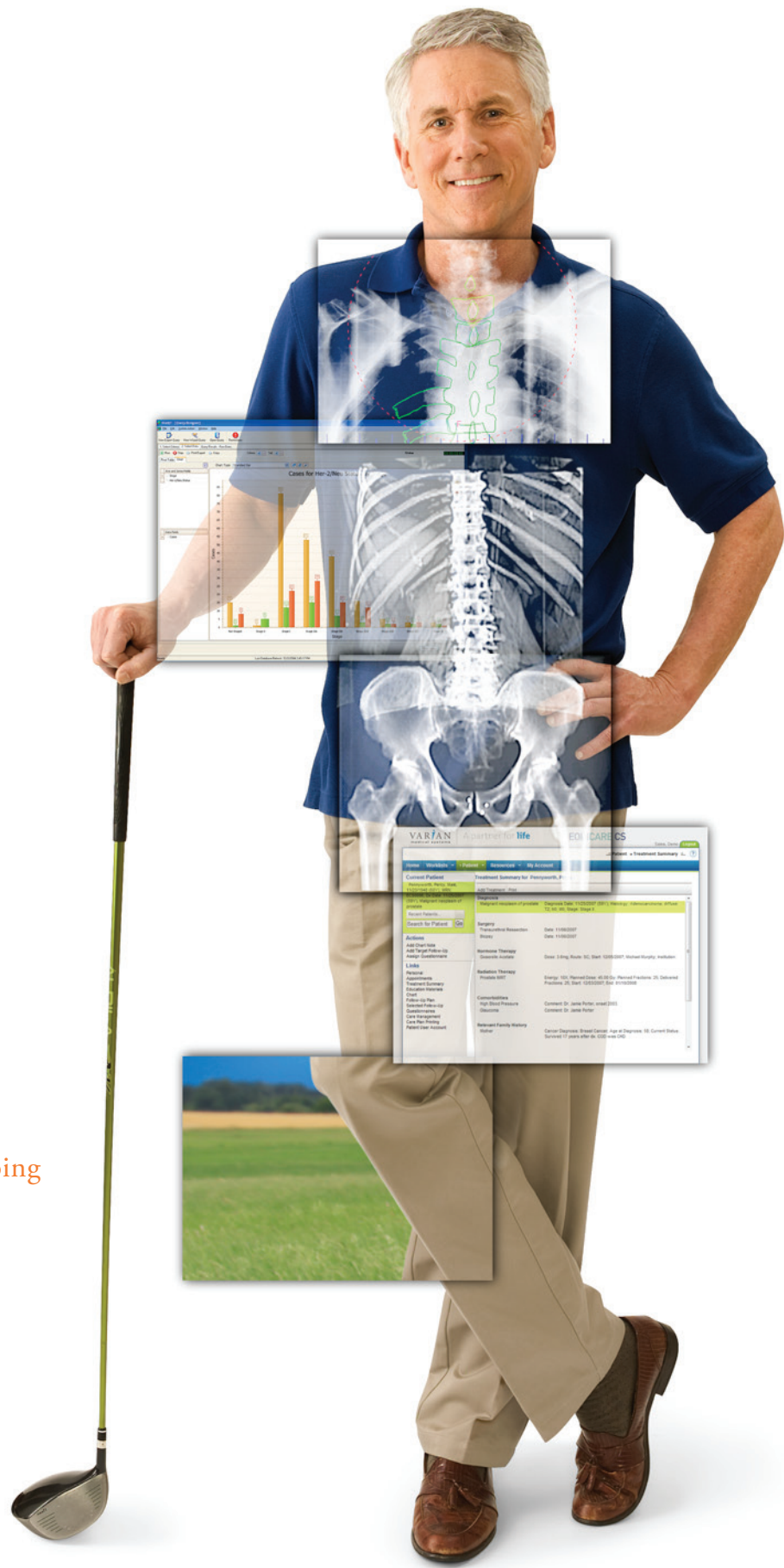
Simplify and accelerate your proton treatment planning

- Powerful contouring tools
- Automatic field setup
- Ocular proton planning
- Double/single scattering
- Uniform scanning
- Pencil beam scanning, including:
 - Spot/raster scanning
 - IMPT
 - IGPT
- Quality assurance tools

ARIA

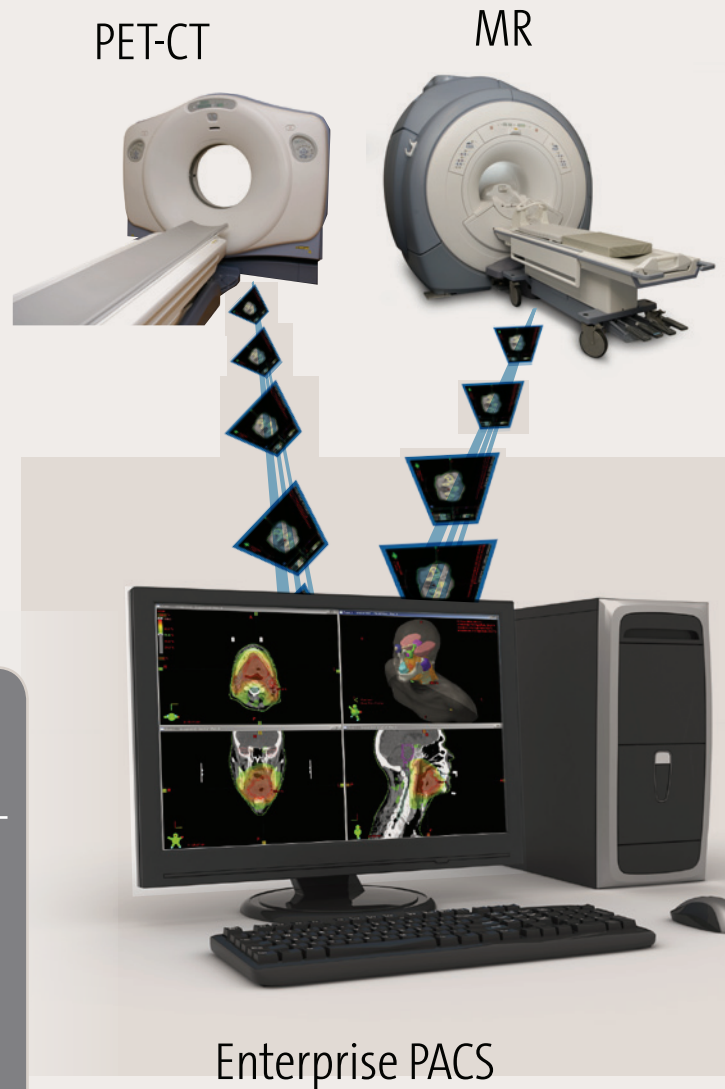
Oncology specific EMR

- Medical and radiation oncology and proton therapy support
- Multimodality imaging review
- Radiation and chemotherapy prescribing
- Radiation treatment QA
- HL7/DICOM support
- Case management for survivorship
- Outcomes analysis



The Oncology Environment

The Varian solution uses standard HL7 and DICOM communication protocols to connect with all devices used to manage and deliver radiation treatment.



Varian Software Systems

- **ARIA**[®] oncology information system
- **Eclipse**[™] treatment planning system
- **OncoView**[™] image management and storage solution
- **IEM**: Information Exchange Manager
- **EQUICARE CS**[™] case management software for cancer survivorship

Varian Proton Therapy



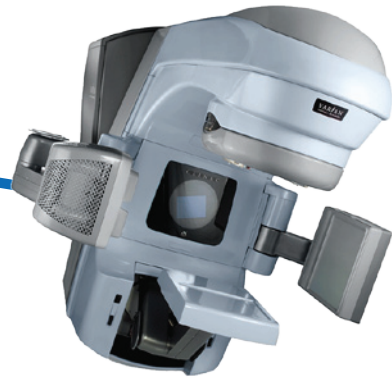
Acuity
Planning, Simulation & Verification



VariSource HDR
Brachytherapy



Trilogy / Clinac
Treatment Delivery



Varian Software Systems

ARIA

Eclipse

OncoView

IEM

EQUICARE CS

DICOM

HL7

Chemotherapy



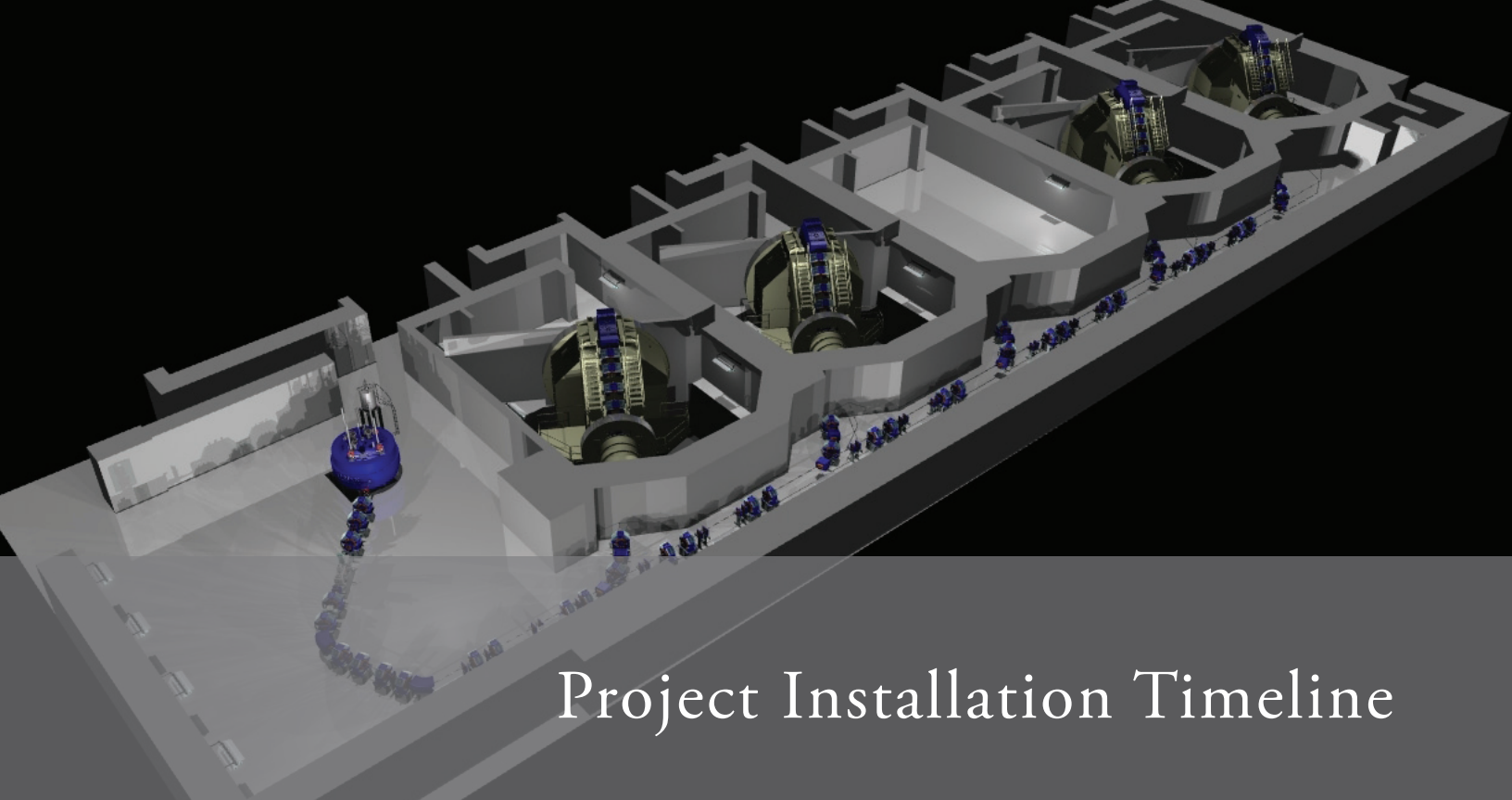
Hospital Information System (HIS)

Proton Therapy Project Scope

During the initial stages of your proton therapy project, Varian can help match your clinical needs and business requirements with the configuration of the proton therapy system. Varian can also provide assistance in identifying architectural design and financial partners.

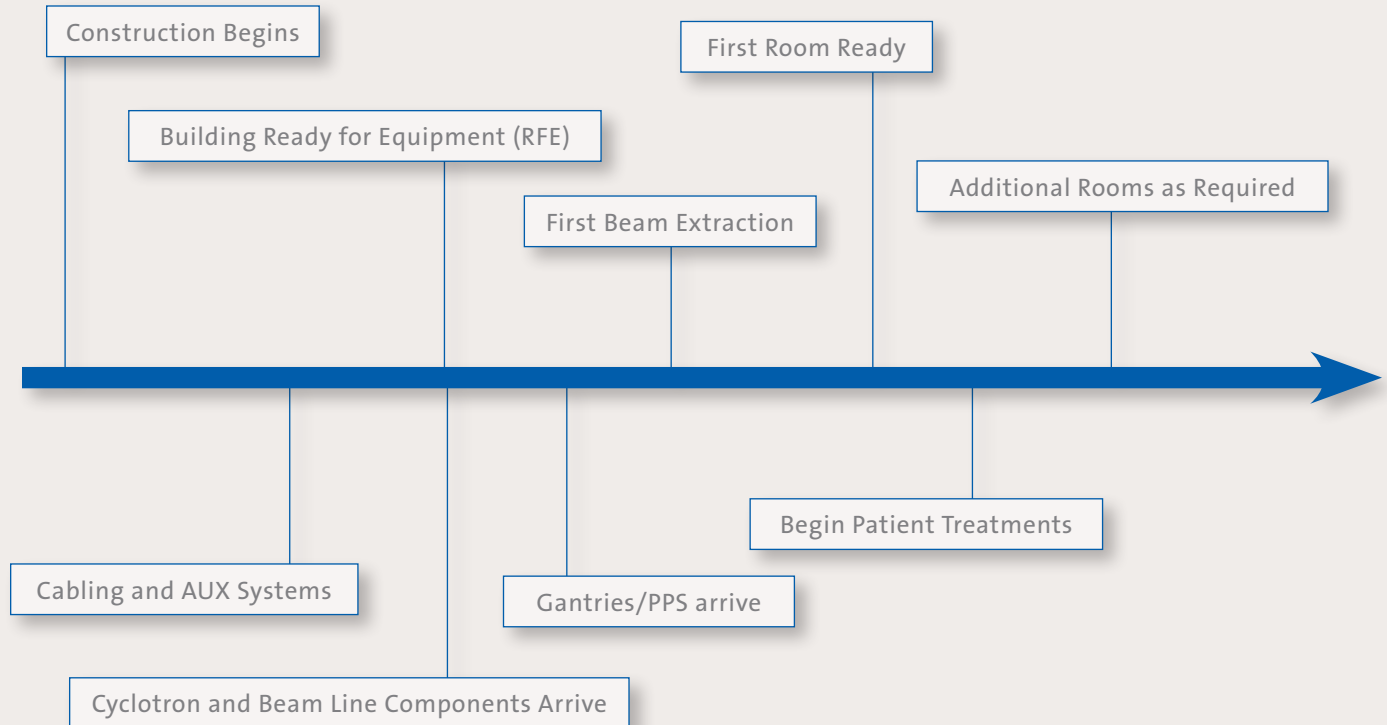
Upon selection of Varian as vendor of choice in your proton therapy project, we play an active role in managing the technical and logistical challenges at every stage of your project.

- **Building Design.** Even before the purchase agreement is completed, Varian will work closely with your chosen architect and general contractor to ensure a thorough understanding of the complex building technology and construction requirements.
- **Construction/Installation.** A Varian project manager will coordinate with your general contractor for the arrival and assembly of all system components during construction and with the lead team of engineers during installation.
- **Technical and Clinical Commissioning.** Once beam is produced from the cyclotron and can be transported down the beam line to the treatment rooms, Varian will conduct a series of tests leading up to final acceptance. Upon final acceptance, clinical commissioning is conducted by the customer according to industry standards or local regulatory requirements.
- **Operations and Service.** After final acceptance of a clinical treatment room, Varian maintains an ongoing relationship with the facility, providing services necessary for efficient daily technical operation and to ensure system up-time goals. With more than 50 years of service to health care providers, Varian's Customer Support Services have remained a testament to service innovation at every level. Our worldwide support team is dedicated to providing local support for our products whenever and wherever needs arise. From site planning to service support agreements, training solutions and on-site support, Varian offers programs that keep your proton products and staff operating at peak efficiency.



Project Installation Timeline

Major events in the installation / commissioning of a Varian Proton Therapy System project.



The actual project schedule duration and sequence will vary for each customer, based on numerous variables, including customer needs, obtaining permits, financing, and regulatory clearance.



Varian Medical Systems – A Partner for Life

Varian Medical Systems, Inc., of Palo Alto, California, is the world's leading manufacturer of medical devices and software for treating cancer and other medical conditions with radiotherapy, radiosurgery, proton therapy, and brachytherapy. Varian products are used every day to help millions of people around the world. The company supplies informatics software for managing comprehensive cancer clinics, radiotherapy centers, and medical oncology practices. Varian is a premier supplier of tubes and digital detectors for X-ray imaging in medical, scientific, and industrial applications. Varian also supplies X-ray imaging products for cargo screening and industrial inspection. For more information, visit <http://www.varian.com/>.

The Varian Mission

“At Varian Medical Systems, patients from all over the world inspire us and remind us to do what matters most...to give clinicians better tools for treating cancer. They are the force behind our mission...to focus all our energy on saving lives.”

Timothy E. Guertin

President and CEO, Varian Medical Systems

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