

# PROTEUS<sup>®</sup> PLUS

TAILOR-MADE IMAGE-GUIDED IMPT SOLUTION

# EXCELLENCE IN PROTON THERAPY

PROTECT +  
ENHANCE +  
SAVE LIVES

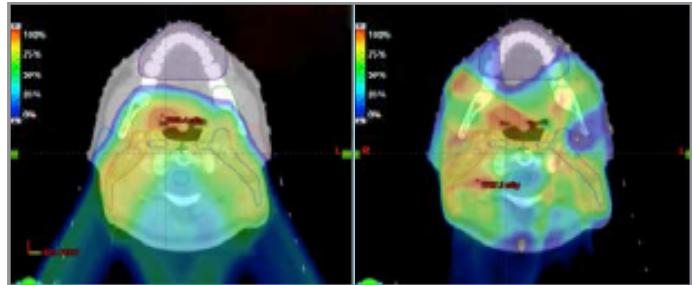
# Proton Therapy

## A true success in cancer care

Proton therapy is used today to treat many cancers and is particularly appropriate in situations where treatment options are limited or conventional radiotherapy presents an unacceptable risk to the patient.

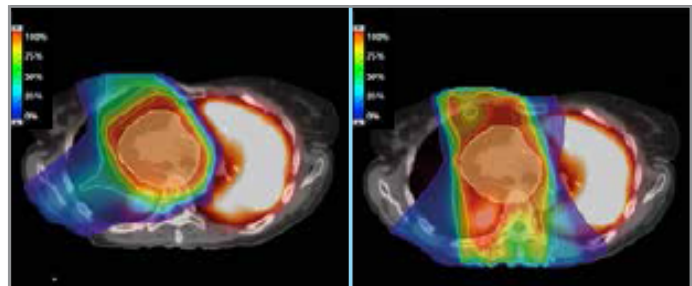
These situations include, but are not limited to, benign and malignant tumor of the eye and brain, tumors close to the brain stem, spinal cord or other vital organs, head and neck cancers, recurrent cancers and pediatric cancers.

## Proton therapy vs X-ray radiation



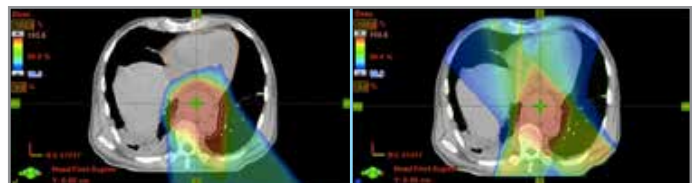
Head and neck

*Images with courtesy of Dr Alexander Lin, University of Pennsylvania School of Medicine*



Lung

*Images with courtesy of Stephen Bowen, PhD, University of Washington*



Esophagus

*Images with courtesy of Dr John Plastaras, University of Pennsylvania School of Medicine*

*For a general overview of the clinical aspects of proton therapy, refer to the following books:*

- "Proton and charged particle radiotherapy" by Thomas F. Delaney, Hanne M. Kooy
- "Proton Therapy", Series: Radiation Medicine Rounds Volume 1 Issue 3 by James M. Metz and Charles R. Thomas, Jr.

# PROTEUS®PLUS

## EXCELLENCE IN PROTON THERAPY

**PROTEUS®PLUS** is a unique proton therapy solution for leading cancer centers striving to meet the treatment needs of a large and growing patient base, while further advancing your clinical reputation in cancer care, regionally and nationally.

Its cutting-edge features can be configured into a tailored solution to meet your research, clinical and business objectives.

**PROTEUS®PLUS** is inspired by clinical excellence with specific attention paid to patient experience. Its versatility powers your institution to rise to the challenges of treating a broad array of complex cancer conditions and to expand your research potential to advance cancer care.

Concretely, **PROTEUS®PLUS** arms your team with the latest advances in precise, image-guided and intensity modulated proton beam delivery. It enables you to offer new treatment options to patients and investigate new protocols and retreatment opportunities. From an administration perspective, its optimized workflow will allow you to maximize the use of the system to offer proton therapy to the largest number of patients possible, while its upgradability will ensure you stay on the leading edge.

**PROTEUS®PLUS** is the perfect solution to differentiate your institution and sharpen its competitive edge.

**PROTEUS®PLUS** is a made-to-measure platform that forges the future of radiation therapy. It will put your institution on course to excellence in cancer treatment.

# Treating with PROTEUS® PLUS

IBA's PROTEUS® PLUS is a tailor-made proton therapy solution focusing on helping clinical teams to deliver the most effective treatment, using the latest clinical innovations, including Image-Guided Intensity Modulated Proton Therapy (IMPT).

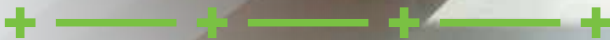
IMPT lets radiation oncologists adjust the precision, depth and intensity of a proton beam to the peaks and valleys of complex tumors, while sparing nearby healthy tissue. The precision and adaptability of IMPT makes it particularly well suited for treating a broader range of tumors that are adjacent to vital organs such as head, neck, spine and lung.

PROTEUS® PLUS enables IMPT by combining the fine precision of the Pencil Beam Scanning (PBS) delivery mode with the accuracy of 3D Cone-Beam Computed Tomography (CBCT) imaging and the adaptive capacity of In-room CT.

Treating with IMPT

Motion management

Towards adaptive image-guided proton therapy



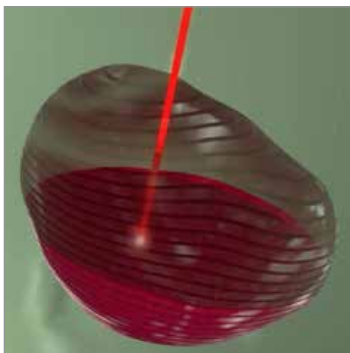


# Treating with Intensity Modulated Proton Therapy

PROTEUS®PLUS delivers a proton beam to the target using the Pencil Beam Scanning (PBS) modality.

Thanks to its advanced technical and clinical capabilities, PBS enables delivery of Intensity Modulated Proton Therapy to cancer patients. IMPT targets the tumor while controlling the intensity and spatial distribution of the dose with fine precision.

With PROTEUS®PLUS IMPT capabilities, you will have the ability to precisely shape the dose according to the target tumor, reaching high levels of conformity and dose uniformity, especially for complex tumors, requiring fewer treatment beams than IMRT.



## What is Pencil Beam Scanning?

PBS is a proton beam delivery mode supporting IMPT. In PBS, the proton beam paints the target volume, one layer at a time, voxel by voxel, to precisely match the shape of the tumor.

IMPT treats a small section of the tumor at a time, adjusting the proton beam dose and depth to wider and narrower contours of the tumor, section by section.

Combined with the appropriate imaging devices and treatment strategies, IMPT is capable of treating moving tumors.

## The key advantages of PBS:

- It sculpts the dose with very high levels of conformity, even in complex-shaped tumors, thanks to its fine precision.
- It enables Intensity Modulated Proton Therapy (IMPT).
- It makes treatment planning easier, while eliminating the need for individualized aperture and compensator devices.
- It decreases the neutron dose to the patient during treatment compared to other proton delivery techniques (Double Scattering and Uniform Scanning).



## adapt Treatment Suite

### **Deliver accurate proton treatments with ease.**

IBA presents its integrated proton therapy software, adapt Treatment Suite. This modular software platform supports a truly integrated treatment environment for safe and efficient proton therapy delivery.

The adapt Treatment Suite incorporates the different delivery techniques, such as Pencil Beam Scanning. It offers ergonomic screens for streamlined control of the patient treatment, along with full integration of the TPS and OIS through DICOM connectivity.

It also enables editing of treatment plans and prescriptions for standalone irradiation or QA modes.

# Motion Management

PROTEUS® PLUS brings together the most advanced techniques in motion management. It enables your clinical staff to effectively treat tumors in motion by using the most appropriate mitigation technique for the patient.

## Motion Management Solutions

Proper motion management solutions will enable users of Pencil Beam Scanning to treat further indications, including those previously challenged by organ motion.

Developed over years by IBA and our clinical partners, IBA offers various advanced features for motion management.

### ■ Gating

Up to four different gating solutions can be connected on the IBA system through the Universal Beam Triggering Interface (UBTI). At the time of treatment and depending on the indication, the clinical staff will select the most appropriate gated solution.

### ■ Repainting

Instead of delivering the dose in one shot, the system delivers the dose through several scans. This not only increases the probability of hitting the target, it also fades out dose difference between hot spots and cold spots through statistical blurring.

### ■ Fast PBS delivery

The faster the dose delivery, the more the dose can be delivered while the target remains within the “beam allowed” window. The current IBA solution enables very fast PBS delivery and IBA continues to work on improving the robustness and speed of the PBS modality.

### ■ Multiple PBS spot sizes

The ability to access multiple PBS spot sizes to reduce the influence of motion and maintain the most conformal treatment plan.

**These techniques can be used individually or in combination, to best fit clinical needs.**





# Towards adaptive Image-Guided Proton Therapy

IBA's PROTEUS®PLUS incorporates the latest imaging technologies so clinicians can deliver Image-Guided Proton Therapy (IGPT) to cancer patients and adapt the treatment plan as necessary.

The advanced IGPT technologies integrated in PROTEUS®PLUS ensure quick and accurate patient position verification by comparison with diagnostic CT imaged during the treatment planning process.

Going beyond the accurate positioning of the patient, integration with in-room CT\* imaging enables PROTEUS®PLUS to incorporate plan verification into the treatment process towards adaptive proton therapy

## Stereoscopic Orthogonal Patient Imaging

True orthogonal Beam's Eye View stereoscopic X-Ray imaging enables accurate patient position verification and monitoring.

adapt<sup>insight</sup> is the IBA imaging platform.

It incorporates image-guidance features such as 3D CBCT and stereoscopic X-Ray imaging for highly accurate patient treatment, as well as tight integration with adapt deliver. An open architecture and programmable workflow configurability builds a solid foundation for the development of future proton specific image-guided solutions.

*\*available in Europe and may be subject to some technical review by competent authorities.*



### 3D Cone-Beam CT Image-Guided Proton Therapy (IGPT)

3D volumetric X-Ray imaging and Cone-Beam Computed Tomography (CBCT), can be directly acquired in the treatment room at isocenter. It can then be compared with treatment planning CT for patient position verification and anatomical modification assessment.

Advanced acquisition software, shading correction, accelerated inline and offline image reconstruction algorithms support high-speed, high-resolution, uniform and low-dose CBCT.

CBCT offers soft-tissue contrast, providing much more information than a conventional stereoscopic alignment system. It enables more accurate patient treatment through anatomical modification assessment, the first step towards adaptive radiation therapy.

### In-Room CT imaging\*

While fully confident that the integrated CBCT is enough for your imaging requirements for patient positioning,

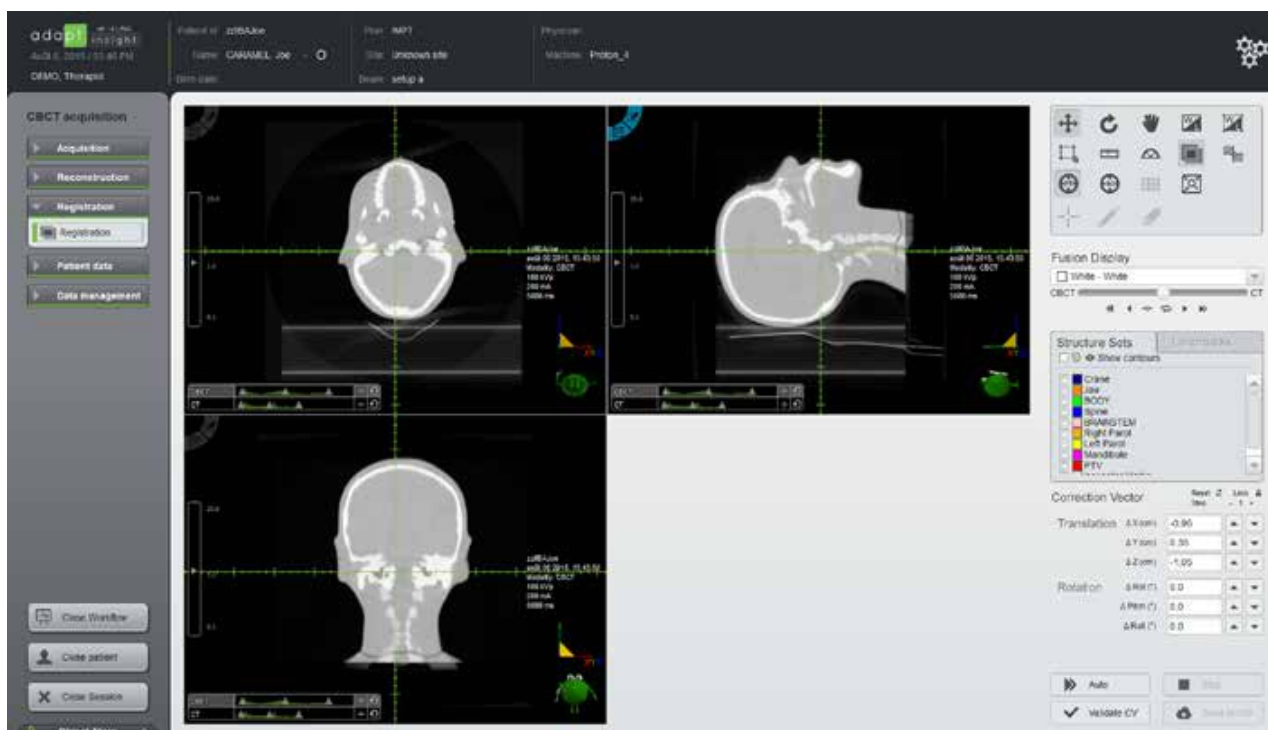
PROTEUS®PLUS supports the integration of a CT imaging system on floor rails directly with the treatment room.

Currently, this layout is fully operational in one PROTEUS®PLUS facility. With our clinical partners, we are working towards the ultimate goal: online proton adaptive therapy to unleash the full potential of protons to optimize treatment outcomes.

With the advanced imaging technologies integrated into PROTEUS®PLUS, clinical users can now apply similar advanced positioning and Quality Assurance protocols as those used in their Image-Guided Radiation Therapy (IGRT) practice.

### IBA's PROTEUS®PLUS brings the advantages of:

- **Acquiring** CBCT image in room and at isocenter.
- **Acquiring** CT image\* in room.
- **Ensuring** accurate patient positioning during treatment.
- **Enabling** the detection of anatomical modifications for treatment plan adaption



## A design inspired by clinical care

Working with clinicians in the development of proton therapy worldwide over the last 30 years has led IBA to understand that successful treatment does not just depend upon the successful application of proton beam physics. The everyday treatment experience is also important — for the patient and clinician.

PROTEUS<sup>®</sup> PLUS is designed to enhance the patient experience by fostering a soothing environment. At the same time, all care has been taken to facilitate medical staff daily practice.

Optimized staff experience

Turning healthcare into human care





# Optimized staff experience

## Full Treatment access

PROTEUS®PLUS is designed with full treatment access. It allows the physicians and therapists to have easy access to the patient during positioning and imaging. This facilitates patient care and comfort, and improves positioning procedures especially during non-coplanar treatments.

## Gantry Rolling Floor

Thanks to the highly functional design of our Gantry Rolling Floor, the patient remains accessible to the treatment staff as the gantry rotates around the isocenter. The Gantry Rolling Floor ensures staff safety during clinical operations, allowing them to focus on their core tasks and attend to patient wellbeing.

## In-room imaging control

PROTEUS®PLUS permits radiation therapists and clinicians to access and control patient imaging from inside the treatment room. This permits improved patient care, greater ease of use and efficient patient positioning.



# Turning healthcare into human care

While focusing on clinical efficiency and interoperability, **PROTEUS®PLUS** also incorporates environmental features to help keep patients relaxed and comfortable during imaging and treatment.

Based on insights from proton patients, healthcare staff and experts, Philips Healthcare and IBA integrated a solution with dynamic lighting, projection and sound; turning a cold, impersonal environment into one that comforts and reassures.

Acknowledged as the best in quality and groundbreaking design, Ambient Experience helps enhance the overall experience for oncology patients and staff.



## Benefits of Ambient Experience

- **For the patients and families:**  
Reduced stress and increased comfort.  
Higher patient satisfaction.
- **For the staff:**  
Increased working comfort.  
Better patient interaction.  
Higher job effectiveness with improved staff experience and satisfaction.
- **For the hospital management:**  
Improved workflow and throughput.  
Improved patient satisfaction leading to word-of-mouth endorsement.  
Attracting and retaining highly trained clinical staff and reducing overhead costs.

## Philips Ambient Experience in figures\*

- **76% increase in staff satisfaction**
- **4% overall decrease in procedure duration**
- **6% overall patient increase**

\* Philips installed base survey "What do our customers say?"; 100 customers interviewed, 27 countries [excl.NA] in September 2011.



In partnership with

**PHILIPS**



**IBA's unique and collaborative culture of innovation has resulted in a series of firsts**

**2001**

First patient treated at MGH, Boston

**2008**

First treatment by Pencil Beam Scanning at MGH, Boston

**2014**

First clinical use of Cone Beam CT at UPENN, Philadelphia





# 2015

First clinical use of In-room CT at APSS, Trento

# 2016

Use of Prompt Gamma Camera within research program in collaboration with OncoRay in Dresden and with UPENN in Philadelphia

# 2017

Introduction of large field of view Cone Beam CT and wireless Hand Pendant

# Leading institutions have already chosen IBA. Join them to develop the future of cancer care together.

## Stay focused on patient care, we can run the system for you

Our experience installing proton systems at more than half of the clinical proton therapy centers worldwide has led us to understand the worries and clinical complexities that arise when treating cancer. Our commitment is to ensure your clinical success by providing reliable systems with the highest availability possible — over 98% uptime. The dependability and reliability of IBA proton systems means you can schedule patient treatments — and necessary clinical staff — with confidence.

To date, being part of the IBA proton therapy client network and benefiting from our technical expertise has helped centers around the world to treat over 60,000 cancer patients worldwide.

Your team can focus on the clinical aspects of cancer care, while IBA's team keeps your proton therapy system running at top performance and meets the highest safety and reliability standards.

## Operation and Maintenance Services in a nutshell

With the largest team of proton experts around the world, you can have access to our qualified field support team at any time, day and night.

In addition to personalized support, other key services are provided:

- **24/7 remote support service**, online or over the phone. This is an important component to maintain your equipment's high uptime.
- A team of **IBA trained specialists** will operate the system onsite to ensure the highest level of availability for clinical treatment.
- In case of emergency, we can **deliver spare parts** the same day via our extensive spare parts worldwide network with hubs in America, Asia and Europe.
- Because technology changes quickly, IBA develops both **update and upgrade** packages tailored to your center's configuration and **training programs** to increase your team's efficiency.

## NEW service features include:

- Remote Service Connections to proton therapy accelerator systems;
- Worldwide Computerized Maintenance Management Systems.



We have been able to treat more than 6,500 patients just in 10 years and we have been at capacity since we were open. Over this time period, there have been only six days that we have lost to treatment. So the operation and equipment have been fantastic from the highest levels to the IBA people on the ground. There is an obvious, deep commitment to patient care.



**Nancy Mendenhall**  
Medical Director at UFPTI, Jacksonville,  
Florida, USA



Since 2014 we have been collaborating with IBA on the clinical implementation of the prompt gamma slit camera, a technology used for proton range verification. I like this joint project very much, not only because it is exciting, cutting-edge research; but also because there is a well developed team spirit, built on trust, competence and reliability. This cooperation is driven by our common goal to enhance the precision of clinical proton therapy, rather than the pursuit of formal milestones.



**Dr. Christian Richter**  
Research Group Leader  
Oncoray – National Center for Radiation Research in Oncology  
Dresden, GERMANY

# IBA has designed and installed the majority of clinically operating Proton Therapy centers in the world.

## North America network



4 ROOMS

**NORTHWESTERN MEDICINE CHICAGO PROTON CENTER**  
Warrenville, IL, USA  
*Treating since 2010*



1 ROOM

**WILLIS-KNIGHTON CANCER CENTER**  
Shreveport, LA, USA  
*Treating since 2014*



4 ROOMS

**SCCA PROTON THERAPY A PROCURE CENTER**  
Seattle, WA, USA  
*Treating since 2013*



3 ROOMS

**TEXAS CENTER FOR PROTON THERAPY**  
Dallas, TX, USA  
*Treating since 2015*



4 ROOMS

1 ROOM

**UNIVERSITY OF FLORIDA HEALTH PROTON THERAPY INSTITUTE**  
Jacksonville, FL, USA  
*Treating since 2006 / Opening in 2019*



5 ROOMS

**HAMPTON UNIVERSITY PROTON THERAPY INSTITUTE**  
Hampton, VA, USA  
*Treating since 2010*



4 ROOMS

**PROCURE PROTON THERAPY CENTER IN OKLAHOMA CITY**  
Oklahoma City, OK, USA  
*Treating since 2009*



4 ROOMS

**PROCURE PROTON THERAPY CENTER**  
Somerset, NJ, USA  
*Treating since 2012*



1 ROOM

**BEAUMONT HEALTH SYSTEM**  
Royal Oak, MI, USA  
*Treating since 2017*



5 ROOMS

**UNIVERSITY OF PENNSYLVANIA HEALTH SYSTEM ROBERT'S PROTON THERAPY CENTER**  
Philadelphia, PA, USA  
*Treating since 2010*



3 ROOMS

**MASSACHUSETTS GENERAL HOSPITAL BURR PROTON THERAPY CENTER**  
Boston, MA, USA  
*Treating since 2001*



3 ROOMS

**THE PROTON THERAPY CENTER LLC (TPTC) PROVISION HEALTHCARE**  
Knoxville, TN, USA  
*Treating since 2014*



3 ROOMS

**MIAMI CANCER INSTITUTE BAPTIST HEALTH SOUTH FLORIDA**  
Miami, FL, USA  
*Treating since 2017*



2 ROOMS

**INOVA SCHAR CANCER INSTITUTE**  
Fairfax, VA, USA  
*Opening in 2020*

## South America network



1 ROOM

**INSTITUTO DE ONCOLOGIA ANGEL ROFFO HOSPITAL**  
Buenos Aires, Argentina  
*Opening in 2020*



- PROTEUS®PLUS
- PROTEUS®ONE

*This map has been updated in August 2017. For last version of the map visit us online at: [iba-worldwide.com](http://iba-worldwide.com)*

## Europe network



**UNIVERSITAIR ZIEKENHUIS LEUVEN**  
Leuven, Belgium  
*Opening in 2019*



**AZIENDA PROVINCIALE PER I SERVIZI SANITARI (APSS)**  
Trento, Italy  
*Opening in 2014*



**CENTRE ANTOINE LACASSAGNE**  
Nice, France  
*Opening in 2016*



**WESTDEUTSCHES PROTONENTHERAPIEZENTRUM ESSEN (WPE)**  
Essen, Germany  
*Opening in 2013*



**PROTON PARTNERS INTERNATIONAL**  
The Rutherford Cancer Centres (Newport, Reading, Northumberland & two other undisclosed locations)  
*Opening in 2018*



**PROTON THERAPY CENTER CZECH S.R.O.**  
Prague, Czech Republic  
*Opening in 2012*



**SKANDIONKLINIKEN**  
Uppsala, Sweden  
*Opening in 2015*



**CENTRE DE PROTONTHÉRAPIE DE L'INSTITUT CURIE**  
Paris (Orsay), France  
*Opening in 2009*



**FEDERAL HIGH-TECH MEDICAL CENTER**  
Dimitrovgrad, Russia, Europe  
*Opening in 2018*



**CHILDREN'S CANCER HOSPITAL FOUNDATION**  
Cairo, Egypt  
*Opening in 2020*



**BRONOWICE CYCLOTRON CENTER**  
Kraków, Poland  
*Opening in 2011*



**CYCLHAD (CYCLOTRON FOR HADRON THERAPY)**  
Caen, France  
*Opening in 2018*



**UNIVERSITÄTKLINIKUM CARL GUSTAV CARUS**  
Dresden, Germany  
*Opening in 2014*



**UNIVERSITAIR MEDISCH CENTRUM GRONINGEN (UMCG)**  
Groningen, The Netherlands  
*Opening in 2017*



**QUIRÓNSALUD PROTON THERAPY CENTER**  
Madrid, Spain  
*Opening in 2019*



**APOLLO PROTON THERAPY CENTER**  
Chennai, India  
*Opening in 2018*



**NARITA MEMORIAL HOSPITAL**  
Toyohashi-shi, Japan  
*Opening in 2018*



**NATIONAL CANCER CENTER**  
Ilsan, Korea  
*Opening in 2007*



**TMUH - TAIPEI MEDICAL UNIVERSITY HOSP.**  
Taipei, Taiwan  
*Opening in 2020*



**WANJIE PROTON THERAPY CENTER**  
Zibo, China  
*Opening in 2004*



**BEIJING PROTON MEDICAL CENTER**  
Beijing, China  
*Opening in 2018*



**GULF INTERNATIONAL CANCER CENTER (PPI)**  
Abu Dhabi, UAE  
*Opening in 2020*



**TATA MEMORIAL CENTRE**  
Mumbai, India  
*Opening in 2019*



**KOJINKAI HOKKAIDO OHNO MEMORIAL HOSPITAL**  
Kushiro, Japan  
*Opening in 2018*



**CCH - CHANGHUA CHRISTIAN HOSP.**  
Changhua, Taiwan  
*Opening in 2021*



**GUANGDONG HENGJU MEDICAL TECHNOLOGIES CO. LIMITED**  
Guangzhou, China  
*Opening in 2018*



**ZHUOZHOU PROTON THERAPY CENTER**  
Hebei, China  
*Opening in 2018*



**QINGDAO ZHONG JIA LIAN HE HEALTHCARE MANAGEMENT COMPANY LIMITED**  
Qingdao, China  
*Opening in 2019*



**GULF INTERNATIONAL CANCER CENTER (PPI)**  
Abu Dhabi, UAE  
*Opening in 2020*



**GULF INTERNATIONAL CANCER CENTER (PPI)**  
Abu Dhabi, UAE  
*Opening in 2020*

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Technical specifications are based on standard operating conditions and may be subject to variations.

Pictures and illustrations are not contractual.

**PROTEUS®PLUS** is the brand name of the Proteus 235 FDA Cleared and CE marked product.

Adapt insight is the brand name of the I2C Image guided therapy device integrated to the IBA Proton Therapy solutions.

IBA, a Belgian company, is listed on the pan-European stock exchange EURONEXT and its annual reports can be downloaded on the website: [www.iba-worldwide.com](http://www.iba-worldwide.com)

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## **IBA: The best in proton therapy today and tomorrow**

Together with our clinical partners, we brought proton therapy to clinical cancer care.

Ever since we started more than 30 years ago, our collaborations, our visionary roadmap and progressively unrivalled experience have enabled us to continue to innovate. Care givers now benefit from leading proton therapy technologies.

Today, our true continuum of Image-Guided Intensity Modulated Proton Therapy solutions can easily be integrated in most healthcare settings to make it available to all patients who need it.

Backed by IBA's unique service offer (financing, workflow optimization, education), our tailor made **PROTEUS®PLUS**, all our solutions and robust processes (installation, operations and upgrades) are developed in collaboration with our end-users.

Tomorrow, our unique and open culture of sharing will further strengthen the clinical and patient communities we have always cared for. Working collectively, we will achieve our goal which is to offer cancer patients access to effective treatments with decreased side effects and better quality of life.

Request more information: [pplus@iba-group.com](mailto:pplus@iba-group.com)

### **Visit us online at:**

[www.iba-protontherapy.com](http://www.iba-protontherapy.com)

