GE HealthCare

Affidea Tomar Case Study with TrueFidelity and DoseWatch

How a combination of Artificial Intelligence (AI) and a systematic dose management approach helped to achieve protocol and dose optimization while enhancing patient experience.*

*The experiences shared by GE HealthCare's customers are specific to their unique environments. Given the variations in radiology departments like size, case mix, clinical practice and IT adoption, similar results cannot be guaranteed for all customers.

Affidea Group is a **private pan-European healthcare provider,** with Diagnostic Imaging at the core of its services, incorporating advanced technology in MR, CT and PET-CT.

With more than 30 years of presence across 15 countries in Europe, and a real commitment to quality and precision in diagnostic imaging, Affidea collaborates with the best professionals, uses modern technology, and provides excellent patient care.

Affidea's Dose Excellence Program received privileged recognition on the EuroSafe Imaging Wall of Stars with 73 centers awarded with 5 stars. With this Affidea is one of the most awarded healthcare providers in Europe for radiation protection and patient safety.

Affidea has been present in Portugal since March 2007, with more than 20 centers, providing high-

quality diagnostic imaging and laboratory services as well as, specialists' consultations, performing around 7.5 million examinations per year.

The Clínica Affidea Tomar (Portugal) is one of the first centers combining GE HealthCare's deep-learning based image reconstruction for CT, TrueFidelity (TF), and DoseWatch Dose Management Software. The center is part of the Affidea's Dose Excellence Program since 2014.

The Opportunity for the Center

At Affidea, patient safety is a strong commitment to the ultimate detail. CT Dose is optimized while image quality ensures diagnostic confidence.

Clínica Affidea Tomar, a center distinguished for its Dose Excellence Program, explored the opportunity that presented itself to optimize radiation dose while preserving image quality.

"In line with our commitment to optimize dose and enhance patient safety, TrueFidelity came as an effective solution to respond to our needs."

After a 3-month period with TrueFidelity, consistent optimization of the radiation dose was performed for every clinical indication and anatomical region. Multiphase abdomino-pelvic examinations were the studies where the impact was most noticed. Compared to former practice with a similar patient collective the protocol was optimized achieving up to 68% * of radiation dose reduction for abdomino-pelvic exams , while maintaining the accuracy of the image.

"With no impact on the workflow and a short adaptation period to image characteristics, noise reduction and tissue homogeneity are seemingly perceived."

*study compared abdomino-pelvic exams done at the site 3 months prior to applying TrueFidelity and 3 month after using TrueFiedlity during the normal practice, consisting of ~1.800 exams; result from this site only and may not be applicable to other sites

The Opportunity for the Radiologists

Radiologis have two ambitions: Enhanced image quality and optimizing radiation dose

While a lower radiation dose is important to all patients, patients in need of consecutive CT exams like oncologic patients, patients with multiphase hepatic studies, and pediatric patients, will benefit mostly from optimization efforts of the Dose Excellence Program.

Vascular imaging with TrueFidelity is also a good example of outstanding spatial and contrast resolutions with smoothened image texture. And the added benefit of the dose optimization comes also as very important for these patients, who perform CT examinations throughout their lives, including surveillance studies (until eventual surgical indication), pre-operative mapping and post-operative monitoring yearly for life.

Dra. Rosana Santos

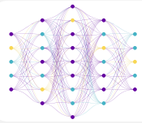
Dra. Rosana Santos is a Portuguese radiologist and Affidea's Group Clinical Education Scientific Leader, with a special interest in Artificial Intelligence. In this new era of Radiology, one of the pursued challenges at Affidea has been the criterious selection and validation of AI tools by radiologists beyond a laboratory investigation setting, for implementation in real-life clinical scenarios.

AI in Image Reconstruction

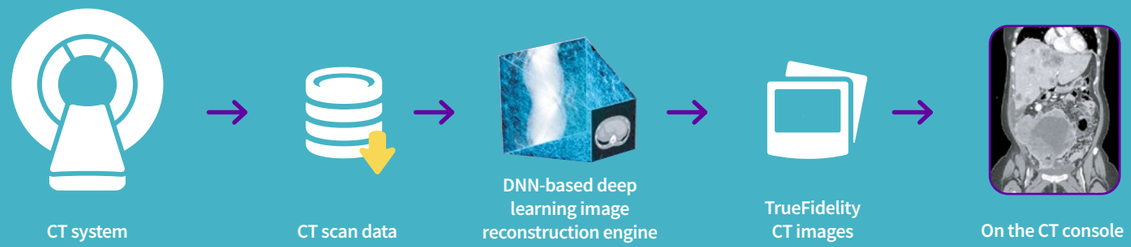
TrueFidelity features a deep neural network (DNN), which was trained with high quality FBP data sets to learn how to diferentiate noise from signals, and to intelligently suppress the noise without impacting anatomical and pathological structures. The resulting TrueFidelity CT images, with outstanding image quality (IQ) and preferred noise texture, have the potential to improve reading confidence in a wide range of clinical applications.

Artificial intelligence
Incorporating human intelligence to machines

Machine learning
Empowering computer systems with the ability to “learn”

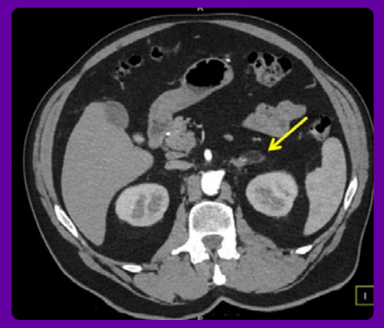


Deep learning
Learning based on deep neural networks

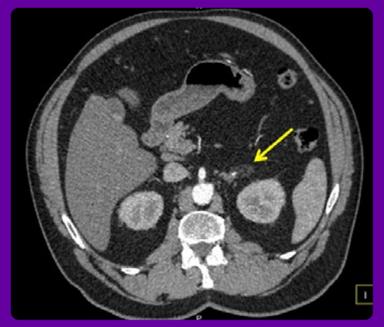


TrueFidelity + DoseWatch comes as a win-win situation: for patients and for radiologists.

With TrueFidelity



Without TrueFidelity

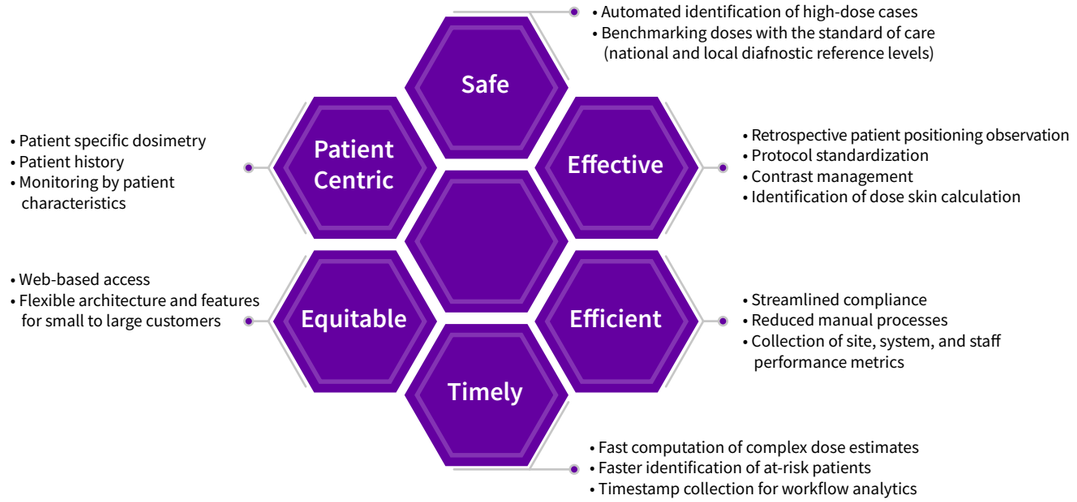


(1) The statements described here are based on Dra. Rosana Santos’ own opinions and on results that were achieved in this unique setting. Since there is no “typical” hospital and many variables exist, i.e. hospital size, case mix, etc…there can be no guarantee that other customers will achieve the same results.

Affidea’s Dose Excellence Program

A structured Dose Excellence Program helps to meet dose regulatory guidelines, supports achieving patient and staff radiation safety goals and ongoing outcome optimization through analytics and education. DoseWatch as GE HealthCare Dose Management Software is the foundation for these optimization efforts.

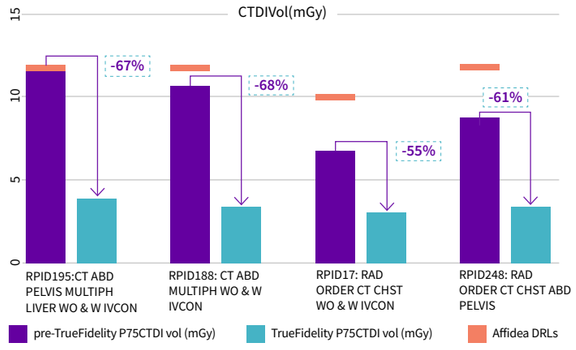
Benefits of GE HealthCare DoseWatch



Moreover, the implementation of TrueFidelity allows ultra low dose[2] thanks to reduced noise in the images. This will impact directly to the patients that will need follow-up with CT scans.

Dose Reduction Results[3] at Affidea Tomar

Revolution EVO™ with TrueFidelity



Standard study description	pre-TF P75 CTDI vol (mGy)	TF P75 CTDI vol (mGy)	DRLs P75 CTDI vol (mGy))	Reduction P75 CTDI vol (mYG)	DRL comparison TF P75 CTDI vol (mGy)
RPID213 : RAD ORDER CT HEAD	42	32	55	-24%	-42%
RPID195: CT ABD PELVIS MULTIPH LIVER WO & W IVCON	12	4	12	-67%	-68%
RPID188: CT ABD MULTIPH WO & W IVCON	11	3	12	-68%	-72%
RPID17 : RAD ORDER CT CHST WO & W IVCON	7	3	10	-55%	-69%
RPID248 : RAD ORDER CT CHST ABD PELVIS	9	3	12	-61%	-72%

Even before the installation of TrueFidelity Affidea Tomar performed their CT studies within the Group Diagnostic Reference Levels (DRLs). Analysis of results 3 months after the implementation and the following optimization of the protocols with Affidea’s Dose Excellence Program, showed that for the same standard study description dose levels decreased by up to 68% for the most used CT examinations (normal BMI patients).*

(2) Caro Franck et al. Preserving image texture while reducing radiation dose with a deep learning image reconstruction algorithm in chest CT: A phantom study, Physica Medica 81, (2021) 66-93 . https://doi.org/10.1016/j.ejmp.2020.12.005.
(3) The results are based on the extract performed from the Affidea Tomar where TrueFidelity is installed. Since there is no “typical” hospital and many variables exist, i.e. hospital size, case mix, etc…there can be no guarantee that other customer will achieve the same results.

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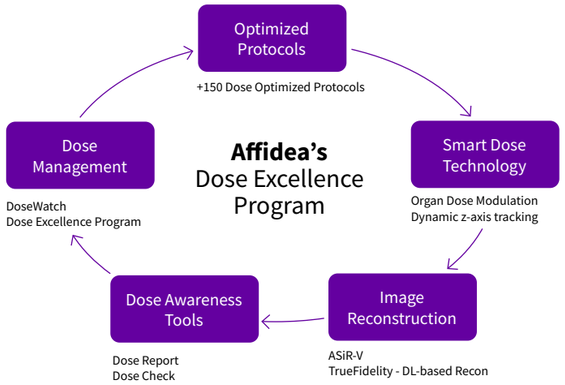
Benefits for radiologists at Affidea Tomar

DoseWatch enables a strategic approach to achieve dose optimization.This involves the close collaboration among the entire team, from technologist operating the equipment, to the radiologist reading the scan and the medical physicists evaluating protocols across the entire operation.



DoseWatch helps to increase the radiation dose awareness across imaging departments by making dose-related information available at a glance at the point of care. All dose data are compared in real time with the established organizational Diagnostic Reference Levels that are used as reference for all the countries where Affidea is present.

The combination of DoseWatch with TrueFidelity and a rigorous Dose Excellence Program allows for optimization of the CT protocols focusing on image quality improvement but also analysing the impact on the dose levels continously. Noise, image resolution and texture of these images are different features that impact positively the image quality. Traditionally, one of these features could be compromised when lowering the dose and image quality might be affected. With the implementation of TrueFidelity, noise levels are reduced, and natural textures and borders of structures are enhanced.

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Key Takeaway

"A rigorous Dose Excellence Program, that incorporates the newest AI-based CT Technology, and continuous improvement process centered around a Dose Management System, enabled Affidea Tomar to optimize dose exposure."

Chryssa Paraskevopoulou
Medical Physicist Expert
Radiation Protection Expert
Affidea Group Dose Management and Radiation Protection Manager

Radiologists' Experience[4]

"Incredible breakthrough allowing for the best of two worlds: dose reduction and image quality gains."

Dr. Luís Rosa. *Radiologist and Country Medical Director of Affidea Portugal*

"TrueFidelity improved our performance as radiologists, by granting exams with enhanced image quality and lower radiation dose."

Dr. Plácido Santos. *Radiologist at Affidea Tomar, Portugal*

"The reduction of radiation dose in CT studies allowed by TrueFidelity application is a benefit for users and a desire of radiologists. It´s a tool that I would like to continue to have available for CT studies."

Dra. Paula Avidago. *Radiologist, Clinical Medical Director at Affidea Tomar, Portugal*

"My initial experience with TrueFidelity (GE HealthCare) Deep learning-based image reconstruction technique has been very positive. The images resulting from this reconstruction method, unlike previous ones, obtained with iterative reconstruction algorithms, have a very natural appearance and fulfill the expectations of reducing radiation dose and in simultaneous, CT images' noise, without the "plastic" look of some previous techniques.

But it goes further than that by allowing us to obtain images with low noise, in series of thins thicknesses (eg. head CT acquired images), identical or inferior to noise measured in Head CT images of standard 2.5 or 3 mm thickness while maintaining radiation dose in already optimized protocols. This ability will potentially improve sensitivity /conspicuity for some lesions."

Dr. Sérgio Galo. *Neurorradiologist at Affidea Tomar, Portugal*

"TrueFidelity" is part of the latest generation of iterative reconstruction algorithms- "Deep Learning", allowing us to reduce the radiation dose our patients are exposed to without compromising image quality, since it reduces noise and artefacts, improving objectively the image quality! It is easy to verify this by comparing previous exams images with present exams of the same patients. Dose reduction is substantial while image quality is enhanced!"

José Venâncio. *Radiologist,.Affidea República, Portugal*

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ECR2023 - GE HealthCare Innovation Theater Session

Watch Chryssa Paraskevopoulou (Affidea Group Dose Management & Radiation Protection Manager) and Dr. Rosana Santos (Affidea Group Clinical Education Scientific Leader) presentation on Affidea's journey to revolutionize healthcare in this fascinating case study from Portugal.

About Affidea

Affidea Group (www.affidea.com) is a pan-European provider of advanced diagnostics, outpatient, and cancer care services. Founded in 1991, the company operates over 330 medical centers in 15 countries, serving more than 12 million patients annually. Due to its high standards in patient safety, Affidea is one of the most awarded providers of medical imaging services in Europe. More than half of the award-winning centers with 5 stars on the Eurosafe Wall of Stars, accredited by the European Society of Radiology in Europe, are Affidea centers. In June 2022, Affidea was awarded the Diagnostic Provider of the Year Award at the Health Investor Awards, and in September, the company won the Diagnostics and Primary Care Award at Laing Buisson Awards 2022.

About GE HealthCare

GE HealthCare is a leading global medical technology, pharmaceutical diagnostics, and digital solutions innovator, dedicated to providing integrated solutions, services and data analytics that make hospitals more efficient, clinicians more effective, therapies more precise, and patients healthier and happier. Serving patients and providers for more than 100 years, GE HealthCare is advancing personalized, connected, and compassionate care, while simplifying the patient's journey across the care pathway. Together our Imaging, Ultrasound, Patient Care Solutions, and Pharmaceutical Diagnostics businesses help improve patient care from diagnosis, to therapy, to monitoring. We are a $18 billion business with 51,000 employees working to create a world where healthcare has no limits.

Follow us on Facebook, LinkedIn, Twitter, Instagram and Insights for the latest news, or visit our website www.gehealthcare.com for more information.

The medical devices indicated above comply with current legislation and are CE marked.

For DoseWatch reach out to your local sales representative to know more on features availability and DoseWatch versions

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