

CARE+CLEAR: Standard with Every Artis System

You Can't Haggle Over Radiation Protection

In recent years, many interventional procedures have become longer, more frequent, and more complex. That's why the need to reduce dose is increasingly important for both patients and clinical staff. In many cases, however, image quality is the key for successful procedures. A dilemma? Not with CARE+CLEAR, a comprehensive portfolio of image-quality and dose-saving tools. Because every patient and every case is different, only interventionalists can decide on the image quality they need – and then determine the lowest possible dose. AXIOM Innovations spoke with representatives from three different disciplines about their experiences with the CARE+CLEAR features.

It has been known for over 80 years that high doses of ionizing radiation can cause tissue damage. An increasingly harder line has been taken when weighing the benefits and risks associated with radiation. The International Commission on Radiological Protection (ICRP) has been dealing with all aspects of radiological protection since 1928. It now recommends that all radiological exposure over and above natural background radiation levels must be kept as low as possible and must lie below an individual radiation threshold, which has been set at 1 mSv per year for the general population.

An Ongoing Challenge for Manufacturers

We know that very high radiation doses in excess of 5,000 mSv¹, acting on the body within a short period of time, will lead to death in just a few days. Doses of over 100 mSv¹ can be harmful to the human organism and may contribute to an increased risk of cancer.

One guide for the development of low-radiation procedures is the statutory guidelines on the maximum permitted dose of radiation as approved by the International Commission on Radiological Protection. In an industrial context there are also agreements such as those of the Medical Imaging and Technology Alliance (MITA) in the US, in which manufacturers have agreed to develop their devices on the basis of established radiological protection requirements, to ensure that radiation exposure complies with the "ALARA" principle ("As Low As Reasonably Achievable", also known in some parts of the world as ALARP, i.e. "As Low As Reasonably Practicable").

"We should be concerned about everyone's well-being. And if we can generate better images using less radiation, then it makes sense for us to do so."

Prof. Ansgar Berlis, MD

Chief Physician Diagnostic and Interventional Neuroradiology
at the Klinikum Augsburg



What “as low as reasonably practicable” actually means is best known by the practitioners themselves, the treatment providers who deal with different people and different diagnoses on a daily basis and whose interest it is to help people by using radiation sensibly and responsibly. We asked these professionals how they deal with the dilemma of achieving an ideal level of image quality while keeping the dose as low as possible. And we wanted to find out how much the CARE+CLEAR features helped in this task.

Radiation Protection for Patients and Staff

When asked whether he thought the CARE+CLEAR features should be supplied as standard or offered as an option, Prof. Ansgar Berlis, MD, Chief Physician Diagnostic and Interventional Neuroradiology at the Klinikum Augsburg, answered with another question: “Who would drive an automobile today without a seatbelt and an airbag?” He believes that manufacturers must look after the safety of both patients and medical staff. In Prof. Berlis’ view, this type of safety system can determine whether or not a sale is made, and should be considered a quality criterion. This opinion is shared by his colleagues, Prof. Thomas Albrecht, MD, Head Physician at the Institute for Radiology and Interventional Therapy at the Vivantes Klinikum Neukölln, and Olaf Göing, MD, Head Physician Internal Medicine at the Sana Klinikum, Berlin, specializing in cardiology. Göing has a particularly radical perspective when it comes to radiological protection: “These days, when we have a better understanding of the connections between radiation dose and potential illness than we did previously, features that enable us to reduce the dose of radiation should be provided as a matter of course. There should not even be the possibility of choosing differently just to cut costs.” He continued: “I will grant that as a young doctor and later as a cardiologist, I did not take these problems seriously enough. I take a totally different view now. If I were buying a new cath lab I would classify

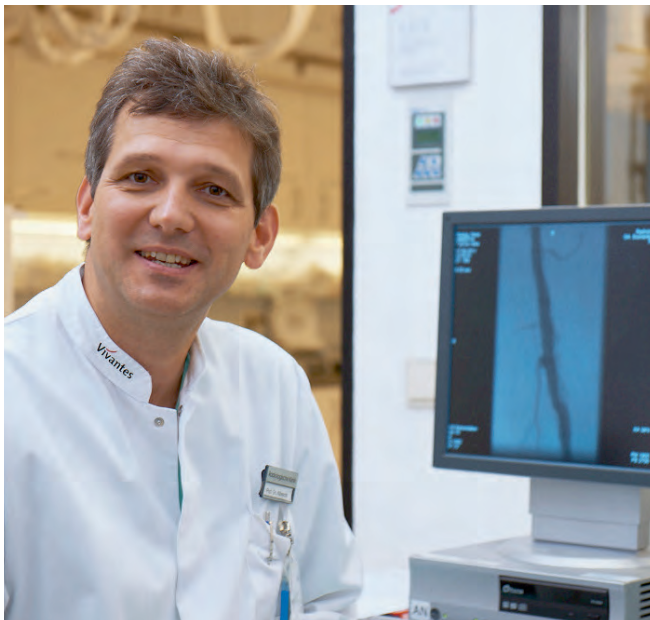
dose-reduction features as a fixture, if the case arose. All other options depend on financial and medical necessity, and can still be negotiated, unlike radiation protection.”

Prof. Albrecht works at the Vivantes Klinikum Neukölln, a maximum care facility with about 1,100 beds and an equally broad range of treatment fields. The focus of the work done there, besides peripheral intervention, includes oncological intervention and embolization of hemorrhages. He considers that “radiation protection goes without saying,” and in this regard is thinking not just of his patients’ well-being but also that of his team: “Many interventions these days take several hours, with correspondingly long periods of X-ray exposure. Reducing the dose is essential in these cases, especially for the staff.”

CAREposition and CAREprofile are the Stars of the Scene

The clear line presented by the experts shows that Siemens is on the right path with its decision to provide dose-saving and image-processing tools as standard with its Artis systems, and that it is in fact setting a clear direction. Because some competitors are still offering comparable packages on an optional basis, Siemens is going a step further and taking on a pioneering role: the CARE+CLEAR package, which currently contains 17 features, has been growing constantly since 1994 and comes as standard with every Artis system. Siemens is thus concentrating fully on the interests of those providing the treatment, which are many and varied.

For cardiologist Olaf Göing, MD, for instance, CAREposition and CAREprofile help establish the correct setting for the devices in relation to the patient’s anatomy with particular speed. He makes most use of the ability to set an individual pulse rate with CAREvision. “This makes it possible to ‘power down’ when handling slim patients and ‘power up’ for very adipose patients, to avoid having to



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accept a loss of information. CAREposition and CAREprofile help find the right position for the tubes or detectors and the collimation and filter with regard to the part of the patient's anatomy that has to be displayed, without having to resort to X-rays, and we use them accordingly."

Conversely, in the area of neurointervention, procedures may be very lengthy. However, it is now possible to treat aneurysms, including full cerebrovascular diagnosis and treatment, in under an hour. Dr. Berlis describes the advantages of the CARE+CLEAR features in this regard: "Table and tubes can be moved with no requirement for X-rays. We can plan treatment within seconds after preparing a rotational angiogram." He adds: "These short intervention times also mean short X-ray times and reduced risks of treatment, which increase with the length of time taken by the intervention process."

In interventional radiology it is standard practice to work with low-dose programs in all parts of the body. The CARE+CLEAR features provide a benefit "for all interventions, actually," in Prof. Albrecht's view. From his perspective, too, however, the stars are the CAREprofile (using the Last Image Hold (LIH) as a reference, CAREprofile enables radiation-free collimator and semitransparent image filter adjustment. As a result, dose reductions can be achieved), and CAREposition (based on the LIH, a graphical outline of the upcoming image is displayed on the monitor, allowing you to move the table or C-arm without needing any radiation. As patients can be positioned without additional fluoroscopy, dose reductions are possible – making CAREposition an ideal choice for long procedures).

Save on Radiation Dose by All Means – But not at the Expense of Image Quality

Whether your patients are tall or short, obese or slender – interventionalists need to see. And in order to see, they need optimal image quality. Dr. Berlis can confirm that the extensive options to save on dose do not come at the cost

of reduced image quality: "The low-dose programs are not only sufficient for normal patients, but also offer the best image quality." In his experience, there has been relatively little need for high-dose programs, since even with corpulent patients the low-dose programs are sufficient in the head and neck area. They are only needed when the spinal column is involved.

The low-dose programs are used both for diagnostic vascular imaging and during actual intervention. Prof. Berlis explained: "In diagnostic angiography procedures, the image frequency can be reduced when advancing the catheter and examining the supra-aortic vessels, which also means that the dose can be reduced. An image frequency of 15 per second is used during interventions and when examining minuscule vessels. At this speed the motion is sufficiently continuous for the human eye, which enables the microcatheter to be positioned down to the nearest millimeter." The CLEAR applications automatically increase certainty during interventions by keeping image quality high.

Awareness is Changing

The CLEAR applications are finally being combined with the CARE features, which have undergone constant development since 1994, and are now offered as a single package. The Combined Applications to Reduce Exposure (CARE) are simple: They are designed to help you deliver better care at the lowest reasonable dose. CARE does more than focus on patient well-being, however.

For the experts it is important to provide protection for their own teams: "Both patients and physicians want to know what dose of radiation to expect with a CT or cardiac catheterization procedure and any potential intervention. Everyone involved is more informed than was previously possible," said Dr. Göing. Prof. Berlis added: "We are talking about protecting the patients, but also ourselves and our employees. We should be concerned about every-

"With the Artis dose-monitoring features, skin dose control is easy and efficient. State-of-the art reporting solutions enable efficient and transparent reporting and documentation of radiation dose."

Olaf Göing, MD

Head Physician Internal Medicine at the Sana Klinikum, Berlin



one's well-being. And if we can generate better images using less radiation, then it makes sense for us to do so."

He offers an example to show that the population as a whole is becoming more aware of radiological exposure: "More and more patients ask after the event whether the radiation dose they were given was significant. There is a key point that we must note here: the system makes it possible to demonstrate not just the dose, but also the dose for particular table settings. Two years ago I treated an arteriovenous malformation (AVM) in the brain of a young female patient who discovered six weeks later that she was pregnant when the surgery was performed. Calculation of the uterine dose showed this to be virtually zero, since I initially X-rayed this young lady in the region of the aortic arch. The physicist on our team could see this based on the device settings, and was surprised at the same time that no X-ray of the groin had been taken."

Protecting Employees is of Maximum Importance

For manufacturers of devices for medical imaging, the important principle in the development process is that users must obtain the best possible image quality but the radiation dose must be kept as low as possible at the same time, since the actual effects cannot be established with total certainty even for low radiation doses, below 100 mSv, for instance. Further technical innovations are constantly needed to achieve these goals, as well as effective training for the radiology staff, to ensure that the devices are used correctly.

Prof. Berlis' neuroradiology team currently performs more than 300 interventions on patients each year. These include about 100 acute stroke treatments, 100-120 aneurysms and 50 arteriovenous malformations affecting the spinal column and brain. "Reducing the dose helps not only the patient but also the intervention team, which includes the interventionalist, the assistants, the medical technical radiology assistants and the anes-

thesiology team." This is precisely why radiological protection is considered so important at the Augsburg Clinic. The structures are set up to enable the patient to be monitored outside the examination room, and the anesthesiology team enters the examination room only when needed – to administer medication, for instance. Additional lead-lined walls on rollers protect the intervention and anesthesiology team.

Prof. Albrecht appeals to the individual responsibility of each of his colleagues: "They are not always as attentive to their own radiation exposure as I would prefer for myself. I consider minimizing radiation exposure for the intervention personnel to be a matter of key concern. In this connection, progress in the area of device technology must be supplemented by observance of radiation protection measures by the staff." Dr. Göing agrees, since he understands the task only too well: "Protecting employees as part of our 'constant activity' in the cardiac catheterization laboratory cannot be rated highly enough."

For more information please visit our CARE+CLEAR website



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