

How AlluraClarity works

There is a clear shift in the medical world from open surgery to minimally-invasive interventions that facilitate faster procedures, minimize risk to patients and improve treatment results. However, with a minimally-invasive intervention, doctors can no longer directly see and feel the organs they are operating on. High-quality imaging technologies that allow doctors to view beyond the patient's skin are therefore essential. These technologies must be capable of visualizing the patient's internal organs and tissues, and the images they produce must be as precise and sharp as possible so that doctors can make accurate diagnoses and carry out successful procedures. Minimally-invasive procedures are less harmful to patients, reduce the risks posed by the treatment, and in some instances can be performed entirely on an outpatient basis.

Interventional X-ray

Interventional X-ray is a special form of radiology in which X-ray radiation is used to produce real-time images of a patient's internal organs. These images, displayed on a computer screen, allow doctors to perform transcatheter procedures (procedures performed via a flexible catheter that is inserted into the appropriate organ or tissue via a small incision in the patient's skin), in which the patient's internal organs and the catheter can be visualized.

AlluraClarity

With interventional X-ray, decreasing the amount of X-ray radiation used to generate the images (beneficial in terms of reducing the patient's and the doctor's exposure to X-rays) is typically linked to a reduction in image quality. Reduced image quality makes it more difficult to diagnose and treat patients effectively, which may have an adverse effect on treatment results. An important step forward in interventional X-ray is keeping the total X-ray dose to a minimum *without* sacrificing image quality in the process. Philips has therefore developed its AlluraClarity interventional X-ray system, which features advanced technology (ClarityIQ) that improves every part of the image generation process - from X-ray tube to screen - in order to drastically reduce the X-ray dose without having any detrimental effect on image quality.

How does AlluraClarity work?

In developing AlluraClarity, Philips combined its own clinical knowledge with that of the world's best interventional specialists.

More than 500 elements in the AlluraClarity X-ray system have been refined to such an extent that the amount of X-ray radiation required for virtually every type of minimally-invasive interventional X-ray procedure can be reduced. For example, Philips' ClarityIQ technology filters out non-image-forming X-ray radiation so that the radiation is used more efficiently. In this way the X-ray tube is used optimally and significantly less X-ray radiation is emitted during the treatment.

How the images are subsequently processed depends on the type of minimally-invasive procedure being performed. For example, the images acquired during a cardiology examination may be processed differently to those obtained during a neurological

examination. Depending on the type of procedure, specific settings are therefore adjusted to achieve the optimum image quality with the minimum X-ray exposure. Noise reduction and real-time compensation of movement artifacts further enhance the images, which are optimized and sharpened on the basis of the latest state-of-the-art image processing knowledge. Movements of both the patient and the patient table are also compensated for, with the entire process being performed in real-time so that the resulting images are immediately visible.

Advantages

With AlluraClarity, image quality is maintained at a fraction of the X-ray dose that was previously required for the same examination. This is safer for patients and reduces the risk of complications arising from exposure to X-rays. The lower X-ray dose is also safer for doctors and nursing staff, who inevitably receive a small X-ray dose during each procedure.

Exposing the human body to X-ray radiation either intensively or for lengthy periods of time can be harmful, particularly in the case of children (pediatric), geriatric patients and obese patients who have to undergo complex interventional X-ray procedures for lengthy periods. Potential harmful effects include tissue burns and hair loss. Birth defects and diseases such as cancer have also been linked to excessive X-ray exposure. In order to counteract the negative effects of X-ray radiation as much as possible, doctors are trained to use the smallest dose of radiation needed to obtain the desired result. At the same time this represents a limitation, particularly if a patient requires several interventions and has reached his or her maximum permitted level of exposure. In such cases procedures sometimes have to be halted or omitted entirely. For both patients and doctors it is therefore important that the amount of radiation used during an examination is reduced.

Clinical trials

The image quality of Philips' AlluraClarity with ClarityIQ technology is currently being researched in clinical studies at various locations around the world. In addition to the completed study in the Radboud University Nijmegen Medical Centre in the Netherlands studies are ongoing at Catherina Hospital in Eindhoven the Netherlands, the St. Antonius Hospital in Utrecht / Nieuwegein in the Netherlands and the Karolinska University Hospital in Sweden.