

Towards safer imaging in neonatal & paediatric radiology

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Long-term health for fragile patients

The reduction of radiation dose is the biggest challenge facing paediatric radiologists today. This is not only due to children's higher sensitivity to radiation, but also to the cumulative effect of the radiation. A premature infant, for example, may undergo 30-40 exams over the course of treatment. In neonatal intensive care units (NICUs) diagnostic radiology is key to effective diagnosis and treatment of these fragile patients. Yet, it's clear that finding ways to reduce radiation exposure for neonatal and paediatric patients makes sense for preserving their long-term health.

Belgian agencies FANC-AFCN (Federal Agency for Nuclear Control) and SCK-CEN (Study Center for Nuclear Energy) conducted a study on radiology doses delivered to babies born before 37 weeks of gestation (report published in 2013). The research followed 285 premature babies in NICUs across Belgium, with birth weight as low as 500g, who underwent a combined total of 830 examinations during their hospital stays.

The study, titled **PreDos**, measured tube output for every contributing x-ray system in the participating hospitals. For each patient, the number of examinations was extracted from the PACS. The researchers found wide variation in the estimated doses across the hospitals. Causes included variations in exam settings, focus-detector distance and tube output for the different x-ray machines. In addition, there were significant differences in the number of exams each patient underwent.

Another European study from 1997 showed a radiation dose variation factor of 70 across different European healthcare facilities. As premature babies can undergo two to three exams each day, this level of variation is unacceptable. Improving awareness of radiation protection, including through initiatives and campaigns like EuroSafe Imaging, is critical to improving medical radiation safety for all patients.

How to pinpoint the optimum balance between radiation dose & image quality

This is the question that Agfa HealthCare is committed to answering. Already, we have developed several tools to support paediatric radiologists – and radiologists in general – in minimising and monitoring patient dose. We have worked together with neonatal and paediatric radiologists to adhere to the 'as low as reasonably achievable' (ALARA) principle, and with hospitals in general, to introduce best practices. We understand that if radiation studies can be performed with less radiation, they should be, and we are committed to empowering imaging centres to do so. Our aim is to advance efforts in dose management because it could, ultimately, have an impact on people's long-term health.



High-efficiency needle phosphors for digital radiography

High-efficiency needle phosphors have an important role to play in dose management. In direct radiography (DR), this includes cesium iodide (CsI), while for computed radiography (CR) we offer cesium bromide (CsBr). Their higher x-ray absorption and conversion efficiency offer a higher DQE (detective quantum efficiency) which can lead to higher-quality images and lower dose requirements, improving the optimum balance between dose and image quality.

MUSICA image processing and NX dose management tools

In Agfa HealthCare's solutions this needle phosphor technology is complemented further by MUSICA, a leading image processing tool for optimising image quality. Adding in the productivity and centralised dose monitoring capabilities of the NX multimodality workstation provides a powerful set of tools for dose management.

The NX workstation includes a colour-coded exposure bar which clearly and visually indicates to the radiologist whether the radiation exposure is 'acceptable', 'slightly out of range' or 'significantly out of range'. Exposure can also be tracked and monitored by a technologist for trends, such as upward drift, downward drift or even variations.

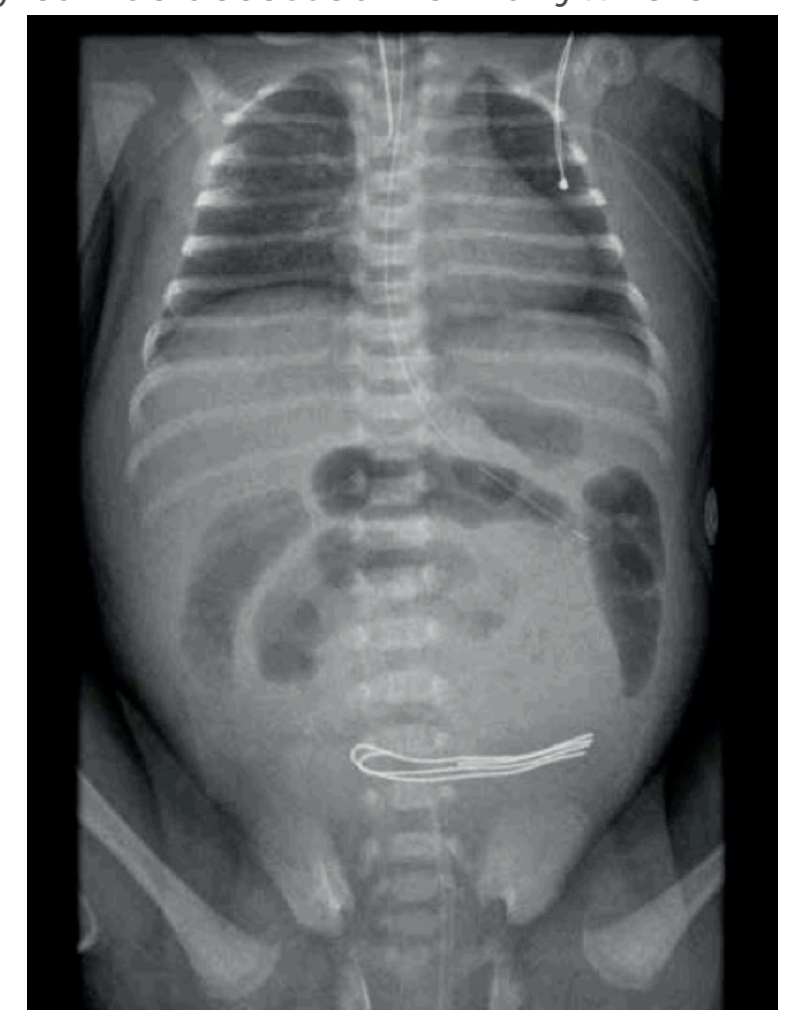
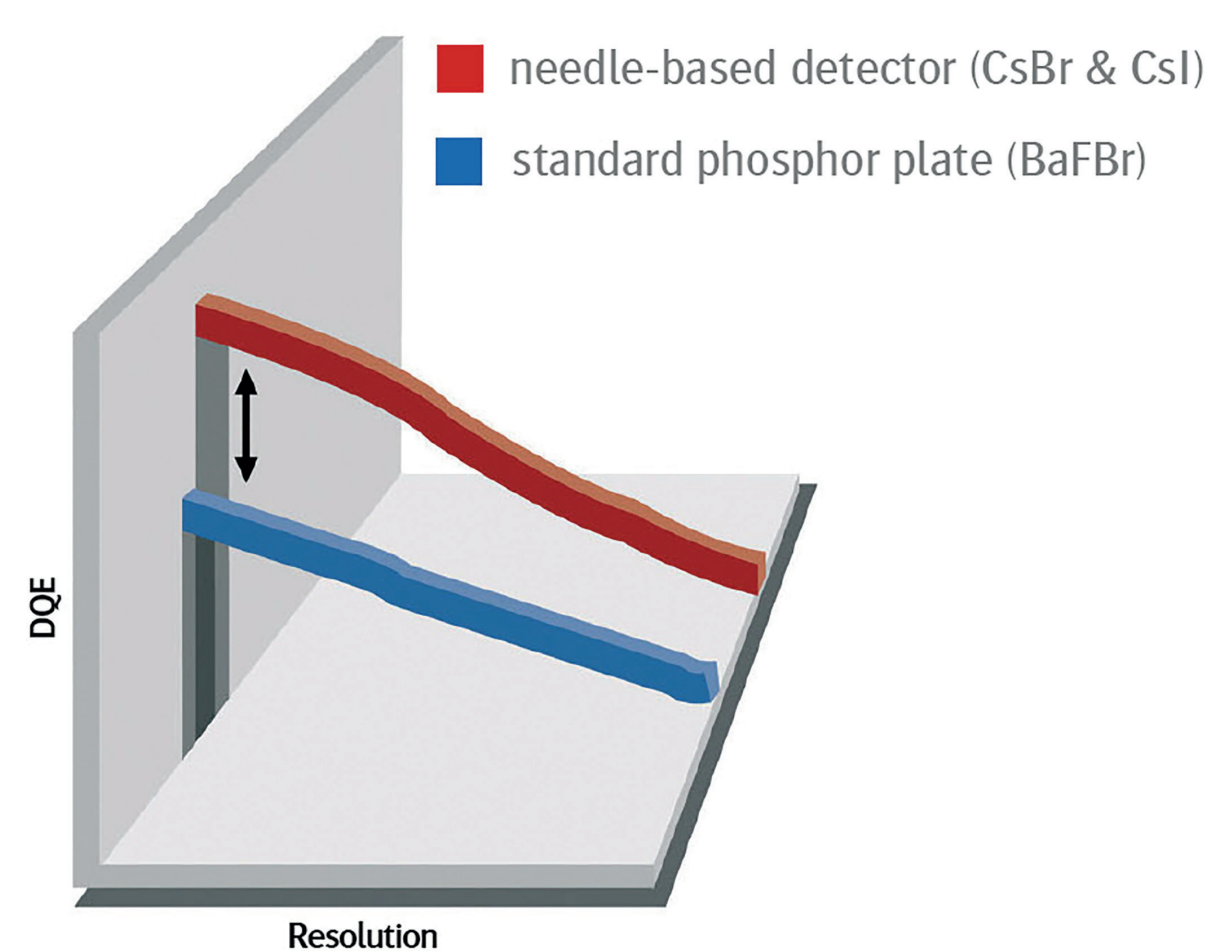


Exposure index standard helps reduce possibility of exposure errors

Agfa HealthCare was the first company to fully implement the exposure index standard into its modalities. Introduced by the International Electrotechnical Commission (IEC) and the American Association of Physicists in Medicine, this standard method for tracking exposure reduces the possibility for exposure errors, as technologists only need to remember one method for monitoring exposure changes, regardless of which vendor's technology is being used for image capture. The exposure index has since become an industry-accepted standard by manufacturers around the globe.

Radiation exposure monitoring with IMPAX REM

Agfa HealthCare's IMPAX REM radiation exposure monitoring solution tracks, stores and performs analysis on radiation dose data from multiple modalities. Until recently, dose data was often not automatically recorded, making tracking difficult. Technology innovations and standards are improving the accessibility of this information, and IMPAX REM can help caregivers and facilities perform patient dose tracking with ease. PACS and modality-vendor neutral, it allows disparate data to be shared and used for analysis, and includes a data modelling tool. Its simple integration with other radiology department systems means dose history can be accessed from anywhere.



About Agfa HealthCare

Agfa HealthCare is all about achieving optimal image quality. A global leader in the fast-growing market of integrated IT and imaging systems, we offer healthcare facilities a seamless flow of information and a 360° view of patient care. Our unique, holistic approach enables us to provide in-depth clinical know-how and fully integrated hospital-wide IT and imaging solutions for radiology, cardiology, mammography and orthopaedics.

As a leader in medical imaging, we have taken on a key role in understanding and contributing to best practices for dose management. Our teams develop new technologies and solutions that can help reduce radiation dose while delivering high-quality images on the front lines of imaging, and provide smart ways to manage dose appropriately. We see dose management as a logical extension of our expertise, as image quality and dose are inextricably linked. So we will continue to find ways to use our technology to produce high-quality images.