



CANON MEDICAL SYSTEMS DO BRASIL LTDA.

Technologic Advances of Artificial Intelligence in Musculoskeletal Radiography.



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Introduction

In the information age, healthcare faces challenges to keep the efficiency and quality, and the investment in information technology is essential. Radiology has evolved from conventional film to digital systems, enabling better acquisition, visualization and storage of images, integrating clinical data in a more efficient way¹.

As for the musculoskeletal segment, radiology has a important role in bone age assessment, osteoporosis screening, fracture detection, column evaluation, metastatic monitoring, tumor diagnosis and osteoarthritis classification. Furthermore, the segment has evolved with advanced techniques, improving image quality, diagnosis and efficiency, highlighting innovation and clinical impact². New Technologies as the use of Artificial Intelligence (AI) has been transforming musculoskeletal radiology, bringing an impact to exam requests, quality, radiation dose and issuance of medical report³.

Intelligent Noise Reduction (iNR)

iNR is an algorithm of noise reduction based on Deep Learning, trained in clinical image data banks. It models the noise of planar radiographs and applies contextual post-processing preserving clinically relevant edges and textures. Compatibility, iNR is a software optional from CXDI Control Software NE (v3.10 or higher) it is also compatible with detectors in of 710 series. In other words, part of the gain comes from processing power, and another part (in the 720C) comes from more advanced hardware.

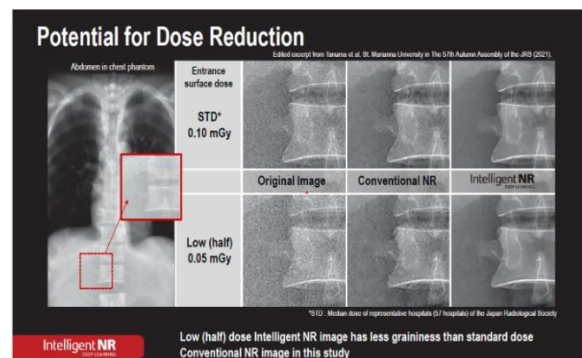


Figure 1 – iNR Technology



Figure 2 – Pelvic X-ray. Original image A and image B with INR. The image with INR shows less noise and greater sharpness, facilitating anatomical visualization with a reduced dose.

Knee X-ray

The knee x-ray clearly shows the femur, tibia, fibula, and patella bones. It is possible to observe the joint space and possible alterations such as osteoarthritis, useful for identifying fractures, misalignments, or bone lesions.

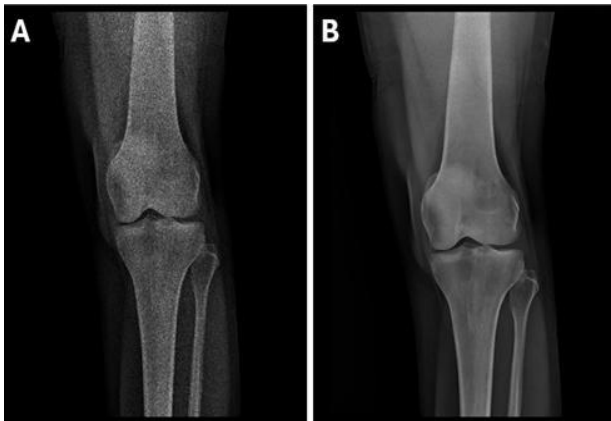


Figure 3 - Knee X-ray. Original image (A) and image (B) with INR. Image without INR is more grainy and less sharp. Image with INR is cleaner, more detailed and with less noise, allowing better visualization with a lower dose.

Ankle X-Ray

The image shows the distal tibia, distal fibula, and talus, allowing for assessment of joint alignment, bone integrity, and possible fractures or degenerative changes.

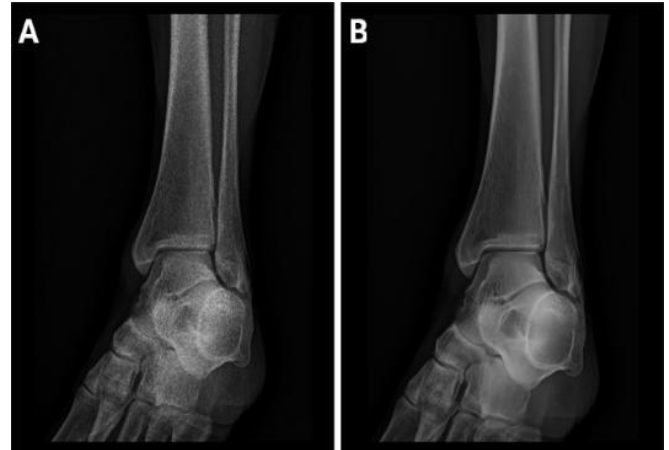


Figure 4 - (A): original radiograph and (B) radiograph with INR, showing significant noise reduction and greater image sharpness.

Hand X-Ray

The image shows good definition of bone contours, allowing for clear visualization of joints, bone trabeculae, and soft tissues. The contrast is adequate, with evident differentiation between bones, soft tissues, and air spaces.



Figure 5 –A: original radiograph and B radiograph with INR, showing significant noise reduction.

Conclusion

Canon's CXDI digital detectors represent an advancement in digital radiography, offering high spatial resolution, enhanced contrast, and noise reduction even at low radiation doses. Their ergonomic and robust design optimizes workflow and clinical productivity, establishing them as a solution of diagnostic excellence and patient safety.

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