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Mean Glandular Dose with Mammomat Fusion

A survey of 2D mammograms acquired in the clinical routine

Introduction

Mammomat Fusion* is a premium mammography system made to enhance everyday screening and diagnostics. This includes intelligent dose reduction features and a new generation Cesium-Iodide (CsI) high-resolution detector to reliably deliver excellent images at the right dose – especially important when screening healthy women.

This paper presents the mean glandular dose with Mammomat Fusion compared to a previous study¹ with other Full Field Digital Mammography (FFDM) systems in the clinical routine.

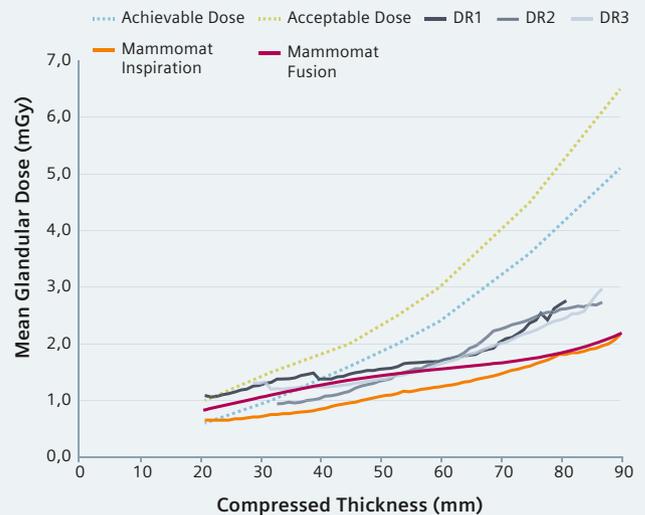


Figure 1: Average mean glandular dose as a function of compressed breast thickness

DR1 to DR3 are FFDM systems from different manufacturers.

New generation CsI detector

The new generation Cesium-Iodide (CsI) high-resolution detector improves both spatial resolution and dose efficiency. This new detector technology is also remarkably robust, making Mammomat Fusion particularly suitable for challenging situations, such as truck-installed mobile screening units.

The X-ray-sensitive area of each pixel of the new detector has been significantly increased with an innovative multi-layer design. This enables a smaller, 83 µm pixel size and higher detective quantum efficiency (DQE) compared to previous technologies. In addition, the scintillator thickness is matched to the X-ray spectrum of Mammomat Fusion. The combination of these developments results in better image quality, at the right dose.

Intelligent dose reduction

The combination of multiple features enables the intelligent dose reduction without compromising image quality.

OpDose® determines the exposure parameters required for each breast individually depending on breast density and thickness. OpDose® works in every position and automatically excludes the pectoral muscle from its calculation.

OpComp® with SoftSpeed slows the compression as soon as the plate reaches the breast. The compression is increased only as long as the breast is soft and pliable, stopping automatically when the optimal level of compression is reached, improving image quality and patient comfort.

OpView image processing software allows the selection from a range of predefined image impressions and flavors to match individual clinical requirements and preferences.

* Mammomat Fusion is not commercially available in all countries. Due to regulatory reasons its future availability cannot be guaranteed. Please contact your local Siemens organization for further information.

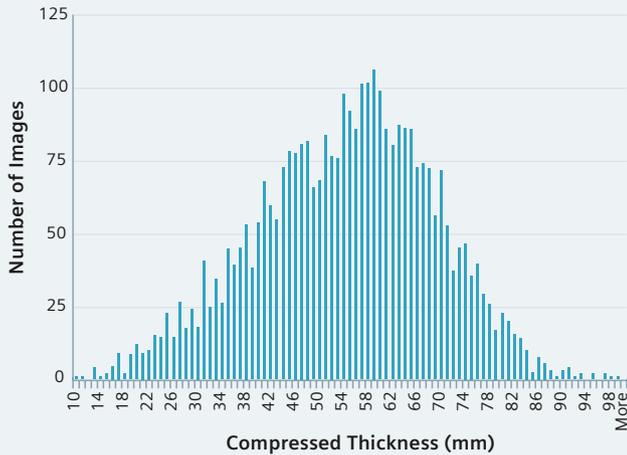


Figure 2: Histogram of 4000 images taken in a routine screening environment

Conclusion

This study analyzed dose levels of clinical cases performed with Siemens Mammomat Fusion, and compared them to dose levels of different FFDM systems obtained in a previous study ¹.

The mean glandular dose of Mammomat Fusion is in the same range as other FFDM systems with a trend toward even lower dose with breast thickness above 50 mm.

Mammomat Fusion's intelligent dose reduction features and new generation CsI detector deliver high image quality at the right dose.

Dose comparison

Dose information was extracted from over 1000 cases (4000 images) performed with Mammomat Fusion. The images were acquired and read in a routine screening environment under the appropriate image quality control conditions. A median dose value for each breast thickness was calculated allowing a dose – breast thickness curve to be plotted.

The result was then compared to the dose levels of a previous study ¹, in order to obtain a comparison of the dose level of Mammomat Fusion to other FFDM systems in the clinical routine. The resulting new dose – breast thickness curve for Mammomat Fusion imposed on the curves from the previous study ¹ can be seen in figure 1.

The curve for Mammomat Fusion is in the same level range or below that of other FFDM systems. This is especially noticed at breast thicknesses higher than 50 mm, demonstrating the effectiveness of the intelligent dose reduction features and new generation Cesium-iodide (CsI) high-resolution detector.

A histogram of the images taken (Figure 2) shows that the majority of examined breasts had more than 50 mm compressed thickness. Therefore, of the women examined in this sample, the majority have benefited from the lower dose with Siemens Mammomat Fusion compared to other FFDM systems.

¹ Mean glandular dose survey of 2D mammograms acquired with the Siemens MAMMOMAT Inspiration system, White Paper, Hilde Bosmans, Koen Michielsen, Kim Lemmens, Jurgens Jacobs, 2011. Department of Radiology University, Hospital Leuven, Herestraat 49, B 3000 Leuven, Belgium.

Note: The above results do not allow a comparative evaluation of the intrinsic performance of the systems, as image quality factors or detector characteristics are not compared. Rather, it shows how the dose levels of these different DR modalities are preprogrammed on the modalities.

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Siemens Healthcare Headquarters

Siemens Healthcare GmbH
Henkestr. 127
91052 Erlangen
Germany
Phone: +49 9131 84-0
siemens.com/healthcare