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7B) Advanced Registration of X-ray and MR Mammograms Provides Morphological and Functional Information at a Glance: Feasibility Study Using a Dedicated Matching Algorithm and Color Coded Parametric Maps

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PURPOSE

Registration of complementary imaging modalities is getting increasingly popular in the medical imaging community. The perhaps most famous example is PET/CT. Further applications are fusion of Xray- and MRI-Mammography exams (XM and MM). It is particularly charming, as it allows combining the morphological information of XM (microcalcification etc.) with functional parameters of MM (enhancement after application of Gadolinium). Previous research on registration of XM with MM focused on the topographic matching of breast tissue. Thus, it ignored the functional information of MRI in the fused images. We have developed a software allowing both topographic matching of breast lesion and fusion of the functional MRI data. This investigation reports overall radiological quality and accuracy of this approach.

METHOD AND MATERIALS

Inclusion criteria were visible mass lesions both in XM and MM in order to control for the quality of image registration. A "virtual XM" was calculated based on the MM using dedicated in house developed software. Based on the enhancement analysis of early and intermediate/late phase upon MM, a color coded overlay was automatically calculated to characterize tumor vascularisation. Subsequently, this overlay was registered with the "virtual XM". Finally, overall image quality and accuracy of the registration result and further tissue parameters were assessed by two experienced readers in consensus.

RESULTS

11 patients were enrolled in this preliminary study (mean age: 59 years; 43-73 years). In all patients fusion was performed, successfully. Overall accuracy reached 0,82 (mean), whereas accuracy was defined as the displacement of the centres of the lesion markings between XM and MM divided by the lesion size. The color overlay allowed identification and characterisation in all patients (n:11/11; 100%).

CONCLUSION

Clinical feasibility of our approach could be demonstrated. Accordingly, fusion of Xray- and MRI-Mammography allows computation of "virtual mammograms" combining exact morphologic and functional characterization of breast tumors into one single diagnostic examination.

CLINICAL RELEVANCE/APPLICATION

Advanced registration of Xray- and MR-Mammograms allows combination of exact topographic, morphologic and functional data into one single examination.

FIGURE (OPTIONAL)

Uploaded Image

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Disclosures:

Nothing to disclose: Matthias Dietzel
Nothing to disclose: Pascal Baltzer
Nothing to disclose: Torsten Hopp
Nothing to disclose: Hartmut Burmeister
Nothing to disclose: Nicole Ruitter
Researcher, Siemens AG Researcher, Bayer AG Researcher, General Electric Company Researcher, Suros Surgical Systems, Inc Researcher, C. R. Bard, Inc Researcher, Boston Scientific Corporation Researcher, Galil Medical Ltd Researcher, Koninklijke Philips Electronics NV Researcher, Confirma, Inc Researcher, CAD Sciences LLC Researcher, Carl Zeiss Stiftung Werner Kaiser

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