evaluate the diagnostic efficacy of contralateral mammography in patients presenting with unilateral operable breast cancer.

Methods: The case records and bilateral mammograms of 1755 patients who were operated between May 2005 and December 2006 were reviewed. Of these 1755 women, 40 (2.3%) patients had a clinically palpable abnormality in the contralateral breast; all were subjected to mammography and biopsy. The remaining 1715 patients had a clinically normal contralateral breast, of which, 5 patients had an abnormal contralateral mammogram. All 5 underwent mammographic localization and biopsy of the suspicious lesions.

Results: In 40 women with clinically abnormal contralateral breast, 19 also had a suspicious or indeterminate lesion on mammogram. On biopsy, 23 of 40 (or, 1.3% out of 1755) turned out to be malignant. Of the remaining 1715 patients with clinically normal contralateral breast, 5 had abnormal mammograms and only one of these 5 (0.06% of 1755) had a positive finding in the form of ductal carcinoma in situ (DCIS) at biopsy. Thus, 1715 mammograms were done to detect one DCIS (0.06%). It was interesting to note that no mammographic abnormality was detected in the clinically normal contralateral breast in women below the age of 50 years.

Conclusion: Thus, in a country like India, where the incidence of breast cancer is low, in women with unilateral breast cancer, mammography is neither useful nor cost-effective in the diagnosis of contralateral breast cancer at time of diagnosis.

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Comparative analysis of synchrotron radiation images of breast cancer tissue with their histopathologic findings

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Background: Synchrotron radiation is expected to improve the quality of clinical breast imaging. It provides detailed images of internal structures of the breast tissue samples with a great magnification and an excellent resolution. Using phase contrast technique, we got monochromated synchrotron images of breast cancer tissue. To figure out relation with their histopathologic findings, we compared the synchrotron images of the breast cancer tissues with their optical microscopic findings of stained adjacent breast tissue section.

Material and Methods: A x-ray microscope was installed on 1B2 beamline of Pohang Light Source, a third generation synchrotron radiation facility with operating energy of 2.5 GeV in Pohang, Korea. The x-ray energy was set at 11.1 keV and the x-ray beam was monochromatized by a W/B4C monochromator. Zernike phase-shifter was adapted for phase contrast x-ray microscopy. Formalin-fixed 10μm-thick breast cancer tissues were attached onto the Kapton film. The sample was positioned 25 m away from the beam source. The x-ray image of sample was converted into a visual image on the CsI(Tl) scintillation crystal, and magnified 20 times by microscopic objective lens. After additional 10 fold digital magnification, this visual image was captured by a full frame CCD camera. For a comparative analysis with its synchrotron image, adjacent tissue section was stained and the histopathologic features of the sample were captured by image analyzer.

Results: The monochromated x-ray microscopic images of breast tissue from breast cancer were obtained with a good resolution. The total magnifying power of this microscope was up to 200×. These images revealed various structures of breast cancer tissues with a good contrast and high visibility by phase contrast technique including proliferation and irregular infiltration of stroma, loss of ductal structures and infiltrating tumor cells into adjacent fat tissues. But lymphocytes nests infiltrating into connective tissues and other fine histopathologic features of breast cancer tissue were not identified well with this phase contrast technique only.

Conclusions: Using monochromated synchrotron radiation, the x-ray microscopic images of the breast cancer tissue were obtained. These images showed a good correspondence with the histopathologic findings of adjacent stained tissue sections. From these images obtained, x-ray microscopic imaging of breast cancer tissue with synchrotron radiation appears to have a great possibilities of use for clinical and research purposes in the near future.

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Examination of US and MR images for pathological complete response in early breast cancer cases

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Background: In cases in whom primary systemic chemotherapy (PSC) has been effective, it is often very difficult to distinguish on preoperative images whether or not a residual tumor still exists. We examined US and MR images in cases showing a pathological complete response (pCR) to identify specific features which would be useful for assessing residual disease.

Materials and Methods: All 149 cases undergoing surgery after PSC, from January 2006 through December 2007 in our institution, had received anthracycline-based chemotherapy followed by taxanes or anthracycline alone. There were 14 pCR cases and 13 in whom only ductal carcinoma in situ (DCIS) remained. We examined mainly US and MR images from these cases, after chemotherapy, in detail.

Results: Proportions of cases positive for NG3, ER(−), PR(−) and HER2(3+) were high among those with pCR and only DCIS. Among these cases, only hormone receptor levels differed significantly in comparison with other PSC cases.

All five cases in whom evidence of tumors disappeared on US showed pCR. Other US findings included 6 with mastopathy-like findings, 3 with intra-ductal lesions and 12 with nodules. DCIS was observed in all cases in whom an intra-ductal lesion persisted. Even if nodules remained, the proportion showing pCR was relatively high (75%) if an acoustic shadow suggesting fibrous change was present.

On MR imaging, disappearance of lesions was seen in eight cases, while eight showed a segmental enhancement pattern and five had nodules. DCIS was observed in 63% of cases that showed a segmental enhancement pattern. Likewise, two-thirds of cases with mastopathy-like findings on US had residual tumors. The presence of mastopathy in the background, may obscure remnant tumors. Both examinations must therefore be conducted with great care to avoid missing these residual tumors.

All three cases in whom lesions were undetectable on both US and MR images showed pCR. Two-thirds of cases in whom the lesions were undetectable on either US or MR images had pCR.

Conclusions: The diagnostic usefulness of US and MR images is limited due to the degree of ductal spread, which often persists after PSC and varies markedly among cases. With US, it is difficult to distinguish between benign and malignant lesions. MR imaging often overestimates residual disease. However, we can enhance the prediction of pCR to some extent by using these two imaging modalities together and carefully interpreting the results.

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Stereotactic vacuum-assisted microbiopsy and precancerous/in situ breast lesions – a monoinstitutional experience

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Background: The issue of diagnostic assessment after mammographic detection of suspicious early disease has been recently improved by new technologies. Our aim was to retrospectively assess the accuracy and clinical usefulness of stereotactic vacuum-assisted microbiopsy (VAB) in the diagnosis of precancerous and in situ lesions of the breast.

Patients and Methods: From January 2003 to July 2007 a consecutive monoinstitutional series of 222 patients underwent a stereotactic VAB. The biopsies were performed using a vacuum suction device (11 gouge probe) with digital stereotactic equipement-guided Mammotome (Fisher prone table). A mean number of 10.8 samples (3−19) were obtained, measuring 3−50 mm (mean size: 13 mm) in diameter. The biopsy site was marked with a nonmagnetic metallic clip when the entire lesion was removed. Among this population we selected patients with VAB diagnosis of both atypical hyperplasia (AH) and intraepithelial neoplasia (IN) and data were compared with definitive diagnosis on surgical specimen.

Results: In 96.3% of patients VAB resulted incisional (lesion only partially removed) while in the remaining 3.7% of cases excisional (lesion totally removed). Among all 222 patients who underwent the procedure the VAB diagnosis was: n = 91 benign lesions (40.9%), n = 38 AH (17.1%; ADH 81.5%, ALH 18.4%), n = 54 IN (24.5%; ductal IN 94.4%, lobular IN 5.5%) and n = 39 invasive carcinoma (IC: 17.5%). Surgery was performed in all

92 patients with VAB diagnosis of either AH or in IN, as well as in all 39 IC. Hystologic exam on operatory specimen as compared with VAC diagnosis demonstrated: IN in 8 of 38 cases diagnosed as AH; IC in 11 of 54 cases diagnosed as IN. Thus, false negative (FN) rate of VAB diagnosis in our series was 21% in AH and 20.3% in IN, respectively. Nevertheless, second surgery for radicalization was needed only in 3 of 19 (15.8%) understaged patients.

Conclusions: Our experience confirms the already reported data of a lower, as compared with other non-surgical diagnostic means, but not negligible FN rate in case of VAB diagnosis of either AH or IN. Given that surgical excision is mandatory after VAC finding of AH to confirm benign lesion, we found that preoperative understaging of both AH and IN has low clinical relevance.

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Bilateral breast cancer – an Asian perspective

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Background: Bilateral breast cancer is rare with a worldwide incidence of 0.8−20% based on Western data. There is limited publication of this in an Asian population. Singapore has one of the highest incidences of breast cancer in Asia. A study was conducted to evaluate the histological features and treatment of bilateral breast cancer in Asian women.

Materials and Methods: A retrospective review of a prospectively collected breast cancer database was performed. Between 1992 to 2007, 1326 women were treated for breast cancer at Changi General Hospital, Singapore. Of these, 52 were found to have bilateral breast cancer. The clinical and histological features and treatment were analysed. Contralateral breast cancer diagnosed within three months of the primary was taken to be synchronous whereas those presenting after three months was considered metachronous carcinoma.

Results: The incidence of bilateral breast cancer was 4.0%. There was a predominance of Chinese women (78.8%) compared to the national demographics. The mean age of diagnosis of the primary carcinoma was 55.3 years while the second was 57.5 years. There were 26 patients with synchronous bilateral breast cancer (SBC) and 26 with metachronous bilateral breast cancer (MBC).

The most (71.2%) common presentation of the primary was a lump. While most (46.3%) of SBC presented with mammographic abnormality, the majority (65.4%) of MBC presented as a palpable lump. The most common histology was invasive ductal carcinoma (55.8% primary cancer and 57% second cancer). A larger proportion of MBC (84.0%) had early stage primary carcinoma compared to SBC (70.8%).

SBC had a lower level of positive hormone receptor status (68.4%) compared to MBC (84.2%). However, SBC had a higher HER-2 receptor positivity (34.6%) compared to MBC (19.2%). Majority underwent simple mastectomy for both breasts (primary cancer 59.6% and secondary cancer 69.2%). Systemic adjuvant therapy was based on the side with the higher stage.

Conclusions: Bilateral breast cancer is rare in the Asian population with the highest incidence amongst Chinese women. Synchronous breast cancer have lower hormone receptor positivity but higher HER-2 receptor positivity compared to MBC.

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Non-malignant papillary lesions of the breast at a US-guided directional vacuum-assisted removal – A preliminary report

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Background: To assess that accuracy of US-guided directional vacuum-assisted removal (US-DVAR) in evaluating non-malignant papillary breast lesions.

Materials and Methods: This retrospective study was approved by the institutional review board at our institution; patient consent was not required. We reviewed the clinical and pathologic findings from a total of 39 papillary lesions diagnosed at vacuum-assisted removal in 37 patients (age range, 26−60 years; mean age, 44.5 years). Over the follow-up period, we evaluated whether any histologic upgrade occurred and whether or not residual lesions were detected on follow-up imaging.

Results: US-DVAR of 39 lesions yielded tissue that was classified as benign in 35 and atypical in four. Of the 33 lesions that were diagnosed as histologically benign at US-DVAR, two were surgically excised. Both of them yield benign results. Of the 33 benign lesions that were not surgically excised, twenty-eight (85%) was not seen at radiographic follow-up. Of the four lesions diagnosed as atypical at US-DVAR that were surgically excised, all the four were benign. None proved to be malignant. The upgrade rate was 0.0% (95% confidence interval: 0−9%).

Conclusion: Among our patients, diagnosis by US-DVAR of benign papillary lesions proved to be accurate and benign papillary lesions at US-guided directional vacuum-assisted removal do not need to be surgically excised for accurate diagnosis.

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MoCo – an image-based retrospective study assisted by electronic image management – an implemented solution at Munich Technical University

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Background: Clinical trials are essential to investigate new diagnostic or therapeutic procedures and their clinical relevance. Information systems are established in clinical routine but clinical trials are often still lacking direct support by electronic systems. Bridging the gap between clinical research and clinical routine, studies are required in a hospital setting. Most studies are paper based and require repeated input of data that already exist in the hospital information system (HIS). Usually, the image data base (if electronically available) is separate from the study data base.

Method: In a collaboration between the Department of Obstetrics and Gynecology, Klinikum rechts der Isar, Technical University of Munich and Siemens Medical Solutions a web-based front-end and back-end integration of different electronical information systems used in clinical routine (SAP/IS-H*Med, SWISSlab, KIS, PACS) as well as a research database was developed. The integrated solution was then implemented to support diagnostic, image-based clinical trials in order to facilitate clinical trials and allow complete data representation within one system.

Two pilot projects using this integrated solution were then started, one phase-II therapy trial (HEDON – Herceptin-Docetaxel-Neoadjuvant) and the MoCo Trial (Motion Compensation).

The MoCo trial focuses on the diagnostic value of motion compensation for MR images using two different motion correction algorithms. Therefore, pseudomized pre-surgically performed contrast enhanced breast MR images of 100 MRI cases performed before breast conserving therapy for staging purposes are stored in a research PACS. The images are analyzed and correlated with the definite histopathological diagnosis by a superreader who describes the findings and writes the results directly into the corresponding eCRF (electronic Case Report Form).

To evaluate the diagnostic value of the motion compensation algorithms, four external readers then perform blinded reading on the set of MR images (with and without applied motion correction algorithms) for each case and store their results in the eCRFs as well.

A special integrated application allows correlating the lesions detected by an external reader with the ones described by the superreader.

Results: The developed system facilitates to easily compare the results of the external readers with the superreader's results. Errors that are traditionally caused by incorrect correlation of images and data entered on paper can be dramatically reduced by electronically linking all images and data (case report forms). Another expected benefit is the comfortable selection of images that are already stored in an existing IT system (clinical routine PACS) for the image based trial.

The result of the first 50 readings will be presented.

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Imaging evaluation of pathological response in breast cancer after neoadjuvant chemotherapy by real-time sonoelastography and MRI

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Background: The evaluation of tumor response and pathological CR (pCR) after neoadjuvant chemotherapy in breast cancer is essential. The goal of the present study was to compare the sensitivity and specificity of real-time sonoelastography (EG) with that of B-mode ultrasound (US) and MRI for prediction of pathological complete response to neoadjuvant chemotherapy in breast cancer.