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SYMPOSIUM

Breast cancer imaging – what progress?

6 INVITED

Digital mammography and multimedial consultation in breast diagnosis

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Digital mammography is a new method for early diagnosis of breast cancer still in the developmental stage.

The potential advantages of digital mammography are:

– the optimal presentation of all clinical images (appropriate optical density, contrast, edge enhancement by separating the functions of image display and image recording;

– the possibility of a Computer Aided Diagnosis (CAD). Several algorithmis for CAD are under evolution and in the next future this tool could be cost-effective in screening, where double reading in now recommended; – teleconsultation between esperts in selected clinical cases;

– pictures archiving and management.

The available technology, currently based on storage phosphor systems, is suboptimal because of a low spatial resolution, but a high-quality digital mammography by full-field digital mammographic equipements will be soon achievable.

In the framework of the European Multimedia services for Medical Imaging Project (Emerald), funded by ACTS-EC-Programme, three breast imaging units-namely Centro per lo Studio e la Prevenzione Oncologica Florence (I), UKRV Strahlenklink and Poliklink Berlin (D), Hospital Principe de Asturia (SP) – have been connected by high speed networks and multimedial consultation on mammography will be experimented. The clinical, social and economic efficiency of the system will be monitored and the preliminary results presented.

7 INVITED

Computer aided diagnosis (CAD) in mammography

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The weakest link in breast cancer diagnosis has always been the radiologist who must find a lesion and make a diagnosis. In routine practice and in screening, 15-20% of cancers are overlooked and show up as interval cancers or late stage cancers in subsequent examinations. Another 30% of cancers is visible on previous mammograms as so-called minimal signs.

The performance of pattern recognition programmes, developed to aid radiologists in detecting breast cancers has now reached a level that renders application in routine practice and in screening useful. First studies in our department indicate that a higher sensitivity can be achieved without lowering the specification.

In the near future the combination of full size digital mammography with CAD will have a serious impact on the early detection programme of breast cancer, even in younger women.

8 INVITED

Nuclear magnetic resonance and breast cancer diagnosis

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Purpose: To give an overview about the present state of MR Mammography (MRM) including an outlook for future developments.

Methods: For 15 years now MRM has been clinically tested. There appears to be increasing consensus, that for an exact diagnosis of breast cancer the selection of temporal resolution (dynamic technique) as well as of spatial resolution is of utmost importance. Results, experiences of more than 5000 own cases and reports of the literature are reported.

Results: For the detection of invasive breast cancers in a size of more than 3 millimeters, the sensitivity seems to be in the range of 99%. DCIS seems to be detectable in 80 to 90% of cases at least in high grade DCIS.

Specificity varies enormously depending on measurement technique and sophisticated data evaluation. Multifocality and/or multicentricity, differentiation between tumor and scarring after biopsy, operation, prothesis implantation are other MRM-indications. An enormous variety of pitfalls can occur (technical, biological, data evaluation, standardization, normal enhancement, in-flow-phenomenen, hematoma, vessels, dosage of contrast medium, zooming, keyhole, opposed-image, clips, localization, field strength, artifacts etc.).

Conclusion: MRM has proven indications, but is still a research technique due to a lacking standardization. Future developments focus on reduction of costs, evaluation of hormone effects and development of one-step-diagnostic/interventional procedures.

9 INVITED

The evolution of ultrasonography

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The use of broad band transducers determined a great increase in spatial, contrast and vascular resolution of ultrasound probes dedicated to breast studies. High resolution sonography (HRS) has improved the sensitivity of ultrasound; this results in a lower number of patients that must be submitted to stereotactic procedures for tissue sampling. Providing better definition of normal as well as pathologic features, HRS also improves the specificity of the diagnosis for the majority of malignant nodules and allows a better definition of both local and regional staging. The most impressive results have been achieved in the evaluation of multifocal and multicentric carcinomas, in determining the size of the tumor, its degree of invasion of the surrounding tissues and of the ducts. Sensitivity of HRS for multicentricity is over 75% while specifity for ductal invasion is over 90%. Similar results can be achieved only with more expensive techniques like contrast enhanced magnetic resonance.

Color and power Doppler offer further characterization that may be particularly useful in searching for small tumors in fatty breasts and in evaluating tumor vascularity during therapies that are planned before surgery. The development of new sonographic contrast media increases the sensitivity of the systems. Their use improves the diagnostic confidence; moreover it opens new possibilities in the diagnosis of non-nodular tumors and in the differentiation of microcalcifications depicted with mammography. These new diagnostic possibilities must push radiologists to adequate their instruments and their methods to provide up-to-date and more accurate informations to the surgeon.

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SYMPOSIUM

Late sequelae of breast cancer treatment

10 INVITED

Late sequelae of breast cancer treatment: systematic therapy

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The widespread use of cytotoxic and endocrine approaches such as systematic adjuvant therapy in primary breast cancer patients may increase the number of patients experiencing late physical effect of the therapy. Irrespective of whether the cytotoxic therapy is given in standard or high dose, the spectrum of non-predictable late organ toxicities like congestive cardiomyopathy, pulmonary fibrosis, chronic nephrotoxicity, and -in rare cases- persistent cytopenias may be the consequence. Secondary malignancies such as acute myelogenous leukaemia and endometrial cancer will be the consequence of high dose therapy with alkylating agents and prolong the exposure to the antioestrogen tamoxifen. Furthermore, the induction of premature menopause in premenoposal women means that early hormone replacement therapy has to be considered in order to reduce the risk of osteoporosis and maybe heart disease. Not only ovarian ablation in these women but also the increasing use of antracyclins and high dose chemotherapy is responsable for more women needing HRT. Since treatment for the late side-effects is primarily symptomatic, it is mandatory