PO-1

Ex vivo expansion of breast circulating tumor cells predicts patient responses to therapy

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Over the past decades, substantial progress has been made in the early diagnosis and treatment of breast cancer. Circulating tumor cells (CTCs) are one of the most promising areas of cancer research for guiding patient treatment and predicting cancer progression. CTCs identification and characterization require extremely sensitive and specific methods. CTCs derived from breast tumors have the potential to be precursors of metastasis. It is therefore of paramount interest to isolate and characterize CTCs from patients to monitor and detection of recurrence.

Method: Custom microfabricated tapered microwells were used to expand CTC clusters without any prior pre-enrichment. Cluster formation in culture was correlated with overall patient survival. 80 patients with a proven diagnosis of breast cancer attending the Department of Medical Oncology, Kidwai Institute of Oncology were enrolled in the study.

Result: Our initial results showed, CTC clusters formation in the patients with metastatic breast cancer. These cluster formation was affected by the presence and duration of systemic therapy. We observed a progressive reduction in cluster formation in samples from patients who had undergone increasing longer treatment. The presence of proliferative cells in these cultured cells gave raise to clusters. Those clusters, which are CK+ve were CD45-ve, suggesting the *ex vivo* expansion of CTCs in microwells. Moreover, the cluster formation during the course of chemotherapy was found to be associated with shorter overall survival and disease progression.

Conclusion: Our result suggests that CTC clusters can be used to rapid evaluation of drug response. We would further use the CTC cluster assay as a potential tool for evaluating patient prognosis during treatment. The study will be employed to determine the drug susceptibility pattern in individual patients and also provide therapeutic choices for personalized treatment.

PO-2

Prospectively patient-reported outcome measures in breast cancer patients treated for late radiation-induced tissue toxicity byhyperbaric oxygen therapy, 6 months folluw-up

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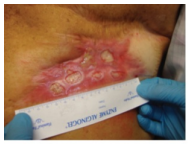
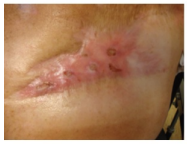
Background/Purpose: Radiation side-effects is encountered in 12-30% of patients treated for breast cancer. General patient reported outcome measures (PROMs) evaluation of cancer patients treated with hyperbaric oxygen treatment (HBOT) for late radiation induced tissue toxicity (LRITT) in an academic hospital in the Netherlands will be presented.
Methods: Quality of life was assessed using validated EORTC (European Organization for Research and Treatment of Cancer) QLQ-C30, in patients treated with HBOT for LRITT from 2014 to 2016, and breast cancer specific questionnaires treated with HBOT for LRITT during 2013-2015. HBOT consisted of on average 40 sessions, 5 days a week. A session last 115 minutes of which 80 minutes are with 100% O2 under increased pressure of 2.4 ATA during a 115 minutes HBOT session.
Results: For evaluation 38 patients were available. Improvements were seen for help with eating, dressing, washing yourselves or using the toilet; limited in doing work or other daily activities; limited in pursuing hobbies or other leisure time activities; had pain; pain interfere with daily activities; difficulty concentrating on things like reading newspaper watching television; difficulty remembering things; overall health past week; overall quality of life in the past week in 50%, 45%, 45%, 52%, 60%, 42%, 34%, 50%, and 50% respectively at 6 months. Regarding the 29 patients receiving the breast cancer specific questionnaires post-HBOT mild to no complaints were seen regarding “pain in arm” (59%), “swollen arm” (79%), “arm movements” (72%), “painful area” (76%), “Swollen area”(83%), “oversensitive area” (72%), “skin problems” (79%), NRS-11 (63%), and PGIC (85%).
Conclusion: PROMs in cancer patients treated for late radiation induced tissue toxicity with hyperbaric oxygen treatment is positive, improvements of 34% to 60% was seen in several health items according the general EORTC questionnaire and between 59% to 85%. HBOT is a well-tolerated treatment for LRITT in cancer patients.





PO-3

MRI findings of low grade DCIS

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Purpose: With the recent argument of overtreatment of ductal carcinoma in situ (DCIS), more of these cancers may be monitored by imaging instead of surgical removal. However, imaging diagnosis of low grade DCIS is sometimes challenging. The aim of the study was to evaluate MRI findings of pure low grade DCIS.
Methods: Our imaging / reporting archives and records of radio-pathological conferences from 2013 to 2015 were retrospectively searched to identify patients with pure DCIS of low grade whose dynamic contrast enhanced (DCE) MRI of the breasts was obtained in our hospital.3-T MR scanner was used to obtain T1WI, T2WI, DWI, and DCE-MRI including pre, early (1-2 min) delayed (5-6min) and high resolution (2-5min) images. MR findings of the lesions corresponding to the pathological diagnosis of low grade DCIS were evaluated based on BI-RADS MRI 2013 lexicon by an experienced breast radiologist.
Results: Eleven female patients with low grade DCIS were included in the analysis (mean age 57 y.o.). Among 11 lesions, one was a 5-mm mass while the remaining 10 were non-mass enhancement (NME) with size ranging from 7 to 70 mm (mean diameter 31 mm). The most common distribution pattern of the NME were segmental (n=7), followed by focal (n=2). They showed either heterogeneous (n=6) or focal (n=5) enhancement. Clustered ring was identified in some part of the lesion in more than half of the lesions (n=6). For kinetic analysis, fast/washout pattern was the most common (n=8). MRI tended to overestimate the size of the lesion.
Discussion & Conclusions: In this analysis, most lesions showed washout pattern, in contrast to the previous report of 13% (Kim et al. AJR 2011). Also clustered ring was identified in more than half of the lesions. These MRI findings may be explained by improved contrast /spatial resolution, allowing us to visualize detailed structure of the DCIS in detail. Even with low grade DCIS, MRI overestimated the size. This is partly due to the surrounding proliferative fibrocystic changes that often co-exist with and mimic DCIS on MRI. The current data indicates both advantages and pitfalls of using MRI for diagnosis of DCIS.

PO-4

Molecular Imaging Heterogeneity Study of breast tumors as a new diagnostic parameter.

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PURPOSE
The concept of tumor heterogeneity, also called in Radiology as Tumor Texture, is based on the different areas of tumor uptake, which correspond to different levels of expression, cellularity, hypoxia or other parameters interested in being measured. We want to know if the description of the tumor heterogeneity uses in Radiology has its relation with PET parameters and if any biological characteristics of the breast tumors have a structure-function correlation.
METHOD AND MATERIALS
We have analyzed 500 consecutive patients with breast cancer in a dedicated breast PET MAMMI (MAMography Molecular Imaging). Different parameters have been defined that allow us to find a pattern of Texture and Heterogeneity (TeHe), for this, and following the rules of the radiological descriptions we have described a series of structural templates that cover practically all tumors, a mathematical pattern has been defined for their correlation, the results obtained in these patterns of heterogeneity have been correlated with clinical values of the tumors, such as molecular classification, size, type, histology, progression, relapses ... etc.
RESULTS
7 different patterns divided into 5 large groups of values for TeHe are described, and classified as: 1: Homogeneous-diffuse, 2: Lobular, 3: Annular and Spindle, 4: Eccentric and Focused; and 5: Speckled. A numerical value has been assigned between 1 and 5 for this classification with 1 being the most homogeneous and 5 being the most heterogeneous. This value is achieved through a mathematical relationship: medSUV/maxSUV: values close to 1 denote an average SUV throughout different regions similar to the SUV maximum: a high homogeneity. Values close to 0 indicate a high heterogeneity. In this two examples, quantification is simple, the process is complicated when the geometry of the tumor becomes part of this heterogeneity. In these cases, some geometric patterns may explain similar medSUV/maxSUV values. For this, we have developed a formula that relates these concepts: medSUV/maxSU/[(MedSUV/maxSUV)Qmax/(medSUV/maxSUV)Qmin]:
CONCLUSION
Studies of tumor heterogeneity based on metabolism show us different patterns that correlate with molecular subtypes and predict response to treatments.
CLINICAL RELEVANCE/APPLICATION
The heterogeneity of the tumors is becoming, like the texture in conventional radiology in a new tool in the prediction of response to the treatments