Surgical impact on stage IV breast cancer

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Background: Approximately 3-8% of patients with breast cancer present with distant metastasis at diagnosis. The standard of care for patients with distant metastasis is systemic therapy, such as endocrine therapy, chemotherapy, or molecular-targeted therapy. Resent studies have indicated that local therapies improve the prognosis for stage IV breast cancer, and surgery is one of the options. The role of surgery for stage IV breast cancer was retrospectively investigated at our institution.
Patients and methods: Data of patients with Stage IV breast cancer at diagnosis were collected and analyzed at our single institution.
Results: Between 1989 and 2017, 40 patients with stage IV breast cancer underwent surgery (surgical group) and 28 patients with stage IV breast cancer patients were treated without surgery (the non-surgical group). The median age was 58 years old (range, 35-84 years) in the surgical group and 64 years old (range, 31-89 years) in the non-surgical group. The median overall survival was 971 days (range, 220-5172 days) in the surgical group and 245 days (range, 17-2159 days) in the non-surgical group. In the surgical group, the median time from the diagnosis to the surgery was 164 days (range, 17-972 days). Twenty-eight patients (70%) received systemic therapy prior to the surgery.
Conclusion: Patients in the non-surgical group were older and exhibited more complications, such as cerebral infarction, heart failure, or dementia. Such patients were contraindicated for surgery or did not consent for surgery. Meanwhile in the surgical group, most of patients harbored single-organ metastasis. These are the biases that affect comparisons between the groups. Twenty-two out of 40 patients (55%) had skin-eroded breast cancer, but a therapeutic effect was achieved using systemic therapies. Surgery salvages local advanced breast cancer. The main purpose of treatment for stage IV breast cancer is to prolong overall survival. Surgical therapy can prolong overall survival when systemic conditions are favorable, the patient harbors less metastatic sites, and prior systemic therapy is effective.

Surgical Oncology
PP-2

Infection associated with immediate breast reconstruction after mastectomy

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Background: Since the silicon implants became covered by insurance in June 2013 in Japan, the rate of breast reconstruction surgeries has been increasing. Although breast reconstruction is a technique used to maintain favorable cosmetic outcomes, several complications were reported. We have previously reported risk factors for skin and NAC necrosis (WCS 2017). Although infection is one of the other serious complications, there are few studies that reported clinical factors related to infection. Methods: Patients who underwent breast cancer surgery followed by immediate breast reconstruction from 2006 to 2016 in Kyorin University hospital were included. We retrospectively reviewed the database. The relationship between infection after immediate breast reconstruction and clinicopathological and social factors was examined. Results: Four hundred and twelve patients underwent immediate breast reconstruction, among whom 12 patients experienced infection of drain fluid or tissue expander (2.9%). The median age was 48 years for the total population and 50 years for patients with infection. None of the patients with infection had DM. Tissue expander needed to be removed in 2 of 12 patients due to poor control of infection. Skin flap necrosis that required surgical resection was the only significant factor associated with infection (p=0.0064). No other clinicopathological and social factors including tumor size, type of surgery, smoking and BMI were correlated with infection.Conclusions: This study showed an association between infection and skin flap necrosis. One of the possible explanations may be that the skin barrier mechanisms were damaged by impaired blood flow in patients with skin flap necrosis. It will be suggested that reducing the risk of skin flap necrosis could lead to a reduction in infection.

Surgical Oncology
PP-3

Prevention of seroma formation after modified radical mastectomy in breast cancer by dead space closure technique: Prospective Randomized Control Trial

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Introduction : Seroma is the most common problem in axillary lymph node dissection that lead to prolong hospital stay, infection and delay further treatment.
Materials and Methods : Eighty breast cancer patients were randomly divided into 2 groups: group 1 was operated on using an altered surgical technique, which is to ligate all of the tissue connecting axillary vein bundles to the specimen, to suture the anterior edge of the latissimus dorsi to the chest wall, and to fix the skin flap to the underlying muscle by subcutaneous sutures; group 2 was operated on using the conventional technique.
Results : The drainage volume, in the initial 3 days, for patients in group 1 was significantly less than that for patients in group 2 ($P < .01$). The duration of drainage in group 1 was shorter than that in group 2 ($P < .01$). The incidence of seroma formation in group 1 (2.5%) was significantly less than that in group 2 (16%) ($P < .01$)
Conclusion : The modified operating technique is an effective approach to reducing the incidence of seroma formation after mastectomy and axillary dissection.

Surgical Oncology
PP-4

A case of recurrent stromal sarcoma of the breast

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Primary stromal sarcoma of the breast is a very rare disease accounting for 0.03 % of primary breast malignant tumors, and no more than 5.0 % of all sarcomas. The rarity of this tumor limits most studies to small retrospective case reviews and case reports, which has led to a lack of consensus on the clinical management. We herein report a 60-year-old female presented with a mass in her left breast. Ultrasonography showed irregular shaped mass of 2.5 cm in diameter. Core needle biopsy suggested it as a soft tissue tumor but it was remained undiagnosed. Partial mastectomy was performed and it was diagnosed primary stromal sarcoma on pathological study. One year after the initial surgery, a small round mass was palpated on her left breast. Lumpectomy was performed and pathological diagnosis revealed recurrence of stromal sarcoma. The patient is on regular follow up and no re-recurrence has been observed for two years. Surgical excision offers the best therapeutic option for breast stromal sarcoma but high rate of local recurrence is reported. To obtain negative margin, wide local excision or mastectomy must be performed. Axillary lymph node dissection is not mandatory since lymphatic metastasis is rare. Adjuvant chemotherapy and radiotherapy have no established role in the management of this disease. Preoperative diagnosis is often difficult but it is suggested to consider the possibility of stromal sarcoma when atypical features as breast cancers are observed on breast examinations.

Surgical Oncology

PP-5

Withdrawn

Surgical Oncology

PP-6

Withdrawn

Surgical Oncology
PP-7

Axillary Recurrence After Negative Sentinel Lymph Node Biopsy using Indocyanine Green Fluorescence Method for Breast Cancer from the KBCRN Multicenter Cohort Study

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Background. Kitai reported the sentinel lymph node (SLN) biopsy by indocyanine green (ICG) method for early-stage breast cancer in 2005. Sugie reported the ICG fluorescence method identified an average of 3.4 SLNs and the detection rate was 99%, and led the result that the first SLN identified by fluorescence imaging provided the exact axillary status. ICG method has been widely used in SLN detection nowadays, however, long-term result has not been reported, and the complication of arm lymphedema with more SLNs resection is concerned.
Purpose. To verify the long-term result of axillary recurrence after negative SLN biopsy by ICG method, a multicenter cohort study was performed.
Methods. From May 2007 to December 2015, patients with clinical T1-4, N0, M0 primary breast cancer, received SLN biopsy without clinical evidence of lymph node metastasis and spared axillary node dissection were enrolled. Overall, 1133 axillas were analyzed. Patients received neoadjuvant chemotherapy were excluded. Primary endpoint was the axially recurrence rate, and we also assessed the risk factor of axillary recurrence. Secondary endpoint was the occurrence rate of lymphedema.
Result. The median follow-up time was 41 (range 12-117) months, and axillary recurrence was found in 6 patients (0.53%). Five out of 6 patients were not received standard adjuvant systemic therapy or adjuvant radiation therapy after breast conserving surgery. Risk factor of axillary recurrence was no standard adjuvant systemic therapy ($p<0.001$). Lymphedema was identified only 4 patients in 632 patients.
Discussion. It is reported that axillary recurrence after negative SLN biopsy was occurred in 5 years after surgery, if present adjuvant multidisciplinary therapy conducted, and the 5-year axially recurrence rate was 0.6%, which was consistent with our result. Axillary recurrence is thought to be correlate with false-negative rate of SLN, but NSABP B-04 trial described axillary recurrence rate was lower if metastatic lymph nodes remained in axilla. Adjuvant systemic therapy and radiation therapy may contribute to improve axillary recurrence. As we do not conduct radiation therapy for SLN negative patients after mastectomy, false negative SLNs may contribute to relapse in axilla.
Conclusion. Axillary recurrence after negative SLN biopsy using ICG method was comparable to RI or blue dye method. Axillary recurrence rate could be lower if patients received appropriate adjuvant medication or radiation therapy.

Surgical Oncology
PP-8

Application of Robotic Surgery (da Vinci) in the management of Breast Cancer- Preliminary results and experience sharing.

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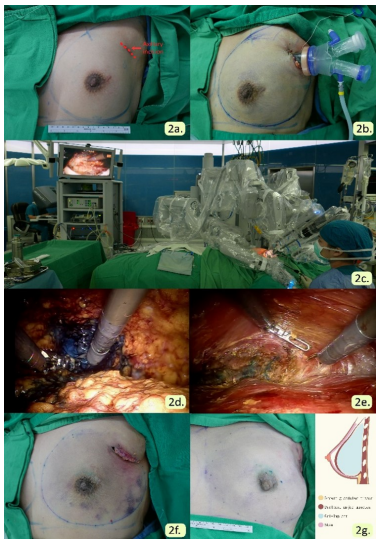
Robotic surgery, which incorporated 3-dimentional imaging system and flexibility of robotic arm, had been growingly used in different field of surgeries. Robotic nipple sparing mastectomy (R-NSM), which introduce Da Vinci surgical platform through a small axillary wound to perform NSM and immediate breast reconstruction, was reported to have potential to overcome the technique difficulty of endoscopic NSM and showed promising cosmetic outcome. In this study, we report the preliminary experience and clinical outcome of R-NSM.
The medical records of patients who underwent robotic surgery for breast cancer during the period March 2017 to January 2018 were collected from single institution. Data on clinicopathologic characteristics, type of surgery, method of breast reconstruction, complications and recurrence were analyzed to determine the effectiveness and oncologic safety of robotic breast surgery.
Twenty-eight robotic breast surgery procedures were performed in 26 female patients with breast cancer, including 2 patient with bilateral disease. Among these 28 robotic breast procedures, 26 was R-NSM related. One patient with bilateral breast cancer received bilateral R-NSM without breast reconstruction. The other 24 R-NSM were associated with immediate breast reconstruction (IBR). Two patients received R-NSM and IBR with robotic assisted harvested of latissimus dorsi flap, and 19 patients received R-NSM and IBR with Gel implant. The mean operation time for R-NSM with IBR was 304.5 ± 93.2 mins (225-505). No major peri-operative complication was found. Two (8%) patients suffered from transient partial nipple ischemia change, which was received after conservative treatment. No (0%) total nipple areolar complex necrosis case was observed. No local recurrence, distant metastasis or case mortality was found during mean 7 ± 2 months follow-up.
From our preliminary experience, R-NSM alone or combined with IBR is a safe procedure, with good cosmetic results, and cloud be a promising new technique for breast cancer patients indicated for mastectomy.



Surgical Oncology

PP-9

Withdrawn

Surgical Oncology
PP-10

Attention to local recurrences as subcutaneous tumors after skin-sparing mastectomy or nipple-sparing mastectomy with immediate breast reconstruction

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Background: Nipple-sparing mastectomy (NSM) and skin-sparing mastectomy (SSM) with maximized preservation of the skin envelope improve the cosmetic results when combined with immediate breast reconstruction (IBR). NSM with conservation of the nipple-areolar complex (NAC) results in a more preferable esthetic outcome. However, local recurrence (LR) in the NAC due to occult nipple involvement has been reported. Most of the selected patients with IBR are young, with in situ disease or early breast cancer. Furthermore, the need for adjuvant post-mastectomy radiotherapy is not recommended as it is deleterious for the reconstructed breast. Therefore, the absence of LR is very important.

Purpose: To reduce the LR rate in NSM or SSM, LR cases were investigated.

Patients and methods: The records of 223 breast cancer patients who received NSM (n=129) or SSM (n=94) with IBR from January 2010 to December 2016 were examined retrospectively. The nipple areolar complex (NAC) was preserved in the following conditions: (1) nipple-tumor distance (NTD) > 10 mm (on enhanced MRI imaging), (2) no pathological nipple discharge, and (3) no malignant findings in subareolar frozen sections analyzed intraoperatively. Post-mastectomy radiation therapy was generally avoided.

Results: In total, five LRs were observed. LR as a subcutaneous tumor in the NSM was found in 3 patients (2.3%, 3/129). There were no NAC recurrences. In SSM, LR was found in 2 patients (2.1%, 2/94). One was a subcutaneous tumor, another was a tumor on the pectoralis major. The histopathology at primary operation was invasive ductal carcinoma (IDC) in 3 patients and ductal carcinoma in situ (DCIS) in 2 patients. The subtype, TNM classification, and time to LR for the 3 IDC cases were: luminal A like, T2N1M0, 58 months; luminal A like, T2N1M0, 89 months; and luminal B like, T3N0M0, 48 months, respectively. The times to LR in the 2 DCIS cases were 14 and 41 months, respectively.

Discussion: The majority of LRs in NSM or SSM occurred as subcutaneous tumors. Although all primary surgical specimens exhibited “no ink” histopathologically, each primary tumor was located close to the skin. It was common that the additional adjuvant radiotherapy in breast-conserving surgery, and the resection of the skin close to the tumor in conventional mastectomy lowered the incidence of LR. As a countermeasure against LR, we now resect part of the skin close to the tumor. Especially, in auto-graft reconstruction, replacement of the defect using the graft skin paddle does not markedly worsen the cosmetic result.

Radiation Oncology

PP-11

Withdrawn

Radiation Oncology
PP-12

PENTAGAMABORONON-0-SORBITOL INDUCES CELL DEATH AND INHIBITS MIGRATION AGAINST HER2-OVEREXPRESSED BREAST CANCER CELLS

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Pentagamaboronon-0 Sorbitol (PGB-0-So) is a complex form of curcumin analogue, PGB-0, with sorbitol capable of increasing solubility of PGB-0. This compound has been developed as anti-cancer chemotherapeutic agent and boron carrying pharmaceutical for boron neutron capture therapy (BNCT). The aims of this study are to investigate the cytotoxic and anti-metastatic activities of PGB-0-So toward HER2-overexpressed breast cancer cells. To make sure cellular uptake of PGB-0-So within the cells, we conducted boron distribution analysis using inductively coupled plasma (ICP) exhibiting the increasing of PGB-0-So cellular uptake compared to that of PGB-0. Based on MTT cytotoxicity assay PGB-0-So performed cytotoxic activity with the IC_{50} value of 35 μM. Flow cytometry analysis revealed that PGB-0-So induced S phase arrest and apoptosis on the MCF-7/HER2 cells. Cellular ROS production analysis also showed that PGB-0-So elevated ROS level production in dose-dependent manner. Wound healing migration assay demonstrated inhibitory effect on cell migration through the suppression of lamellipodia formation. In conclusion, PGB-0-So performed cytotoxic effect and inhibited cell migration, then it is potential to be developed as a chemotherapeutic agent against HER2-overexpresssed breast cancer.
Keywords: PGB-0-So, MCF-7/HER2, breast cancer, cytotoxicity, migration

Radiation Oncology
PP-13

PENTAGAMABORONON-0 FRUCTOSE COMPLEX (PGB-0-F) PERFORMS CYTOTOXIC EFFECT AND ANTI-METASTATIC ACTIVITY TOWARD MCF-7/HER2 CELLS

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HER2 (human epidermal growth factor) is a protein that affects the growth and progression of cancer cells. Pentagamaboron-0 (PGB-0), a newly curcumin analogue performed cytotoxic effect on HER2-positive breast cancer cells but it is practically water-insoluble. The aims of this study are to determine the cytotoxicity and anti-metastatic activities of a more soluble form of PGB-0 namely PGB-0 fructose complex (PGB-0-F) toward HER2 positive cancer cells. PGB-0-F was obtained from Cancer Chemoprevention Research Center Faculty of Pharmacy UGM. Based on DCFDA staining assay PGB-0-F in concentration of 70 and 140 μM induced the increase of cellular ROS level. Cell cycle analysis by PI-staining flow cytometry showed that PGB-0-F induced S-phase arrest at concentration 30 and 45 μM in 24 h compared to the control group. Moreover, annexin V-FITC/PI staining flow cytometry revealed that PGB-0-F induced apoptosis. PGB-0-F also affected cells migration through scratch wound healing assay. In under gelatin zymography assay addition, PGB-0-F at the concentration 30 and 45 μM induced MMP-9 activity. Hence, PGB-0-F performs cytotoxic effect and inhibits cells migration on breast cancer cells.

Keywords : HER2, Curcumin, PGB-0-F, Cytotoxicity, Metastasis

Investigations of Dosimetric Evaluation and Cytotoxicity of Boron Compounds for Application of Boron Neutron Capture Therapy to Recurrent Breast Cancer

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Local recurrence breast cancer is one of the most difficult conditions to cure and there is a need for new therapy. Tumour cell destruction in boron neutron capture therapy (BNCT) is effected by nuclear reaction between ^{10}B and thermal neutrons with the release of alphaparticles (^{4}He) and lithium7 ions (^{7}Li). 4He kills cells within 10 microm of the site of ^{4}He generation. If sufficient boron compound can be targeted to the tumour, BNCT can be applied to local recurrent breast cancer. In this study, we performed dosimetry evaluation in the field of medical physics, and cell cytotoxicity experiments with ^{10}B compounds in the field of pharmacotherapeutics.
We performed a preliminary dosimetry with a phantom model of the mammary gland at Kyoto University Research Reactor. The thermal neutron flux was 5.16 E+08 n/cm^2s at the surface of phantom. The blood boron concentration is estimated to be 30 ppm; tumour boron concentration is also estimated to be 90 ppm according to tumour/blood ratio 3 and skin/blood ratio 1.2. Tumour RBE dose is estimated to be 47 Gy/h, and skin RBE dose is 12.4 Gy/h.
We also performed a feasibility dosimetry with JAERI Computational Dosimetry System(JCDS) at JRR4 reactor of Japan Atomic Research Institute. [Case 1] We performed the feasibility estimation of 3D construction of tumor according to the MRI imaging of a patient with epithermal neutron mode at JRR4. The blood boron concentration (ppm) and tumor/normal tissue ratio are estimated to be 24 and 3.5, respectively. Skin RBE dose is restricted to 10 Gy/h, the maximum tumor RBE dose, minimum tumor RBE dose, and mean tumor RBE dose are 42.2, 11.3, and 28.9 GyEq, respectively, in half hour irradiation. [Case 2] The irradiation technique for a total mastectomy patient with recurrent cancer was optimized by JCDS dosimetric calculations. The evaluation was performed using an en face technique and a tangents technique. The irradiation time with the tangents technique was a few times longer than with the en face technique. It has the possibility that the en face technique is an optimal irradiation technique for recurrent breast cancers using thermal neutron beam mode in terms of shorter irradiation time and easier patient positioning.
[^{3}H]-TdR incorporation by MRKnu/nu-1 human breast cancer cells treated with ^{10}B-containing liposomes showed 40% suppression compared with control on thermal neutron irradiation. Inhibition of tumour cell growth with liposomes prepared with 100 mg ^{10}B-compound was as significant as with those made with 500 ppm ^{10}B solution.
In this study, we showed the possibility to apply BNCT to local recurrent breast cancer. We will be possible to irradiate tumours selectively and as safely as possible, reducing the effects on neighboring healthy tissues.

Radiation Oncology
PP-15

Assessment of access to digital resources (smart phone and cross-platform instant messaging) of breast cancer patients in developing countries

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Background: Whatsapp is freeware with cross-platform instant messaging. With the advent of whatsapp, education of patients with breast cancer may become more frequent, detailed and comprehensive. Hence aim of our study was to assess the possession of smartphone and whatsapp service by women with breast cancer.

Methods: All patients attending radiation oncology out-patient were assessed for possession of smartphone, whatsapp application and ability to view PDF (portable document files) on their smartphone

Results: One of the family member of patient with breast cancer possess smart phone. However, majority of women per se did not own any smartphone or internet connection to their phones.

Conclusion: Individualized patient messaging and education service of patient with breast cancer may be feasible in near future in developing countries

Radiation Oncology
PP-16

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.

Medical Oncology
PP-17

BORON-CONTAINING PHARMACEUTICAL PENTAGAMABORONON-0 COMPLEX WITH POLYOL SUGAR SORBITOL POTENCY AS ANTICANCER AGENT THROUGH THE INHIBITION OF BREAST CANCER CELL PROLIFERATION AND MIGRATION

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Mortality in cancer is primarily due to failure of metastasis prevention. One strategy to target the cancerous cells is Boron Neutron Captured Therapy whic showed high affinity toward cancer cells and reported to have anti-proliferative as well as anti-metastatic activities. CCRC, Faculty of Pharmacy Universitas Gadjah Mada Indonesia, has developed boron-containing substance namely Pentagamaboronon-0 (PGB-0) which is known to exhibit anticancer activity towards breast cancer cells. However it also had disadvantage regarding its low solubility. Complex formation of this substance with sorbitol was achieved to improve the delivery of this substance towards the target cells. The purposes of this research are focused to improve the solubility and the anticancer activities of this compound. The MTT cytotoxixity assay of PGB-0 against 4T1 cells were found to exert potential cytotoxic effect in dose-dependent manner with IC_{50} values of 39 µM. The cytotoxicity of PGB-0-So complex was found to be increased considerably compared with that of PGB-0. Cell cycle modulation and apoptosis induction analyses on its IC_{50} concentration, using PI-staining and Annexin FITC-staining respectively, were found to modulate cell cycle arrest in S phase and induce programmed cell death apoptosis. The sub-IC_{50} treatment of this compound was also improved the celullar ROS level which took role in apoptosis induction. In addition, the study of gelatin zymography and *in vitro* wound healing migration assays on highly metastatic cancer cell line 4T1 were able to slightly inhibit cell migration through the inhibiton of matrix metalloproteinase-9 (MMP-9) expression. These findings suggest that PGB-0-So is potential as an anticancer agent.
Keywords: Metastasis, Anticancer, Curcumin analogue, PGB-0-So, 4T1 cell line

Medical Oncology
PP-18

A COMPARISON OF CYTOTOXIC AND ANTI-METASTATIC ACTIVITIES OF PENTAGAMABORONON-0 (PGB-0) AND PGB-0 FRUCTOSE COMPLEX (PGB-0-F) IN 4T1 BREAST CANCER CELLS

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Metastasis is the most common cause of breast cancer death in the world. Newly curcumin analogue, Pentagamaboronon-0 (PGB-0) represents a potential anticancer agent toward HER2 positive breast cancer cells. The purposes of this study are to explore the anti-cytotoxic and anti-metastatic activities of Pentagamaboronon-0 (PGB-0) and PGB-0 fructose complex (PGB-0-F) toward 4T1 breast cancer cells. The cytotoxicity study by MTT assay revealed that PGB-0-F exhibited more potent cytotoxicity than PGB-0 with the IC_{50} value of 33 and 250 μM at 24 h, respectively. Cell cycle analysis by PI-staining flow cytometry showed that PGB-0 and PGB-0-F promoted S-phase arrest at concentration 75 and 34 μM in 24 h, correspondingly. In addition, lower dose of PGB-0-F (34 μM) induced higher early apoptosis percentage compare with PGB-0 dose (75 μM) detected by Annexin V-FITC/PI staining flow cytometry. Under scratch wound healing assay, PGB-0 and PGB-0-F inhibited cells migration. Moreover, based on gelatin zymography assay, both PGB-0 and PGB-0-F repressed MMP-9 expression. In conclusion, PGB-0-F exerts more potent cytotoxic and anti-metastatic activities than PGB-0 in breast cancer cells.

Keywords : Metastasis, Cytotoxicity, PGB-0, PGB-0-F, 4T1 cells

Medical Oncology
PP-19

Everolimus pharmacokinetics and efficacy in Japanese patients with advanced breast cancer

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Background
Everolimus is an important drug for advanced breast cancer treatment. However, frequently occurring adverse reactions are a major issue in clinical practice, especially in Japanese patients. The optimal target range of everolimus blood concentration has been established for treatment in patients with subependymal giant cell astrocytomas associated with tuberous sclerosis complex (5-15 ng/mL). However, there is limited information on the relationship between everolimus blood concentration and efficacy/toxicity in breast cancer patients. We recently reported that high everolimus blood concentration could be associated with high risk of dose-limiting toxicity (Hirabatake et al. ASCPT 2017). In this study, we evaluated the correlation between everolimus pharmacokinetics (PK) and efficacy.
Methods
Sixteen patients were enrolled in the study from November 2015 to August 2017. Ten patients started everolimus treatment at 10 mg once daily, whereas six patients started with a reduced dose of 5 mg. Subsequent dose adjustments were made based on toxicity. Blood samples were collected at pre-dose, 1, 4, and 8 hours post-dose. Everolimus blood concentration was determined using a validated latex-enhanced turbidimetric immunoassay. PK parameters were calculated with Bayesian estimation using the MW/Pharm clinical software (Mediware, Prague, Czech Republic).
Results
The median (range) age and body weight were 66 (42–85) years and 52.9 (39.0–67.8) kg, respectively. Importantly, 50% dose reduction in 8 patients (i.e., 4 patients in each initial dose group) was necessary due to occurrence of adverse events before the PK study. Progression-free survival (PFS) was evaluable in 14 patients. The median PFS was 13.0 months, with a follow-up period of 8.5 months or more. For all patients, the pre-dose (trough) concentration in the PK study was higher than 6 ng/mL, which is within the everolimus target window (5-15 ng/mL) defined in the treatment for patients with subependymal giant cell astrocytomas associated with tuberous sclerosis complex. Within the range of everolimus blood concentrations (6–35 ng/mL) observed in this study, there is no difference in pre-dose concentration between patients who had PFS longer (n = 10) or shorter (n = 4) than 8.5 months, which is the median PFS observed in the Japanese subgroup analysis of the BOLERO-2 study.
Conclusions
In this study, favorable PFS was observed, although the everolimus dose was reduced in the majority of patients. Our results suggest that, in Japanese breast cancer patients, increased everolimus concentration does not improve the PFS when the patients showed everolimus trough concentration higher than 6 ng/mL. Thus, prospective evaluation is warranted.

Medical Oncology
PP-20

Pregnancy and treatment outcomes of young patients aged <40 years with node-positive breast cancer

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Background: Chemotherapy (CT) and extended endocrine therapy (ET) are essential treatments for young patients with breast cancer, and subsequent declining fertility is an important issue for survivorship. We investigated actual treatment results and pregnancy outcomes of young patients with node-positive breast cancer. **Patients and Methods:** We carried out a retrospective study of the treatment, prognosis, and pregnancy outcomes of 174 patients with lymph node metastasis who were aged <40 years at the time of surgery between 2007 and 2011. **Results:** CT was administered in 165 patients, and ET in 150. Oocyte cryopreservation prior to CT was used by 2 patients; 10 took LHRH-analog during CT for ovarian protection; and 2 refused CT, 5 refused ET, and 10 discontinued ET due to pregnancy wish. Recurrence was observed during follow-up (median: 7.0 years) in 49 patients (28.2%); 25 (14.4%) died from breast cancer and three (1.7%) from other causes. Of the 122 (70.1%) who exhibited recurrence-free survival, 104 completed five years of ET, of whom 48 (46.2%) were extending ET for 10 years. The recurrence rates for each subtype were luminal, 23.0%; luminal-HER2, 35.3%; HER2, 28.6%; and TNBC, 66.7%. The clinical stage, number of positive nodes and TNBC were significant poor prognostic factors ($p<0.05$, respectively). Regarding pregnancy after adjuvant treatment, 6 patients became pregnant (3.4% of the entire group, 8.3% of those who wanted to become pregnant). Five patients were HR-positive, of whom 4 became pregnant naturally after completing 5 years of ET and one by ART having discontinued ET after 3 years. One patient was HER2-positive and became pregnant naturally after completing CT with trastuzumab. No patient with TNBC became pregnant. All of the patients who became pregnant had completed CT and were surviving in good health. However, 5 of 7 patients who refused adjuvant therapy due to pregnancy wish developed recurrence and died without becoming pregnant. **Conclusion:** At the clinical practice, most of young patients with node positive breast cancer had prioritized cancer treatment over future pregnancy, only a few patients became mothers. Young patients at a high risk of recurrence who desire to have children should consider undergoing fertility-sparing procedures before adjuvant therapy, and then attempting to become pregnant after completing treatment. The medical care provider must support young patients' decision making for fertility issue by providing appropriate prognostic information.

Medical Oncology
PP-21

Pathologic change before and after dose- dense AC chemotherapy and examination of the enhanced MRI expanse pattern of 54 cases.

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[Background/Method] We performed dose-dense AC therapy (ddAC) as neoadjuvant chemotherapy (NAC) for the primary breast cancer in this hospital.We performed 100 cases of NAC from February 2015 to April 2017.We examined the clinicopatholocical factor of 54 cases of ddAC and the association with image pattern.of 48 cases that took enhanced MRI. [Results] Median age 48 years old, StageI; 7 cases, II; 31 cases, III; 27 cases,NG1;7 cases, NG2;18 cases, NG3;29 cases, HR-positive 27cases /negative 14 cases,HER2-positive;14 cases/negative 40 cases,Ki67;high 41 cases /low 7 cases./unknown 5 cases. Three cases were treated and were not able to accomplish it. In postoperative tissue diagnosis, ypT0N0 is 9 cases (17%). In ypT1, subtype changed in 43 cases (67%), (table1) 25 of 39 cases (64%) that Ki67 was measurable varied from high to low . When multivariable analysis does a clinicopathologic factor and image pattern in the examination of 48 that we added an MRI image.Subtype(LHorT,OR;12.5, 95% CI, 1.59-190, p=0.01), Ki67 (unit OD 1.05,1.01-1.12,p=0.01),cT(stageI,2.6x109,1.31-,p=0.03), MRI (1.02x109,0.96-,p=0.05 which is not a mass scattering type) were independent pCR predictor. Increase of ypT0N0 and ypTisN0 was found in the comparison according to the subtype with the non-ddAC197 case of this hospital in LH,H. [Conclusion]We could predicte pCR or subtype of non-pCR cases, and could examine strategies for treatment. We repeat cases and want to examine it.

Medical Oncology
PP-22

Pathologic change before and after dose- dense AC chemotherapy and examination of the enhanced MRI expanse pattern of 54 cases.

[1]Department of Breast and Endocrine Surgery,Toranomon Hospital,Tokyo.Japan,[2]Department of Medical Oncology,Toranomon Hospital,Tokyo.Japan,[3]Department of Diagnostic Pathology,Toranomon Hospital,Tokyo.Japan
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Medical Oncology
PP-23

Dose eribulin mesylate reduce the occurrence of new metastasis ?

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Background：Eribulin mesylate is a chemotherapeutic agent that inhibits microtubule functions. In experimental setting, it is shown that eribulin reverses the phenotype from epithelial-mesenchymal transition to mesenchymal-epithelial transition, and remodels the tumor vasculature, which is considered to suppress the occurrence of a new lesion or metastasis (NL). We investigated how eribulin influences on the post-treatment in clinical settings by examining our single-center experience.
Methods：The retrospective chart review was done on 41 advanced/metastatic breast cancer (A/MBC) patients who were treated with eribulin between September 2011 and January 2017 in Toranomon Hospital. We assessed the clinicopathological variables and investigated which factors have the relation with improvement of post-progression survival（PPS） and with the reduction in appearance of NL.
Results：The median age of A/MBC patients was 54 years. 6 were ABC（15%）, and 35 were MBC（85%）. 24 were Luminal type, 4 were HER2-enriched type, 6 were Luminal HER2 type, and 7 were Triple Negative（TN） type. The median OS was 3.5 years. The median period from the introduction of the 1st chemotherapy to death was 2.55 years. The relation between clinicopathological variables and PPS was analysed in 31 patients who were treated with more than 2 courses of eribulin. Eribulin was discontinued due to increase in size of pre-existing lesions (PEL) in 12 patients, NL in 14 patients, adverse events in 3 patients, and other reasons in 2 patients. Kaplan-Meier analysis for PPS was conducted for age, subtype, Progressive Disease type (PEL or NL), line of eribulin administration, and the period of administration of eribulin. The period of administration of eribulin was found to correlate with prolonged PPS (<120 days; 156 days vs ≧120 days; 280 days, p=0.05). The Comparison of the rate of NL was done among the pre-eribulin therapy, eribulin, and post-eribulin therapy, and was analysed in the same subgroups as PPS analysis. ER negative (57%→83%→75%), HER2 negative (41%→55%→44%), TN (50%→75%→25%), ≧120 days of administration (53%→53%→45%), and ≦2nd line administration (67%→78%→56%) were found to correlate with reduction in occurrence of NL in post-eribulin therapy.
Conclusion: Our data indicates that ER negative, HER2 negative, TN, long period of administration, and early administration are correlated with reduction in the occurrence of NL in the post-eribulin therapy, which may lead to prolonged PPS. Further studies are required including the comparison between eribulin and other chemotherapeutic agents.

Pathology
PP-24

Number of negative lymph nodes is potential prognostic factor in breast cancer in Thailand.

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Tanin Titipungul[1]

Background: Breast cancer is one of the common cancers in Thai women. Previous studies show number of negative lymph nodes (NLNs) is an independent prognostic factor in breast cancer patients, but there is no study of this topic in Thailand. Aim of this study is study the prognostic value of NLNs among Thai patients with invasive breast cancer.
Materials and methods: We retrospective analyses the prognostic value of NLNs on survival outcomes in patients with invasive breast cancer from medical records of 113 female Thai patients who underwent modified radical mastectomy, between 2009 – 2011. The median of follow time is 79.16 months. The clinicopathological data are collected and statistic analyzed.
Results : Mean age is 51.78 years. The 5-year-survical is 70.8%. The metastatic lymph node status and Lymph-vascular invasion status show statistically significant for survival ($p < 0.05$). The patients who have NLNs ≥ 5 nodes have better prognosis than who have NLNs < 5 nodes ($p = 0.011$) and the 5-year-survival rate are 76.04% and 41.17%, respectively ($p = 0.004$).
Conclusion: This study support that NLNs is an independent predictor of survival in invasive breast cancer in Thai patients.

Pathology
PP-25

A rare case of nodular mucinosis of the breast away from the nipple-areola complex

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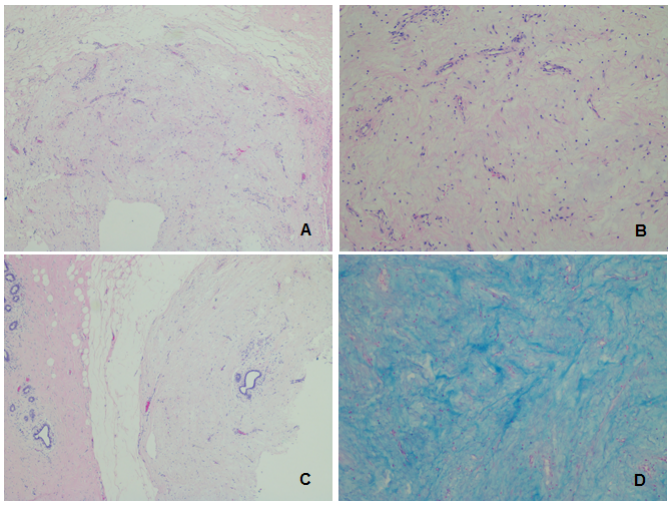
Tingting Feng[1],Han Boon Oh[1, 2],Yin Huei Pang[1, 3],Chuan Chien Tan[1]

Nodular mucinosis of the breast (NMB) is an extremely rare breast lesion with only eleven cases been described in the English literature. It usually presents as a slow-growing soft mass in a young, previously healthy person, mostly female. All previously reported cases of NMB involve the nipple or subareolar region of the breast. None of the cases reported showed any association with Carney complex. Common radiological findings of NMB include lobulated, circumscribed, homogenous, hypoechoic mass on Ultrasonography. Histologically, it is described as a nodular myxoid/mucinous lesion containing scattered spindle cells and blood vessels, with no epithelial components. The myxoid stroma are typically positive for Alcian blue, hale colloidal iron, and negative for Periodic Acid-Schiff.

We present a case of nodular mucinosis of the breast occurring outside the nipple-areola complex in a 40-year-old lady, with clinical, radiological and histological findings. This is the first reported case of NMB away from the nipple-areola complex. We also review the previously reported cases of NMB in the literature, and discuss the possible differential diagnosis of this rare entity.

Although NMB is a very rare condition, it is important for clinicians to be aware of this benign entity, and to be able to distinguish NMB from other myxoid or mucinous lesions of the breast, especially malignant lesions. Complete surgical excision is warranted to prevent future recurrence and to rule out other mucinous or myxoid lesionsof the breast.



Pathology
PP-26

LYMPH NODE RATIO AS A VALUABLE PROGNOSTIC PREDICTOR IN BREAST CANCER PATIENTS WITH LESS THAN 10 AXILLARY LYMPH NODES EXAMINED.

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Putachart Misang[1],Tanin Titipungul[2]

Background
Breast cancer is a common cancer in Thai women. The ratio of number of metastatic lymph nodes to total number of dissected axillary lymph nodes (lymph node ratio: LNR) is described as an independent prognostic factor in breast cancer patients. It is generally accepted that a minimum of 10 axillary nodes are required for adequate staging of breast cancer.
Aim
The aim of this study is to investigate the correlation of LNR and prognosis among Thai breast cancer patients who have less than 10 axillary lymph nodes examined.
Methods
We retrospectively analyze 35 Thai female breast cancer patients who underwent modified radical mastectomy between2009 – 2011. All patients have less than 10 axillary lymph nodes examined without evidence of distant metastasis. The patients are divided into <0.65 and ≥0.65 LNR groups.
Results
Median follow-up period is 71.17 months and 5-year-survival of all cases is 68.6%. The 5-year-survival of patients with LNR <0.65 group and LNR ≥0.65 group are 72.72% and 0% respectively (P=0.031). The cut-off point of LNR at 0.65 shows significantly correlated with overall survival (P<0.0001), while there is no statistically significant correlation of T stage, N stage, and survival outcome (P>0.05).
Conclusion
Our study supports that LNR could be an independent prognostic factor for survival in breast cancer patients with less than 10 lymph nodes examined.

Pathology

PP-27

Withdrawn

Biology
PP-28

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

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Govind Babu kanakasetty[1],Prashant Kumar[2],Ajay Balakrishnan[2],Anuradha Rangarajan[3],Abhishak Anand[1]

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.

Biology
PP-29

Wnt5a accelerates aggressiveness of ER-positive breast cancer by promoting cancer cell migration through ALCAM pathway

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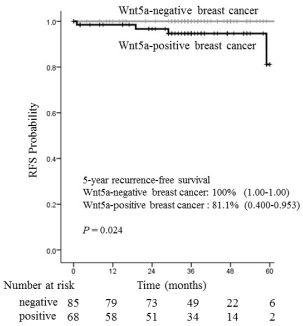
Background: Wnt5a is a representative ligand that activates β-catenin-independent pathways and involved in cell motility and cell polarity, and the like. We elucidated the implication of Wnt5a expression in breast cancer.
Methods: One hundred seventy eight breast cancer patients (mean age ± SD: 60.0 ± 13.2 years) with clinical Stage I-III between January 2011 and February 2014, were prospectively evaluated. We examined relationships between Wnt5a expression and clinicopathological factors by immunohistochemical analyses. 5-year relapse-free survival rates and sites of recurrence were analyzed. In addition, molecules induced by Wnt5a in cultured cells were identified by DNA microarray analysis.
Results: Wnt5a expression was significantly more frequent when estrogen receptor (ER) was present, 68/153 (44%) than when ER was absent, 1/25 (4%) (P <0.001). In ER-positive breast cancer, a significant interaction between expression of Wnt5a with lymph node metastasis, high nuclear grade, and lymphatic invasion. 5-year relapse-free survival rates were 81.1% and 100% in Wnt5a-positive and Wnt5a-negative breast cancers, respectively (P = 0.024). All recurrent breast cancer patients in this study had bone metastasis. We established MCF7 stably expressing Wnt5a (MCF7/Wnt5a cells) and conducted cell migration assays to determine the migratory capacity of Wnt5a-positive breast cancer. We also tested Wnt5a-silenced MCF7/Wnt5a cells. The migratory capacity of MCF7/Wnt5a cells increased significantly, whereas knockdown of Wnt5a resulted in a lower increase in migratory capacity. Microarray analyses identified several genes induced by Wnt5a, involving activated leukocyte cell adhesion molecule (ALCAM). We focused on ALCAM and investigated its protein expression by Western blotting, and found remarkable increase of ALCAM in MCF7/Wnt5a cells. The migratory capacity of MCF7/Wnt5a cells decreased significantly by knockdown of ALCAM.
Conclusions: Wnt5a expresses in ER-positive breast cancer and is associated with high-grade malignancy and a poor prognosis through ALCAM pathway. Wnt5a could be a novel prognostic factor of ER-positive breast cancer.



Number at risk						
negative	85	79	73	49	22	6
positive	68	58	51	34	14	2

Biology
PP-30

Shedding light to shedding HER2-ECD

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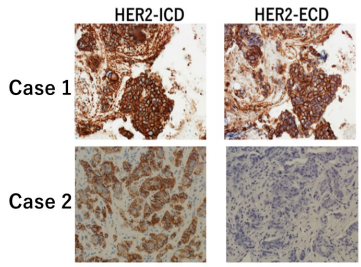
【INTRODUCTION】The sheddase in HER2-positive breast cancer removes HER2-ECD to generate p95 with strong protein kinase activity and the loss of HER2-ECD leads to the loss of the target for anti-HER2 drugs. HER2 shedding might be a powerful survival strategy for HER2-positive tumor. For detection of HER2 by IHC, however, a many of the hospitals use the antibody recognizing not HER2-ECD but -ICD and the antibody is unable to detect HER2-ECD if shedded. As a result, the current anti-HER2 therapy might carry on to the breast tumor of unknown ECD status. In the present study, the expression of ECD and ICD was compared between the tumors highly sensitive and resistant to anti-HER2 therapy and the contribution of the loss of ECD to the resistance to anti-HER2 was discussed. 【METHODS】The expression of ECD and ICD of the tumors highly sensitive and resistant to anti-HER2 therapy at core needle biopsy of the primary tumor was investigated by IHC using specific antibodies. Case 1 and 2 were HER2-positive HR-negative tumors with multiple liver metastasis and represented as highly sensitive and resistant tumor to anti-HER2 therapy, respectively. Case 1: stage Ⅳ: cCR by trastuzumab +PTX followed by trastuzumab +pertuzumab +PTX has maintained by trastuzumab +pertuzumab for 42 months up to the present. Case 2: recurrent within 6 months after operation: The tumor recurred during adjuvant trastuzumab after pCR by FEC followed by trastuzumab + PTX. The recurrent tumor showed early PD to trastuzumab +pertuzumab +DTX as well as T-DM1 and responded remarkably to TCH (DTX +carboplatin +trastuzumab). Due to the adverse effect TCH terminated at 7th cycle and lapatinib +trastuzumab +PTX has been effective for 4 months up to now. 【RESULTS】HER2-ICD was highly expressed (score 3+) in both cases. The IHC score of HER2-ECD was 3+ and 0 for case 1 and case 2, respectively.【CONCLUSION】It was suggested that the status of HER2-ECD might be related to the sensitivity to anti-HER2 therapy more than that of HER2-ICD.More cases are needed to have the solid conclusion. We are planning the further study including the survey of early progression to anti-HER2 therapy using big database.



Expression of HER2-ICD and -ECD of primary tumors at CNB

Biology
PP-31

PROLIFERATION AND MIGRATION INHIBITORY EFFECTS OF GENISTEIN ON CHO-K1, OVARIUM CELLS AND 4T1, BREAST CANCER CELLS OCCUR THROUGH CELL CYCLE ARREST, SUPPRESSION OF MMP-9 AND RAC-1 PROTEIN EXPRESSION

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Edy Meiyanto[1, 2],Riris Istighfari Jenie[1, 2],Nur Dina Amalina[1],Gagas Pradani Nur Ilmawati[1]

Proliferation of cells were affected by numerous factors, due to internal and external condition of the cells. It is already known that genistein, an isoflavone from soy (*Glycine max* L.), performed cytotoxic activities against various cells. In this study, we evaluate the proliferation and migration of the proliferative normal and the highly metastatic cancer cells in the presence of genistein. Genistein exhibit different cytotoxic effect on both CHO-K1 and 4T1 cells in time and doses dependent manner with the IC_{50} values of 43 μM and 8 μM in 72 h respectively. This finding shows that Genistein give more potent to the proliferative active of cancer cells rather than to proliferative normal cells. However, cell cycle and apoptosis analysis under flow cytometry showed that genistein at the dose of 50 μM on CHO-K1 and 4T1 cells altered cell cycle profiles and induced cell cycle arrest at G2/M phase with the apoptosis evidence was higher on 4T1 cells. Scratch wound healing assay revealed that genistein inhibited the migration of 4T1 cells. Moreover, under gelatin zymography and western blotting experiment genistein decreased MMP-9, MMP-2, Rac-1, ER-α, Bcl-2, pRb, p19 and p14 protein expression that possibly contribute to the migration and proliferation inhibitory effect to the cells. In conclusion, our study demonstrates that genistein inhibits proliferation and migration on proliferative and highly metastatic cells and potential to be developed for anti-proliferative and metastatic cancer. Hence, consumption of genistein containing products should be monitored carefully to minimize its side effects.

Biology
PP-32

Age Impact as a Prognostic Factor in Luminal, HER2 and Triple-Negative Breast Cancer.

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Hung Chun Skye Cheng[1],Soa-Yu Chan[1, 2],Lei Lei[3],Yi-Ping Lin[4],Xiao-Jia Wang[3]

Background
Early-onset breast cancer (age ≤ 35 years) is a prognostic factor in early breast cancer (EBC). The impact of age on different breast cancer subtype is not studied sufficiently. This study using Taiwan Cancer Registry Dataset (TCRD) in a Cancer Center, Taipei to examine the prognostic value in different breast cancer subtypes and validate the impact of age in SEER Asian EBC

Patients and methods
Using the data in Taiwan as the derivation dataset, information was collected for 6,847 women that had surgery for invasive breast cancer from 1990 to 2014. Total follow-up time was 39,756 years with a median follow-up interval of 5.69 years (ranged 0 – 10 years). An external dataset of 12,519 Asian from the 2010 to 2013 Surveillance, Epidemiology, and End Results (SEER) Breast Cancer database was used for validation (Herceptin data available). The age impact on overall survival in luminal (ER/PR+ and HER2-), HER2 and triple-negative (TN) breast cancer was calibrated and validated.

Results
Age was a non-linear prognostic factor for breast cancer. The hazard ratio increased gradually for patients with age between 31-35 years and increased sharply with age 30 years ($p < 0.00001$, Figure 1A). However, the hazard ratio for HER2 patients with age 35 years did not change significantly. The poor prognosis in early-onset breast cancer was mainly from luminal and TN breast cancers (Figure 1B). The calibration of SEER Asian EBC is fitted well in every 5-year age interval except in patients with age between 45-49 years ($p = 0.05$). Among 394 patients with a minimal 3-year follow-up, the predicted events of mortality were 6.8, but the observed events were 12.

Conclusion
Early-onset breast cancer has a poor prognosis, the age impact on prognosis is mainly due to luminal and TN breast cancer patients.

Figure 1A

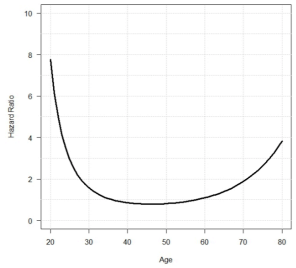
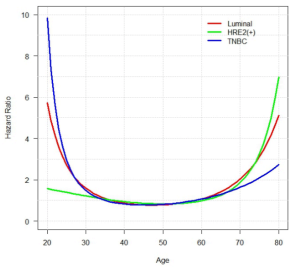


Figure 1B



Biology
PP-33

Expression of PgRMC1 (Progesterone Receptor Membrane component 1) in breast cancer

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Background: PgRMC1 (Progesterone Receptor Membrane component 1) is one of the progesterone binding proteins and known to be highly expressed in ovarian, liver, lung, colon and breast cancer cells. The expression of PgRMC1 was reported to associate with cancer development, chemoresistance and poor prognosis in breast cancer by regulating drug and sterol metabolism, cell cycle and apoptosis. However, the precise functions of PgRMC1 remain to be elucidated.
Method: We examined PgRMC1 expression in breast cancer tissues and analyzed its relation to clinicopathological characteristics of cancer, among 112 women diagnosed with invasive breast cancer between 2008 and 2011. Total RNA was isolated from core needle biopsy or surgical specimens without any systemic treatment. The mRNA expression of ER, PgR, HER2, AR and PgRMC1 was determined by real-time PCR assay.
Results: The median age of the patients was 58 years. PgRMC1 expression was higher in luminal and HER2 types (Kruskal-Wallis; p-value=0.0054). In addition, PgRMC1 mRNA expression was correlated with ER, PgR, HER2 mRNA expression (Spearman correlation; p-value=ER; 0.0030, PgR; 0.0039, HER2; 0.0031). Furthermore, PgR expression was positively correlated with AR mRNA level (Spearman; P-value<0.0001). It was not associated with primary tumor size, lymph node metastasis, and grade. In 13 patients treated with neo-adjuvant chemotherapy, patients with poor pathological response showed significantly high expression of PgRMC1 (Kruskal-Wallis; P-value=0.0424).
Conclusion: In our works, PgRMC1 mRNA level of luminal type and HER2 type is higher and has positive correlation with AR mRNA level. These results indicate that PgRMC1 expression is related with regulation of hormone receptor and HER2 expression which affect cell proliferation signaling pathway. Furthermore, we showed that PgRMC1 might be relevant to response to chemotherapy, and hence PgRMC1 is an important component in the mechanism of chemoresistance. Further studies must now be directed defining the role of PgRMC1 in breast cancer cells.

Epidemiology
PP-34

Risk factors for Delay in presentation of breast cancer: a real-word evidence from northeast of China

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Background: In China, there are high diagnosis rate of primary advanced breast cancer and low breast-conserving surgery rate. Delay in presentation is a crucial factor, which always contributes to poor cancer survival and more medicine resource. In this study, we aimed to identify factors associated with presentation delay in breast cancer patients. **Methods:** We interviewed 150 histologically confirmed breast cancer patients using structured personal interviews, which were carried out by trained nurses in the hospital setting. Patient delay was defined as time from onset of symptoms to first medical consultation; doctor delay was defined as time from first doctor has found the mass to diagnosis of breast cancer. The effects of various factors on the likelihood of prolonged delay were evaluated using logistic regression. **Results:** Among 150 eligible patients, median of patient delays was 5 months. 90% patients delayed for longer than 3 months; 30% patients delayed for longer than 6 months; 10% delayed for even longer than 12 months. As shown by multivariate analysis, the risk of prolonged patient delay was significantly associated with lower family income, non-medicine breast care, lower educational Qualifications, symptoms other than painless breast lump and no history of mammograms; the risk of prolonged doctor delay was related to the type of health care, level of the primary consulting hospital and with stable marital partner or not. It is notable that patients with lineal descent being diagnosed as breast had lower delayed presentation rate. **Conclusions:** This study provides real-word evidence that the factors associated with delayed presentation of breast cancer in northeast of China. The statistical analysis results suppose that individual messages and more medicine resource should aim at the population of lower family income, redundant breast care, lower educational Qualifications, painless breast lump and no history of mammograms.

Pathology

PP-35

Withdrawn

Epidemiology
PP-36

Characteristics of molecular breast cancer subtypes among Uzbekistan's women

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Background: The epidemiology of breast cancer (BC) has been extensively studied in developed countries; however, epidemiological data is scarce in the Central Asia. We present epidemiological analysis and molecular subtypes of BC in Uzbekistan in an attempt to aid continuously evolving strategies for cancer surveillance and control. The 5 year survival rate in BC patients over the past decades does not exceed 50% on the territory of Uzbekistan. Furthermore, we highlight the temporal changes of cancer care delivery over the period of this study.
Material and methods: Date from Tashkent City Cancer Registry about female BC, diagnosed in 2008-2015 was analyzed. Estrogen receptor (ER), progesterone receptor (PR), Human Epidermal Growth Factor Receptor type 2 (Her2) expressions and Ki 67 status were assessment, using immunohistochemistry (IHC) in 890 BC patients. The IHC analysis is significant, yet it is almost impossible to pass in Uzbekistan. IHC assessments were grouped into five phenotypic subtypes: Luminal A (161cases), Luminal B Her2 negative (371cases), Luminal B Her2 positive (80cases), triple negative (189cases) and non-luminal Her2 positive (89cases). Cohort study included 2 groups of female BC: the 1 group of BC is Uzbek native women (492cases), the 2 group of BC is women from another ethnics group (398cases).
Results: Median age of Luminal A BC in the 1 group is 51,8±11 years (85cases-17,3%), 2 group is 53,8±11,3 years (76cases-19,1%). Median age of Luminal B Her2 negative BC in the 1 group is 49,6±12years (189cases-38,4%), 2 group is 51,5±10years (182cases-49,1%). %). Median age of Luminal B Her2 positive BC in the 1 group is 49,5±13,2years (50cases-12,6%), 2 group is 49,5±13,5years (30cases-7,5%). Median age of non-luminal Her2 positive BC in the 1 group is 46,6±7,4years (49cases-10%), 2 group- is 53±8,3years (50cases-12,6%). Median age of triple negative BC in the 1 group is 48,4±12years (99cases-20,1%) and in the 2 group is 52,4±10,6years (90cases-22,6%).
Conclusion: Our study findings suggest that the prevalence of triple negative (21,2%) BC in Uzbekistan's subjects is not similar to that among Western cohorts. Age is important risk factor for BC, but it has also been suggested that age at diagnosis is related to BC survival. This study represents the first comprehensive assessment of the epidemiological features of BC in Uzbekistan basing a framework for enhancing strategic health plans regarding BC control in Uzbekistan.

Epidemiology
PP-37

The clinicopathological features of young Japanese women (≤35 years old) with hormone receptor-positive breast cancer who became pregnant after treatment

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[Background] Endocrine therapy (ET) is administered for 5-10 years to young hormone receptor-positive (HR+) breast cancer patients. However, there is concern that this causes a deterioration of fertility.
[Aim] To clarify the clinicopathological features of patients who became pregnant after breast caner treatment in the clinical setting.
[Methods] Among 4200 patients who underwent primary breast cancer surgery in our hospital between 2007 and 2010, the data of 151 patients with Stage 0-III HR+ breast cancer and who were ≤35 years of age (3.6%) were retrospectively analyzed to investigate the clinicopathological features, pregnancy outcomes, and prognoses. Tumors with ER ≥10% and/or PgR ≥10% were regarded as HR+ breast cancer.
[Results] The number of patients with clinical stage 0, I, II, III was 51, 46, 43, and 11, respectively. The treatments were as follows: chemotherapy and ET (n=64), and ET alone (n=29); 53 patients received no adjuvant therapy. Seventy patients expressed a specific desire to become pregnant at the time of the breast cancer diagnosis. During the observation period (median, 7.7years), ET was administered as follows: extended to 10y in 14 cases; complete 5y treatment in 46, treatment discontinuation after 2–4y because of a desire to become pregnant in 9, discontinuation for other reasons in 22, refused treatment for desire to pregnancy in 4, no ET in 50. Forty patients (26.5%) became pregnant and there were 50 births. The mean age of the patients who became pregnant was 30.6 years at diagnosis, which was younger than the age of 31.9 years of the non-pregnant women (p=0.018). The pregnancy rates of stage 0, I, II, III were 50%, 20%, 14.6% and 0%, respectively. The pregnancy rates according to the treatments were: without chemotherapy, 40.5%; with chemotherapy 9.5%; without ET, 46.3%; completed 5y ET, 11.7%; 2-4y ET, 24% (p<0.001). The pregnancy rate of patients who had desire to become pregnant was 43.5% (p<0.001). Overall, breast cancer recurrence occurred in 23 patients, and there were 10 breast cancer-related deaths. All the patients who become pregnant survived without relapse.
[Conclusions] In the present study, age, the clinical stage at diagnosis and treatment with or without adjuvant systemic therapy were significantly associated with pregnancy after breast cancer. All the patients who gave birth survived without distant metastasis.

Epidemiology
PP-38

HBOC pre-counseling by medical oncologist is important opportunity to increase genetic counseling and BRCA testing

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Background: In Japan, genetic counseling for hereditary breast and ovarian cancer syndrome (HBOC) is commonly performed by medical geneticist and/or breast surgeon when they have breast cancer. Medical oncologists specialized for breast cancer and ovarian cancer have great knowledge about both disease characteristics and treatment. Therefore, if they have genetic testing knowledge and counseling skill, they will be able to support genetic counseling field as well.
Aim: We aimed to determine whether HBOC pre-counseling by medical oncologists would increase the number of patients in visiting authentic genetic counseling and to take *BRCA* testing.
Method: We retrospectively performed chart review and determine candidates recommended for genetic counseling according to NCCN guideline ver1.2018. Among primary breast cancer and metastatic breast cancer, we searched 449 cases (cohort1: 1/Jan/2013-31/Dec/2015) as the period medical oncologists were not involved genetic counseling. In contrast, we reviewed 321 cases (cohor2: 1/Dec/2016-30/Nov/2017) after our HBOC pre-counseling was installed, and we compared patient characteristics, and case number and frequency who visit genetic counseling and take *BRCA* testing. In this period, physician who see breast cancer freely book HBOC pre-counseling.
Result: Cohort1 included 128(28.5%) of candidates to suggest genetic counseling, and physician explained genetic counseling only for 26 cases (20.3%). Six cases (4.7%) visited genetic counseling and no one took *BRCA* testing. Cohort2 included 87 candidate and physician explained 49 cases (56.3%). Two medical oncologists (TK and KH) performed pre-counseling for 29 cases(59.2%). Fifteen cases (51.7%) visited genetic counselling and 13 cases took *BRCA* testing.
Conclusion: With our experience, HBOC pre-counseling performed by medical oncologists showed increased possibility to visit genetic counseling probably by better understandings of HBOC characteristics and risk. Hence, it may be useful for medical oncologist to obtain genetic testing knowledge and counseling skill for supporting breast and ovarian cancer patients to access personalized treatment and/or prevention plans.

Imaging Radiation
PP-39

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.

Imaging adiation

PP-40

Withdrawn

Imaging Radiation
PP-41

Second-look US using Real-time Virtual Sonography increases the sonographic detection rate of MRI-detected lesions with non-mass enhancement on breast MRI

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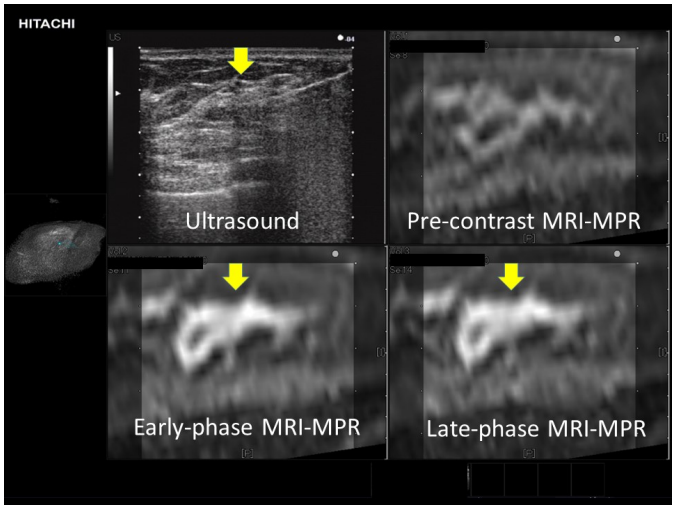
Breast MRI-detected lesions are often further evaluated using second-look US. The second-look sonographic correlation rate of non-mass enhancement (NME) is lower than that of mass or focus. The aim of this study was to verify the utility of second-look US using Real-time Virtual Sonography (RVS), which can localize the enhanced distribution obtained by MRI onto the breast surface using an image fusion technique, for the sonographic detection of MRI-detected lesions with NME.
19 consecutive patients (19 lesions) with NME on 1.5T prone MRI were enrolled in this study. For conventional B-mode occult NME, second-look US using RVS was performed after additional 1.5T supine MRI. All RVS examinations were performed on an outpatient basis. Pathological findings were confirmed by sonography-guided biopsy or excision.
Of the 19 NME lesions, 12 (63%) were identified with second-look US using conventional B-mode alone. Of the seven conventional B-mode occult NME lesions, six (86%) were sonographically detected with second-look US using RVS; all of these sonographic morphology were non-ductal, irregular, hypoechoic masses with architectural distortion and lacked convex outer borders. The six lesions could be evaluated using sonography-guided biopsy, and MRI-guided biopsy was not required. The single lesion that was not sonographically detected required surgical biopsy after body marking using RVS. Overall, four cases were malignant (three DCIS and one IDC) and three were benign.
Our results suggest that second-look US using RVS increases the sonographic detection rate of MRI-detected breast lesions with NME.



Imaging Radiation
PP-42

Importance of Detection of Intratumoral Heterogeneity on Diffusion-weighted and T2-weighted MRI for Predicting Breast Cancer Subtypes

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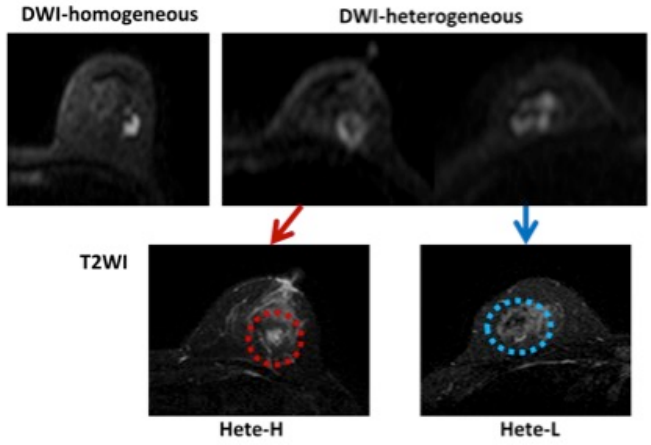
Sachiko Yuen[1, 2],Seiji Yanai[1, 3],Yoshihiro Yata[1, 3],Hajime Matsumoto[1, 3],Yo Ichinose[3],Teruyuki Deai[3],Takashi Hashimoto[3],Shuichi Monzawa[4],Takashi Tashiro[5],Kazuhiko Yamagami[1, 3]

Objectives: To assess the morphology of breast carcinomas on diffusion-weighted MR images (DWI) and the intratumoral signal intensity (SI) on T2-weighted MR images (T2WI), and to evaluate the association between the combined findings on DWI and T2WI and breast cancer subtypes.
Materials and Methods: Two hundred and eighty breast cancer patients who underwent breast MRI prior to operation or neo-adjuvant chemotherapy were included in this retrospective study. All had invasive carcinomas which were classified into 6 subtypes: Luminal A (Ki67 index: <20%, n=110), Luminal AB (Ki67 index: 20~30%, n=39), Luminal B (Ki67 index: <30%, n=63), Luminal-human epidermal growth factor receptor (HER)2 (n=31), HER2 (n=13) and triple-negative (TN) (n=24). Based on the morphology on DWI, the tumors were classified into 2 patterns, DWI-homogeneous and DWI-heterogeneous. If DWI-heterogeneous, the assessment of intratumoral SI on T2WI was added: the tumors with intratumoral high SI on T2WI were classified as Hete-H, and the tumors with intratumoral low SI on T2WI were classified as Hete-L (Figure). The association between 1) the morphological patterns on DWI and the 6 subtypes, and 2) the intratumoral SI patterns on T2WI and the 6 subtypes in DWI-heterogeneous were evaluated.
Results: There was a significant association between 1) the morphological patterns on DWI and the 6 subtypes ($p < 0.0001$), and between 2) the intratumoral SI patterns on T2WI and the 6 subtypes ($p=0.02$). DWI-homogeneous was dominant in Luminal A (65.5%) and Luminal AB (81.8%), and Hete-H was dominant in the TN type (75%). High proliferative and/or aggressive subtypes other than Luminal A and AB were frequent (80%) in Hete-H. Hete-L included more Luminal types compared with Hete-H. The mean Ki 67 index of Hete-H was significantly higher than that of Hete-L ($p=0.005$) and DWI-homogeneous ($p<0.001$).
Conclusion: The detection of intratumoral heterogeneity using MRI is useful for predicting breast cancer subtypes, which is possible by carefully examining T2WI and DWI.


DWI-homogeneous
DWI-heterogeneous
T2WI
Hete-H
Hete-L

Imaging Radiation
PP-43

Importance of teamwork for performing scalp cooling: an experience from the PAX-15 stud

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Background:

Chemotherapy-induced alopecia(CIA) is one of the most distressing side effect for breast cancer patients. Reducing CIA reliefs anxious of patient who receives chemotherapy. Paxman scalp cooling cap is available in EU and has been reported its hair loss prevention. Recently, a new cap was developed for more better fitting for Asian people, and PAX-15 study was conducted in 5 sites in Japan. To prepare PAX-15 study at the outpatient chemotherapy room, it was necessary to set up and learn the scalp cooling device to prepare scalp cooling for the first time. This is the first experience of scalp cooling to reduce CIA in Kanazawa Univeristy hospital from PAX-15 study.

Material and methods:

To prepare the study, we developed PAX-15 team in breast surgery department (surgeons, pharmacists and nurses), CRC, and outpatient nurses. All members received cap fitting trainings and information related to the scalp cooling. We managed scalp cooling schedule for patients, and location to install PAX-15 to keep privacy from other patients who does not receive scalp cooling. Patients received cap fitting and information by CRCs about scalp cooling before actual treatment. Multiple CRCs involved for each scalp cooling to prepare PAX-15, cap fitting and careful monitoring during scalp cooling, after the treatment, and shared all information within entire team if necessary.

Results:

The CRC and staff worked as a team which minimized patient's anxiety of scalp cooling and immediate actions were taken for adverse events. There were headaches, scalp pain, and chilling reported due to the excessive tightened cap bands and scalp cooling. However, all patients completed the treatment without drop-out due to intensive support by our staff. In results hair prevention was observed comparing to chemotherapy without scalp cooling, and patients recommend scalp cooling to all breast cancer patients according to a QOL questionnaire

Conclusions:

To introduce new medical device, it is necessary to adjust hospital environment and human resource. PAX-15 study was successes due to the good team work and well preparation. CRCs were responsible for the scalp cooling in the study, however doctors and nurses will do. Therefore, it is necessary to succeed its experience learned from the PAX-15 study to establish a same system to remove patient anxiety and same level of treatment. Our hospital conducts chemotherapy average of 35 people a day for breast cancer. It is important to establish the system to perform scalp cooling as standard care with limited facilities and personnel.

Imaging Radiation
PP-44

Dedicated breast PET (dbPET) for quantifies response to neoadjuvant therapy in breast cancer.

Head of Molecular Oncology and Imaging Program / Director of Molecular Breast Imaging Division SERGAS-GALARIA"
Michel Herranz

Continued progress in the control of breast cancer will require sustained and increased efforts to provide high-quality screening, diagnosis, and treatment. Recently, the MAMmography with Molecular Imaging (MAMMI) dedicated breast PET (dbPET) has emerged as an additional imaging tool for breast cancer diagnosis, clarification of complex lesions and therapy follow-up. This study is aimed to determine whether correlations exist between physiological images with 18FDG of pre, post-2-cycles and post Neoadjuvant Chemotherapy, with a predictive value of response.

METHOD AND MATERIALS

Two hundred (200) patients, and three scan points: pre, after 2 cycle and post (pre-surgery) Neoadjuvant Chemotherapy were included in this study. A prone position high-resolution dedicated breast PET (MAMMI-dbPET) was performed 60 min after administration of 120-140 MBq of 18F-FDG. Maximum standardized uptake value (SUVmax) quantification, volume characterization, positioning in all three space-axes, distances to reference points (proximal breast limit, nipple areola complex) were registered.

RESULTS

When treatment was successful, a significant difference was found between pre and post neoadyuvant chemotherapy status and the SUVmax ($p < 0.001$) of breast tumors. Pre Neoadjuvant (mean SUVmax, 13.1) demonstrated a significantly higher SUVmax than did post 2 cycles tumors (median SUV, 5.5) ($p= 0.019$). No statistical significant difference was found for SUVmax of post-2 cycles vs. post lesions with a mean SUVmax of 5.5 and 3.9 ($p=0.35$) respectively. A statistically significant difference was found for volume measurement of pre vs. post-2 cycles vs post Neoadjuvant therapy lesions. A clear qualitative difference by three different observers has been reported among dbPET and MRI volume characterization.

CONCLUSION

dbPET MAMMI has proven to be an excellent tool for quantification, 3D spatial localization and monitoring of neoadjuvant therapy. Our data suggest that SUVmax measurements of 18FDG-dedicated breast PET can provide valuable information about therapy efficiency. Such an association might be of relevant importance to treatment continuity or adjustement.

CLINICAL RELEVANCE/APPLICATION

The use of a physiological technique such as dbPET, will allow us to be more precise and in an earlier way in the follow-up of the treatment.

Imaging Radiation
PP-45

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

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Michel Herranz

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

Imaging Radiation
PP-46

Design, development and validation of the first 3D PET manual breast guided biopsy system.

Head of Molecular Oncology and Imaging Program / Director of Molecular Breast Imaging Division SERGAS-GALARIA"
Michel Herranz

PURPOSE

The molecular imaging of the breast is becoming more and more important. Nowadays, being able to define the biology of breast lesions helps to better characterise lesions. In this context, breast-specific PET imaging is of great utility. Some of the problems reported by this technology lies in those lesions that the dedicated breast PET system are able to detect and which are invisible to other techniques, or those that, because of their heterogeneity are difficult to characterize, or those that present a functional resistance to chemotherapy. How we can be able to validate or demonstrate the correct diagnosis of these lesions?.

METHOD AND MATERIALS

The ProBioS™ system consists in: 1.- A resistive resin adapter with fixed or mobile grids of 1, 3 or 6 racks. 2.- A disposable holding system with receptacle for blood and other fluids, sterile and detachable. 3. A specific software for: i) needle positioning ii) deformation study and deformation by compression to calibrate de voxels and iii) an interface for automatic segmentation program, slice contour and 2D mesh generation. The system is adapted to be able to be used with any type of needle or manual biopsy system. In addition, the equipment is developed with the ability to place clips in the lesion.

RESULTS

Test with PROBioS: 1.- Calibration of the 3D result of the dedicated-PET images with the structure of the rack to grid positioning. 2.- Checking the theoretical calibration values 3.- Verification of empirical calibration values using point sources. Accuracy definition. 4.- Verification of empirical calibration values using sources mimicking tumors 5.- Verification of empirical calibration values using breast phantoms 6.- Design of coordinates of biopsy for the stereotaxic, empirical verification. 7.- Mathematical study of correlation between the values of biopsy in stereotaxic and MAMMI, corrections. 8.- Compression-software studies 9.- Compression-hardware studies 10. Viability and sterilization studies 11.- Biopsies on patients.

CONCLUSION

We present the first manual biopsy system guided by dedicated breast PET, its design, and its clinical utility. The development of this technique will allow the diagnosis of breast pathology to be much more precise and provide image services with an additional tool

CLINICAL RELEVANCE/APPLICATION

Functional biopsy will greatly improve the quality and accuracy of breast cancer diagnoses

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Breast MRI and dedicated breast PET (dbPET): Synergies and multimodal imaging.

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PURPOSE

MRI has the advantages of providing a 3D view of the breast with high sensitivity and using non-ionizing radiation, however, MRI has significant disadvantages including its moderate specificity. Recently, the MAMmography with Molecular Imaging (MAMMI) dedicated breast PET (dbPET) has emerged as an additional imaging tool for breast cancer. To compare FDG-dbPET with the conventional magnetic resonance imaging (MRI) on breast lesion characterization, we analyzed sensitivity, specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV) of 100 cases of patients with BC using both dbPET and MRI.

METHOD AND MATERIALS

Two hundred women with known or suspected breast carcinoma were enrolled in this study. Both a prone dbPET scan, and routine breasts MRI scans were performed. A joint reading of the MRI and PET scans side-by-side and a nuclear medicine physician and a radiologist performed integrated images. Sensitivity and specificity of MRI and dbPET scans were calculated on the basis of pathology reports.

RESULTS

A total of 252 lesions were assessed. Lesion size range was 0.18 to 7.6 cm. In lesion-by-lesion analysis, sensitivity and specificity of MRI alone were 93% and 67%, respectively; meanwhile the lesion-based sensitivity of dbPET were 96% and the breast-based specificity were 100%. The positive predictive value and the negative predictive value for MRI alone were 75% and 89%, respectively; however for dbPET were 100% and 97%, respectively. In a significant number of cases, dbPET helped to disprove positive findings by resonance, and in four cases helped to define new positives that had gone unnoticed at resonance,

CONCLUSION

Dedicated breast PET scans increase the specificity of MRI. False positives, one of the most annoying aspects of breast MRI, are reduced. The results of the current study shown that FDG-dbPET is much more effective than MRI in detecting breast cancer positives. This information may improve the likelihood of a successful excision, reduce costs from additional procedures, and minimize discomfort and anxiety for the patient.

CLINICAL RELEVANCE/APPLICATION

We must offer to our patients the best diagnostic tools we have. Adding to breast MRI, the use of a metabolic technique such as dbPET will help clinically by reducing false positives and therefore unnecessary biopsies and surgeries.