Migration assay on primary culture isolated from patient's primary breast cancer tissue

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Background: Migration is an essential component of breast cancer metastasis, which study has been concentrated on culture of established breast cancer cell lines that do not accurately represent the sophistication and heterogeneity of patient's breast cancer. An attempt to perform migration assay using *Boyden Chamber Assay* (BCA) on primary culture originating from patient's breast cancer tissue was developed to accommodate upcoming study of breast cancer migration in Indonesian patients.

Methods: Pathologically proven primary breast cancer tissue samples were obtained from Ciptomangunkusumo Hospital during core (n=4) and incisional (n=3) biopsies of stage IIA up to stage IIIA breast cancer patients. Following biopsy, the breast cancer tissue samples underwent processings to isolate the cancer cells. These cancer cells were then resuspended within *Dulbecco's modified Eagle's medium* (DMEM) and cultured in 12-well plate. The growth of primary culture were observed and compared between the core biopsy and the incisional biopsy specimens. Optimization of BCA method was later performed to investigate the migration of the breast cancer primary culture towards different experimental conditions, which were control, *Fetal Bovine Serum* (FBS), and *Stromal Derived Factor-1* (SDF-1). Two different number of breast cancer cells were tested for the optimization of the BCA, which were 1×10^5 and 3×10^5 cells.

Results: None of the culture performed on core biopsy specimens grew, while one out of three incisional biopsy specimens grew until confluence. The one primary culture that grew was later assesed using BCA to assess its migration index towards different experimental conditions. Using 1×10^5 breast cancer cells in the BCA , the result of the absorbance level of migrated cells showed that the migration towards SDF-1 (0.529) nearly doubled the migration towards control medium (0.239) and FBS (0.209). Meanwhile, the absorbance level was similar between the control medium (1.050), FBS (1.103), and SDF-1 (1.104) when the same test was run with 3×10^5 breast cancer cells.

Discussion: Breast cancer tissue collected using incisional biopsies had better chance to grow in primary culture than those collected using core biopsies, possibly due to the difference in the amount of tissue extracted. Consistent with previous research, patient's breast cancer cells was shown to migrate more towards the chemokine ligand SDF-1, as compared to control medium and FBS. The number of breast cancer cells run in the BCA also affected the result of the migration assay, where 1×10^5 cells showed a superiority as compared to 3×10^5 cells in showing the migration difference between the different experimental conditions.

Conclusions: This study encourages and facilitates future research to study the intrinsic migration characteristic of individualized patient's breast cancer as well as to assess the change in migration characteristic of breast cancer cells after an in vivo treatment in human.

Keywords : breast cancer, primary culture, migration, Boyden Chamber Assay, SDF-1