Poster: Radiobiology track: Immuno-radiobiology

PO-1072 INTRABEAM: precision hypo-fractionated radiotherapy with a systemic immune response.

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Purpose or Objective

To evaluate the changes in immune-cell phenotype in peripheral blood following intraoperative radiotherapy (IORT) in breast cancer patients.

Material and Methods

45 patients were classified in three groups of treatment as follows: Group A (Lumpectomy and Intrabeam exclusive), Group B (Lumpectomy and Intrabeam followed by EBRT 40.05 Gy in 15 fractions of 2.67 Gy) and Group C (Lumpectomy and EBRT 40.05 Gy in 15 fractions of 2.67 Gy +/- EBRT boost 9 Gy in 3 fractions). For each group, peripheral blood mononuclear cells (PBMCs) were isolated from heparinized venous blood samples collected before treatment and during different time points after treatment: before lumpectomy, 48 hours after IORT or EBRT, and 3 and 10 weeks after radiation treatment was completed. Peripheral blood populations of cytotoxic T-cells (CTL), helper T-cells, Natural Killer cells (NK), regulatory T-cells (Treg) and Myeloid Derived Suppressor cells (MDSC) were measured using flow cytometry. Cell phenotypes were evaluated using the FACS Navios system (BeckmanCoulter). Data were analyzed using FlowJo software (Tree Star Inc., Ashland, OR, USA).

Results

30 patients were included: 11, 15 and 4 patients for Group A, B and C respectively. For group A and B, the number of CTL increased three weeks after IORT (60.20% basal vs 67.10%) and EBRT (66.50% basal vs 71.30%) respectively. In contrast, for the control group (group C), a decrease in CTL was seen (64.35% vs 61.50%). In group A the number of NK cells increased after treatment (46.20% basal vs 59.20%), while in group B (42.90% basal vs 36.35%) and group C (56.80% basal vs 38.40%), we observed a NK decrease. For Treg we had mixed results which were hard to interpret. For Group A we saw a decrease during treatment (1.54% basal vs 1.44%) while for Group B we observed an increase of these cells (2.0% basal vs 2.75%). After 3 weeks, this tendency was reverted. For Group C, we observed an increase during treatment (1.45% basal vs 2.87%). For the MDSC panel, for granulocytes we observed a decrease in group A (6.44% basal vs 5.78%) and an increase in both group B (7.90% basal vs 10.31%) and group C (7.65% basal vs 10.20%) after 10 weeks. For Monocytes, in group A we observed the number of activated monocytes stable (8.95% basal 9.13%), whereas in group B and C we saw an increase after EBRT.

Conclusion

These results suggest that high doses per fraction would play an important role in CT, NK cells but not on the Treg and monocytes immunosuppression cells. Deciphering immune responses to treatment in breast cancer patients might introduce new useful biomarkers for treatment choices in the future.