

IART® (INTRA-OPERATIVE AVIDINATION FOR RADIONUCLIDE THERAPY) – A RADIOTHERAPY BOOST IN BREAST CANCER

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The conservative surgery with axillary dissection and additional radiotherapy represents the treatment of choice for patients with early breast cancer. A standard course of whole-breast external-beam radiation therapy (EBRT) followed by a boost to the tumour bed generally require 5/7 week to complete. This can represent a logistical problem for many patients, particularly the elderly and those who reside a considerably distance from a radiation treatment facility. As alternative to the traditional treatment of radiotherapy, the intraoperative radiotherapy (IORT) has been recently proposed. This technique, although valid, is limited by two major points: i) the availability of a dedicated intraoperative linear accelerator, ii) a restricted field of irradiation which limits the management of positive surgical margins. The experience developed in our Institute with the ROLL technique and the radionuclide therapy with the avidin-biotin pre-targeting system lead us to the development of a new approach named I.A.R.T.® (Intraoperative Avidination for Radionuclide Therapy) capable to control recurrence as for EBRT and IORT.

The IART® procedure consists of a first step where the surgeon intraoperatively injects avidin directly into the tumour bed followed by a second step of an intravenous injection of ⁹⁰Y/¹⁷⁷Lu radiolabelled biotin, 1 day later.

The avidin injection can be done with a syringe or with a dedicated spray -device (disposable and ready for intraoperative use) in the frame time while the surgeon is waiting for the sentinel node pathological analysis or after axillary clearance.

Avidin percolate the tissue of the index quadrant as well as it is drained by locoregional lymph nodes. Due to its positive electric charge (pI 10.7) and the inflammatory reaction after surgery, avidin is retained at site of injection for several days and constitute a sort of new “artificial receptor”, only expressed in the breast area, able to homing radioactive biotin and deliver a dose as high as 50 Gy.

The IART® approach is simple, low cost and easy to perform and it might represent an alternative to IORT in early breast cancer patients.