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# Left breast DIBH in radiotherapy: IMRT step and shoot, IMRT dynamic MLC or VMAT?

## Radiothérapie du sein gauche DIBH: IMRT step and shoot (S&S), IMRT dynamique MLC (DMLC) ou VMAT ?

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### Résumé

*Introduction:* Treatment of the left breast uses deep inspiration breath hold (DIBH) with surface guided radiotherapy (SGRT) to follow the position of the thorax. This method increases lung volume and moves the heart and left anterior descending coronary artery (LAD) away from the breast being treated, thereby reducing radiation doses. The treatment is delivered during apnea phases using different techniques: intensity modulated radiotherapy (IMRT) with two leaf sequencing step and shoot (S&S) and dynamic multileaf collimator (DMLC), or volumetric modulated arc therapy (VMAT). The aim of this study is to investigate the potential advantages of different modes.

*Material and Methods:* Ten left breasts were planned using S&S, DMLC and VMAT. Doses delivered to the predicted target volume (PTV) and organs at risk (OARs) were compared. All plans were compared, and a Wilcoxon signed-rank test was performed. Pre-processing QA and metrics of MLC complexity were also studied.

*Results:* DMLC and VMAT improved D95% coverage by 0.4 Gy and 0.3 Gy respectively, compared to S&S, with VMAT showing improved conformation. DMLC decreased the mean dose to the homolateral lung by 0.6 Gy and by 5.1% on V5Gy compared with VMAT. The 5 Gy isodose in VMAT increased by 38% and 41% compared to S&S and DMLC, which also increased mean doses to the heart, breast and contralateral lung by 0.2 Gy, 0.4 Gy and 0.5 Gy respectively. Plans were more modulated in DMLC but QA results remained satisfactory.

*Conclusions:* For IMRT, dosimetric differences are not clinically significant. VMAT may be an alternative to DMLC for more complex morphologies, but it results in higher doses outside the PTV, including in OARs. DMLC delivery is the fastest, benefiting the patient. With SGRT, IMRT is less restrictive when addressing beam interruptions caused by the gantry obstructing the camera.

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**Mots-Clés:** DIBH, SGRT, IMRT, S&S, DMLC, left breast, VMAT