



**HAL**  
open science

**Early subclinical cardiovascular changes after  
radiotherapy detected by echocardiography in women  
with breast cancer: contribution of the MEDIRAD  
EARLY-HEART cohort**

Médéa Locquet, Sophie Jacob, A.P.G. Crijns, J.A. Langendijk, Daan Spoor,  
Arantxa Eraso, Ferran Guedea, Manuela Fiuza, Susana Constantino Rosa  
Santos, Stephanie Combs, et al.

► **To cite this version:**

Médéa Locquet, Sophie Jacob, A.P.G. Crijns, J.A. Langendijk, Daan Spoor, et al.. Early subclinical cardiovascular changes after radiotherapy detected by echocardiography in women with breast cancer: contribution of the MEDIRAD EARLY-HEART cohort. ImmunoRad Conference: The International Conference and Immunotherapy Radiotherapy Combination, Sep 2021, Paris, France. hal-04495199

**HAL Id: hal-04495199**

**<https://hal.science/hal-04495199v1>**

Submitted on 21 Mar 2024

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License

## EARLY SUBCLINICAL CARDIOVASCULAR CHANGES AFTER RADIOTHERAPY FOR BREAST CANCER DETECTED BY ECHOCARDIOGRAPHY: CONTRIBUTION OF THE MEDIRAD EARLY-HEART COHORT

M. Locquet<sup>1</sup>, A. Crijns<sup>2</sup>, J. Langendijk<sup>2</sup>, D. Spoor<sup>2</sup>, A. Eraso<sup>3</sup>, F. Guedea<sup>3</sup>, M. Fiuza<sup>4</sup>, S. Constantino Rosa Santos<sup>4</sup>, S. Combs<sup>5</sup>, K. Borm<sup>5</sup>, G. Frija<sup>6</sup>, E. Cardis<sup>7</sup>, S. Jacob<sup>1</sup>

(1) Institute for Radiation protection and Nuclear Safety (IRSN), Laboratory of Epidemiology, Fontenay-Aux-Roses, France

(2) Department of Radiation Oncology, University Medical Center Groningen (UMCG), University of Groningen, Groningen, Netherlands

(3) Institut Catala Oncologia (ICO), Department of Radiation Oncology, Girona, Spain

(4) Centro Cardiovascular da Universidade de Lisboa (CCUL), Faculdade de Medicina da Universidade de Lisboa, Lisbon, Portugal

(5) Technical University of Munich (TUM-MED), Department of Radiation Oncology, Munich, Germany

(6) Paris-Descartes University, Department of Radiology, Hôpital Européen Georges Pompidou, Paris, France

(7) Barcelona Institute for Global Health (ISGlobal), Radiation Programme, Barcelona, Spain

### BACKGROUND

Breast cancer (BC) represents a major public health burden. Radiotherapy (RT) allows reducing local recurrence and deaths resulting from BC. However, RT for BC can lead to cardiotoxicity.

### OBJECTIVE

- To determine the short-term impact of BC RT on subclinical cardiac function by means of echocardiography.
- To consequently explore the dose-response relationship.

### METHODS

The MEDIRAD EARLY-HEART study ([www.medirad-project.eu](http://www.medirad-project.eu)): a multicenter cohort study (women with BC RT, aged 40 to 75, chemotherapy naive).

Myocardial deformation analysis provided by 2D-speckle-tracking echocardiography. Global longitudinal strain (GLS) and its worsening > 15% considered to evaluate subclinical cardiac dysfunction.

Echocardiographic exams after the RT+6-month, September 2021: subclinical cardiac function alterations occurred?

Echocardiographic exams after the RT+24-month, December 2021: subclinical cardiac function alterations persisted?

### RESULTS

The EARLY-HEART cohort included 258 women with BC, mean age of 58.2±8.1 years, 63.5% left-sided BC.

RT total dose varied from 40.05 Gray (Gy) to 50.40 Gy, and 46.1% received a boost.

Echocardiography exams (n=242): mean GLS of -19.3±3.3% at baseline and of -19.2±3.6% after the RT+6-month (p-value = 0.81).

Baseline characteristics of the EH cohort from the echocardiography analysis (n=258)

Study center	
CCUL	26 (10.1%)
ICO	42 (16.3%)
IRSN	50 (19.4%)
TUM-MED	20 (7.7%)
UMCG	120 (46.5%)
Type of RT	
3D-CRT	132 (51.8%)
IMRT	2 (0.8%)
VMAT RapidArc	121 (47.4%)
Body mass index, kg/m <sup>2</sup>	26.4±4.6
Smoking status	
Current	38 (14.8%)
Former	85 (33.1%)
No	134 (52.1%)
Total cholesterol, mg/dl	210.5±46.6
Hypertension, Yes	51 (19.9%)
Menopause, Yes	193 (76.6%)
Hormonotherapy, Yes	163 (63.9%)
CV treatment, Yes	33 (12.8%)

Description of radiation doses received by patients from the MEDIRAD EARLY HEART study (n=258)

Minimum dose LV, Gy	0.53±0.32
Maximum dose LV, Gy	16.81±17.42
Mean dose LV, Gy	2.01±1.76
V5 LV, %	5.02±7.84
Minimum dose WH, Gy	0.36±0.25
Maximum dose WH, Gy	22.49±17.68
Mean dose WH, Gy	1.76±1.07
V5 WH, %	3.61±5.35

Preliminary analyses regarding the relationship between dose and restriction of GLS > 15% in the MEDIRAD EARLY-HEART study (n=242)

	OR (95% CI)	P-value	aOR* (95% CI)	P-value
Dmean (Gy), left ventricle	1.47 (1.22-1.81)	0.0001	1.70 (1.26-2.39)	0.001
Dmean (Gy), whole heart	2.03 (1.46-2.93)	<0.0001	2.61 (1.60-4.65)	0.0003

\* Adjusted for age, BMI, smoking status, total cholesterol, hypertension, menopause, laterality, center hormonotherapy, CV treatment, laterality.

### CONCLUSION

The impact of RT on subclinical cardiac function in patients with BC are being explored within the MEDIRAD EARLY-HEART project. Preliminary analyses suggested an association between dose received during RT and subclinical cardiac dysfunction. The 24-month follow-up analyses will allow to determine if the alterations observed remained at longer term.