

Agreement between manual and AI-enhanced echocardiographic assessment of cancer therapy-related cardiac dysfunction in patients with early breast cancer - data from the **CARE** study

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PURPOSE

To assess the feasibility and agreement of artificial intelligence (AI)-enhanced versus manual echocardiography for visit-level cancer therapy-related cardiac dysfunction (CTRCD) classification and longitudinal trajectories of left ventricular ejection fraction (LVEF) and global longitudinal strain (GLS) in a real-world breast cancer cardio-oncology population.

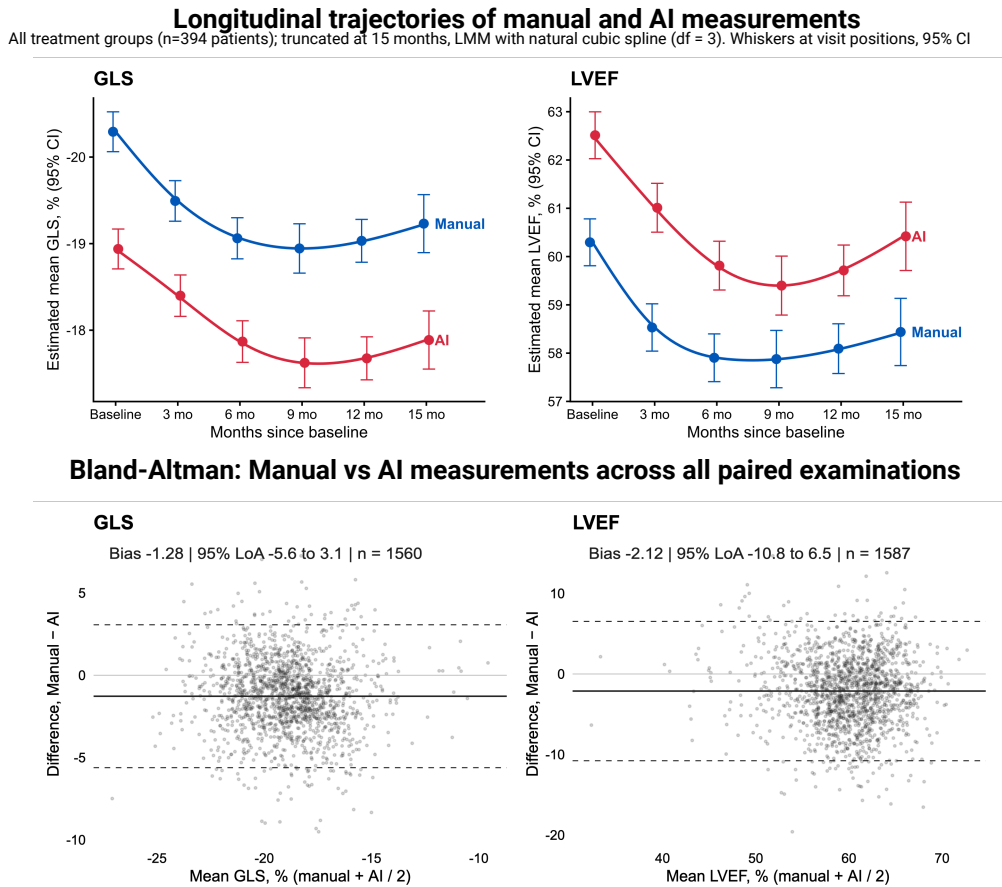
METHODS

- Data from a cohort of unselected patients scheduled for chemotherapy: 515 patients (median age 52 years; 65% anthracycline only, 19% anthracycline + HER2-targeted, 16% HER2-targeted only)
- Echocardiography performed and analyzed manually by experienced cardiologists and sonographers.
- All examinations analyzed by a commercially available AI software platform (Us2.ai)

Echocardiographic CTRCD-definitions according to 2022 ESC Cardio-oncology guidelines:

- **Mild:** LVEF > 50% and GLS decline > 15%
- **Moderate:** LVEF decline ≥ 10 percentage points to <50% OR LVEF decline <10 percentage points to <50% AND GLS decline > 15%
- **Severe:** LVEF < 40%

RESULTS



		Manual			
AI		No CTRCD	Mild	Moderate	Severe
No CTRCD	810 (89.7%)	87 (9.6%)	6 (0.7%)	0 (0.0%)	903 (100%)
Mild	140 (69.7%)	54 (26.9%)	7 (3.5%)	0 (0.0%)	201 (100%)
Moderate	10 (41.7%)	5 (20.8%)	8 (33.3%)	1 (4.2%)	24 (100%)
Severe	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (100.0%)	1 (100%)

- 394 baseline and 1129 follow-up visits with complete paired data were classifiable for CTRCD
- Overall CTRCD incidence was 24%: 19% mild, 5% moderate, 1% severe
- Mean±SD bias (figure) and Pearson correlation coefficient for manual vs. AI measurements were -1.3±2.2%; r=0.55 for GLS and -2.1±4.4%; r=0.62 for LVEF.
- Change-from-baseline bias was near zero (-0.10 pp for LVEF, 0.11 pp for GLS) (figure)
- More frequent mild CTRCD by AI (table) likely reflects sensitivity to image quality, while fewer moderate cases reflects AI's LVEF overestimation keeping values above the 50% threshold.

CONCLUSION

In a large real-world breast cancer cohort, AI-enhanced echocardiography reliably reproduced longitudinal trajectories and ruled out CTRCD. Classification disagreements likely reflect a systematic offset and sensitivity to image quality. In the hands of an experienced cardio-oncology operator, AI-enhanced echocardiography has the potential to improve precision and workflow efficiency.