Validation of a deep learning-based workflow for the interpretation of the echocardiogram in a cardio-oncology population

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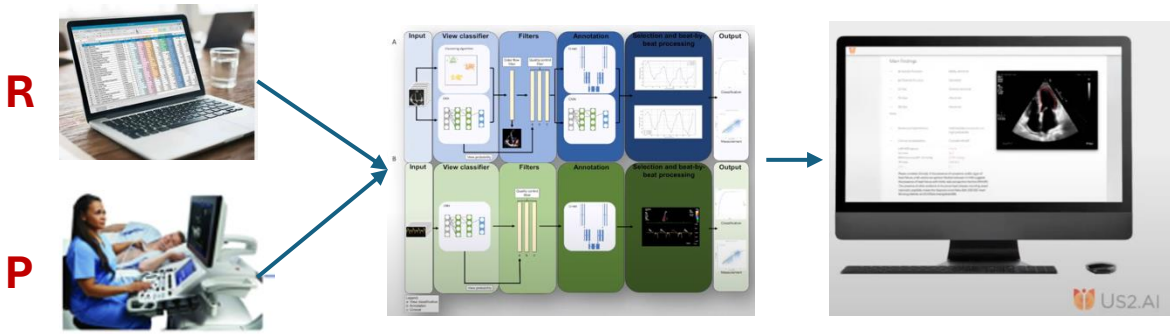
Echocardiography is central to risk stratification, diagnosis, and monitoring of CTRCD (1). AI–echo, which has shown high accuracy in diverse cardiac populations and may reduce variability while improving workflow efficiency(2, 3), has not yet been validated in a **dedicated cohort of patients with cancer.**

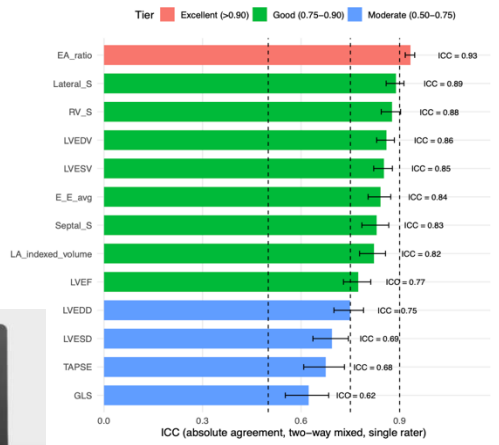
Aim: To evaluate the accuracy of AI-guided echocardiography in assessing LVEF and additional parameters, compared with conventional echo, in a cardio-oncology population.

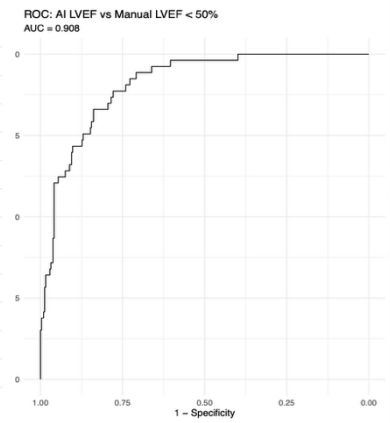
Methods: Retrospective and prospective cohorts from the cardio-oncology centre. Echocardiographic studies were analysed using a validated DL platform (FDA/CE cleared), with standard sonographer-derived measurements as reference.

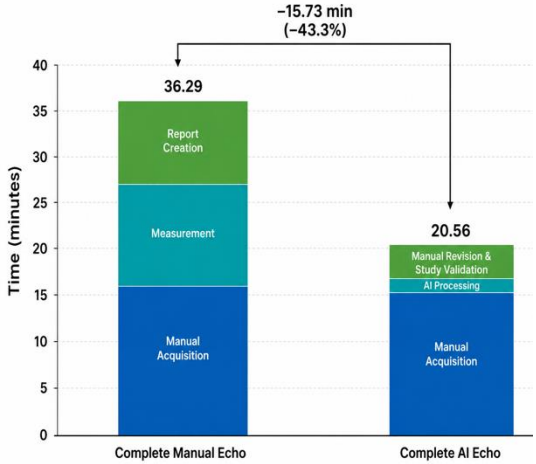


- **Primary outcome:** level of agreement (LoA) for 2D LVEF.
- **Secondary outcomes:** LoA for additional echocardiographic parameters and LoA between AI- LVEF and 3D LVEF, temporal variability, interstudy repeatability, discrimination of LVEF <50%, time to study completion.

Parameter	n	ICC	95% CI	Bias	LoA low	LoA high	Spearman rho
LVEF	369	0.774	0.729 - 0.812	0.092	-10.9	11.0	0.729







Results:

- 384 patients included (Retrospective: 282, prospective: 102)
- Mean age: 62 ± 16 years, 61% women. Breast cancer 28.2%, haematology 19.2%, GI 10.1%
- Mean Manual LVEF: 58.15 (8.2)
- Mean AI-LVEF: 58.11 (8.15)
- 3D LVEF vs AI-derived 2D LVEF (n=85) showed narrower limits (bias: 0.04, ICC: 0.8, 95% LoA: –9.97 to 10.0).
- **Interstudy variability** was lower for DL repeated measurements compared to manual (SEM 0.21 vs 3.14, p <0.01)
- **Temporal variability** was comparable between methods (manual SEM 3.97 vs DL-SEM 5.93; p = 0.112)

Conclusions:
In a large real-world cardio-oncology cohort, AI-guided echocardiography demonstrated **strong agreement** with conventional echocardiography for LVEF, reliable discrimination of reduced systolic function, comparable longitudinal variability, improved interstudy repeatability, alongside a significant reduction of the time invested in performing the study.

1. Lyon AR et al, EHJ 2022. 2. Tromp J et al, Lancet Digital Health 2022 3. Tromp J et al, Nat commun 2022