

TETRIS WP2: development of a framework for predicting adverse events after breast cancer radiotherapy

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Purpose

Breast cancer accounts for the majority of female cancers in the world, leading to a large fraction of patients undergoing adjuvant radiotherapy (RT). Despite major improvements in the techniques of radiotherapy delivery, the impact of long-term side effects has not been systematically and routinely accounted for, yet. The **TETRIS consortium**, including six hospitals and oncological institutes and two companies distributed across 4 European countries, was instituted for this purpose. The aim of **work package 2 (WP2)**, led by Karolinska University Hospital (KUH), is to **develop a prediction model framework**, based on dosimetric and clinical predictors, **to be used in personalised follow-up of breast cancer patients**. Thereof, patients at higher risk of rare severe cardiac and respiratory side effects, or secondary cancer, can be informed and followed-up effectively.

Conclusion

The KUH cohort presents a rich dataset to pilot the testing of multiple prediction models, to identify the most suitable candidates to be implemented in the TETRIS model framework.

Material and Methods

The dosimetric and clinical data from a **retrospective cohort of 2400 breast cancer patients**, treated between 2010 and 2013 with 3D-conformal RT at KUH, were obtained for the initial modelling phase. In parallel, **models for radiation-induced cardiac and respiratory late adverse reactions, as well as for secondary cancers**, were retrieved from the literature and analysed in terms of their applicability to the KUH cohort and the full TETRIS cohort, as well as their performance.

Results

The KUH dataset includes data from Swedish national health registries (breast cancer-, cancer-, cause of death-, medicinal-, outpatient-, and inpatient registries). Core information regarding **pre-existing conditions, detailed treatment data, side effects from RT, and cause of death** are currently being extracted and **processed for further stratification and testing of the models**. The literature review revealed 24 models for cardiac and respiratory side effects at a given time after RT, as well as a larger number of survival models for all endpoints of interest. The models vary widely in terms of type of cancer, adverse events considered (single or composite endpoints), RT modality, dose delivered, cohort size, incidence (see Fig. 1 for cardiac events), dosimetric and clinical predictors, and performance metrics used.

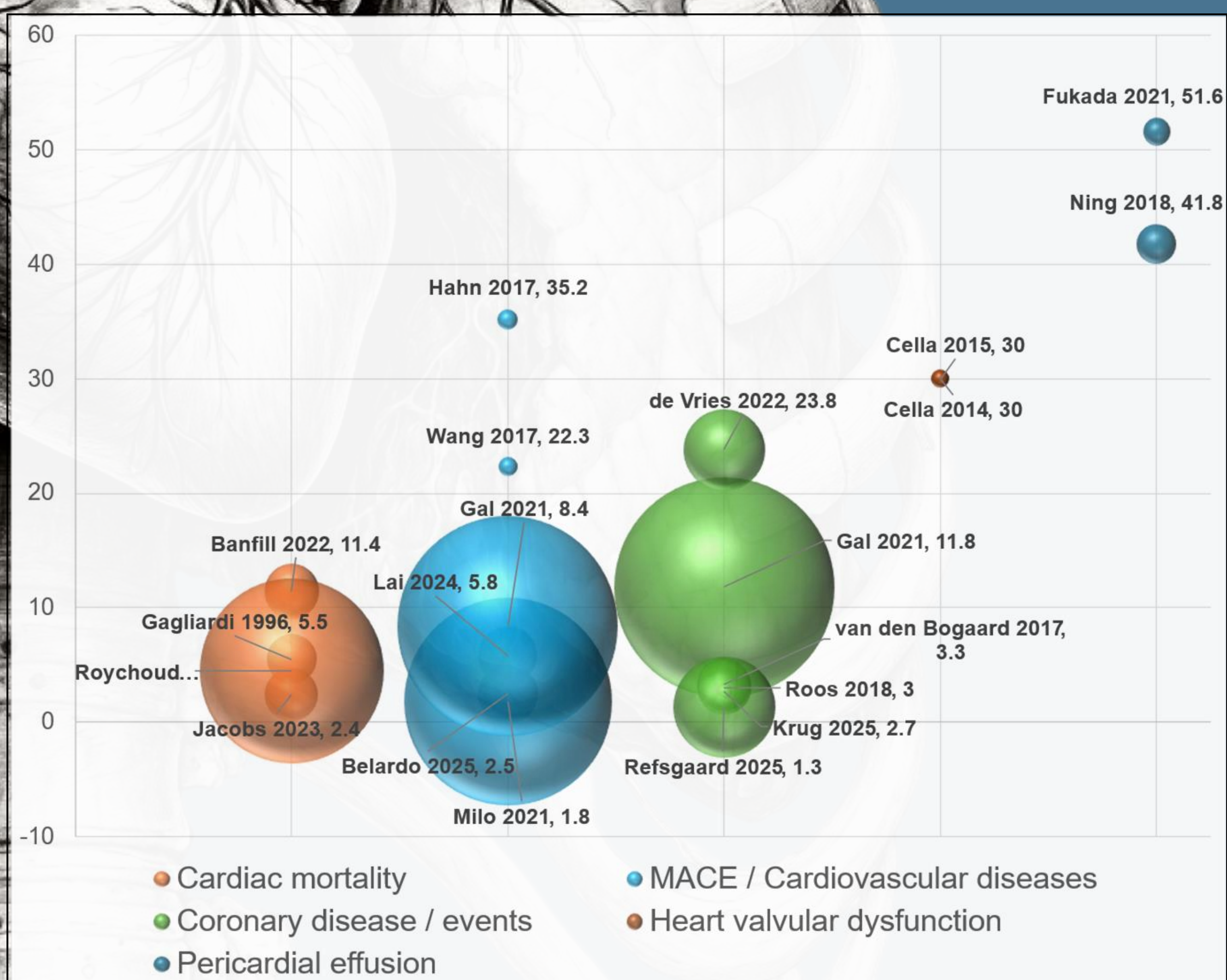


Figure 1. Summary of literature review. Incidence of cardiac events by study (%). Smallest bubble: cohort of 75 patients; largest bubble: cohort of 15915 patients

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