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# Comparison of tangential-intensity modulated radiotherapy (t-IMRT) and volumetric modulated arc therapy (VMAT) for different sizes of left-sided breast cancer

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# INTRODUCTION

- **Breast cancer** is the most **common cancer** among **women**. Every year, approximately **1.2 million** women are newly diagnosed with breast cancer, and **500,000** women die from it (Zhao et al., 2015).
- **Radiotherapy** is a **cornerstone** of its management (Zhang et al., 2024).
- Generating treatment plans faces challenges in both achieving good radiation **dose conformity** to the **target volume** and minimising radiation **doses** to the organs at risk (OARs). (Inoue et al., 2020)
- Modern **treatment planning techniques** aim to achieve **optimal tumour control** while **minimising exposure** to **critical organs** (Lamprecht et al., 2022).
- Despite technological advancements, **selecting** the most **effective planning technique** remains **challenging**, particularly in patients with varying **breast sizes** (Moussawi et al., 2025).

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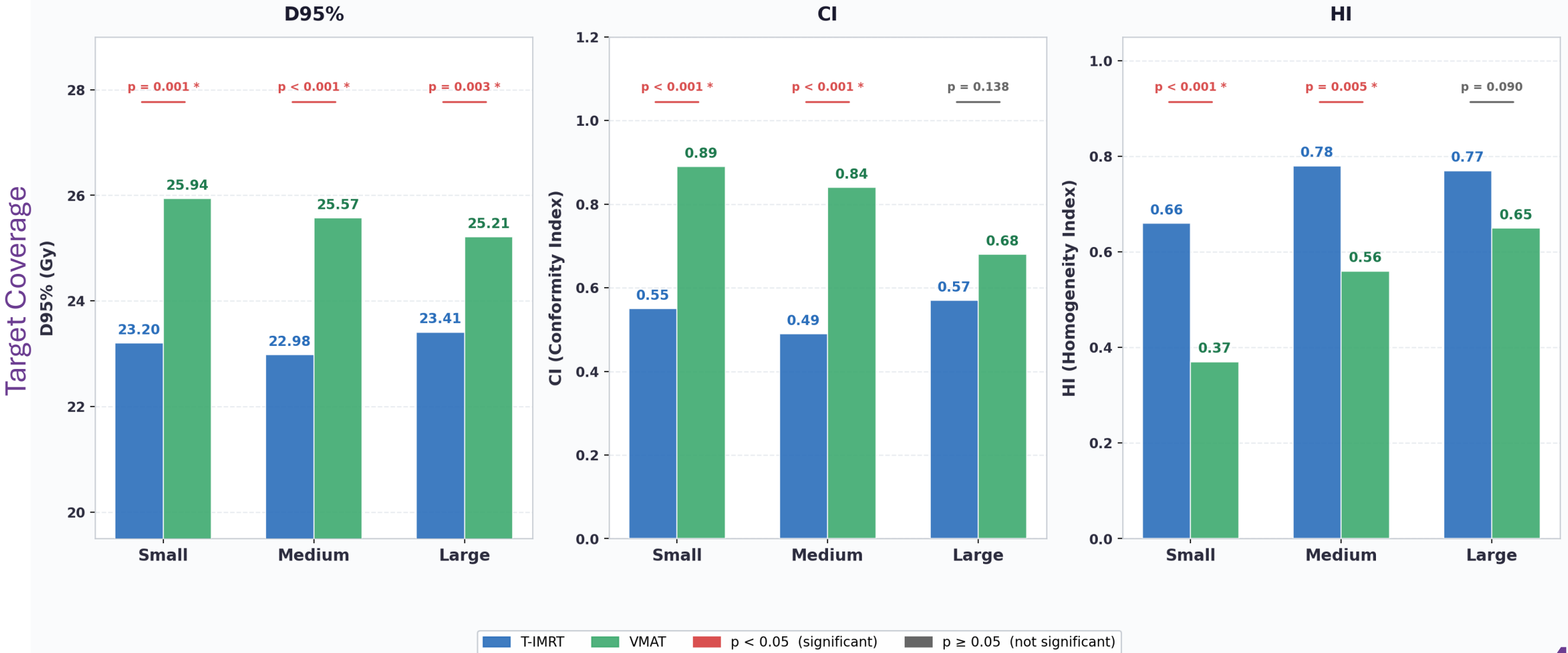
- This study **aims** to compare the **effectiveness** of **t-IMRT** and **VMAT** for hypo-fractionated **small, medium, and large** sizes breast cancer treatment.
- **Objectives:**
  - Evaluate the **dose distribution**.
  - Estimate the **OARs sparing** level.
  - Determine **Homogeneity** and **Conformity** Index.
  - Recommend the more **effective** technique between **t-IMRT** and **VMAT**.

# METHODOLOGY

- **CT of 30 female patients with left-sided breast cancer** between 2020 and 2025 at **SBAH** were used.
- **Breast sizes: small** breasts  $\leq 589.77$  cc, **medium** breasts between **590** and **900** cc, and **large** breasts  $\geq 900$  cc.
- **T-IMRT** and **VMAT** plans were generated using the **Monaco treatment planning** system with a **Monte Carlo** algorithm.
- A prescription dose of **26 Gy** in **five fractions** was delivered.
- **Target Coverage** ( $D_{95\%} \text{Gy} \geq 95\%$ ), **Homogeneity index**, and **Conformity index**.
- **OARs** parameters, **Heart** ( $V7\text{Gy} < 5\%$  and  $V1.5\text{Gy} < 30\%$ ), and **Ipsilateral lung** ( $V8\text{Gy} < 15\%$ ).
- **Two-way ANOVA** was used ( $P < 0.05$ ).

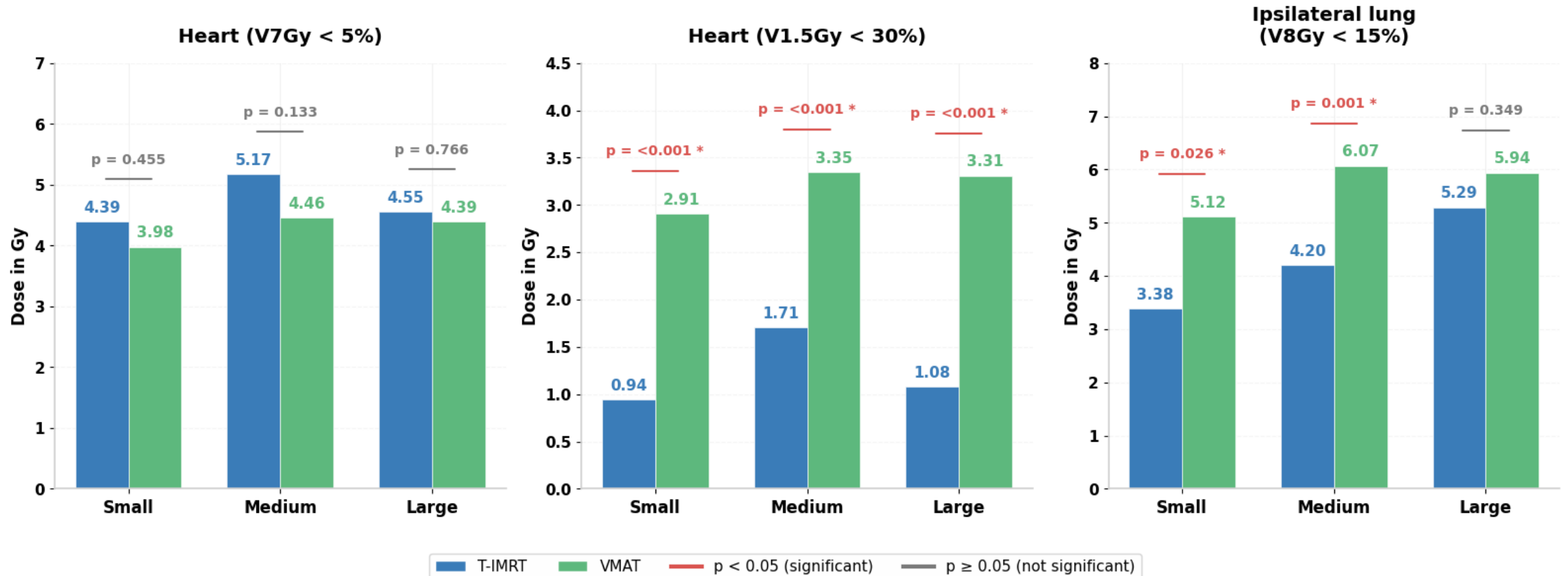
# RESULTS & DISCUSSION

Planning Target Volume (PTV) Parameters: T-IMRT vs VMAT  
Small, Medium & Large Breasts



# CONT...

## Organs at Risk Parameters: T-IMRT vs VMAT Small, Medium, & Large Breasts



# CONCLUSION & RECOMMENDATION

- **VMAT** is preferable when the **target coverage** is the highest priority.
- Tangential-**IMRT** is superior when **minimising heart and lung toxicity** is the priority, especially for patients with pre-existing cardiovascular risks.

## RECOMMENDATION

- If **VMAT** is chosen for its **superior coverage**, it is **highly** recommended to be used in conjunction with **DIBH** to mitigate the **higher cardiac doses**.

**THANK YOU FOR YOUR ATTENTION**

