EE109

Functional Precision Medicine Testing Improved the Clinical Outcome of Non-Hodgkin Lymphoma Patients with Acceptable Cost-Effectiveness

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Introduction

- **Clinical Need:** Patients with relapsed/refractory non-Hodgkin lymphoma (r/r NHL) after multiple lines of therapy lack standard-of-care options.
- **Technology:** Functional Precision Medicine (*ex vivo* combinatorial drug sensitivity testing) provides clinical decision support by ranking the efficacy of available single-drug and combination therapies
- **Objective:** Evaluate the cost-effectiveness of functional precision medicine testing-guided treatment versus physician-guided empiric treatment in r/r NHL in Singapore.

Methods & Decision Model

- **Model Framework:** A partitioned survival framework was constructed to model patient time spent in Progression-Free Survival (PFS) and Progressive Disease (PD).
- **Survival Input:** Clinical survival data derived from a clinical utility study comparing test-guided versus physician-guided arms[3].
- **Health State Utilities:** Published hematologic malignancy utility scores were applied: PFS Utility: 0.79 PD Utility: 0.54
- **Cost Inputs:** Drug prices based on institutional physician guide costs in Singapore (SGD).
- **Threshold:** Willingness-to-pay (WTP) threshold set at SGD 75,000 / QALY.

Optim.AI™ and NHL Clinical Validation

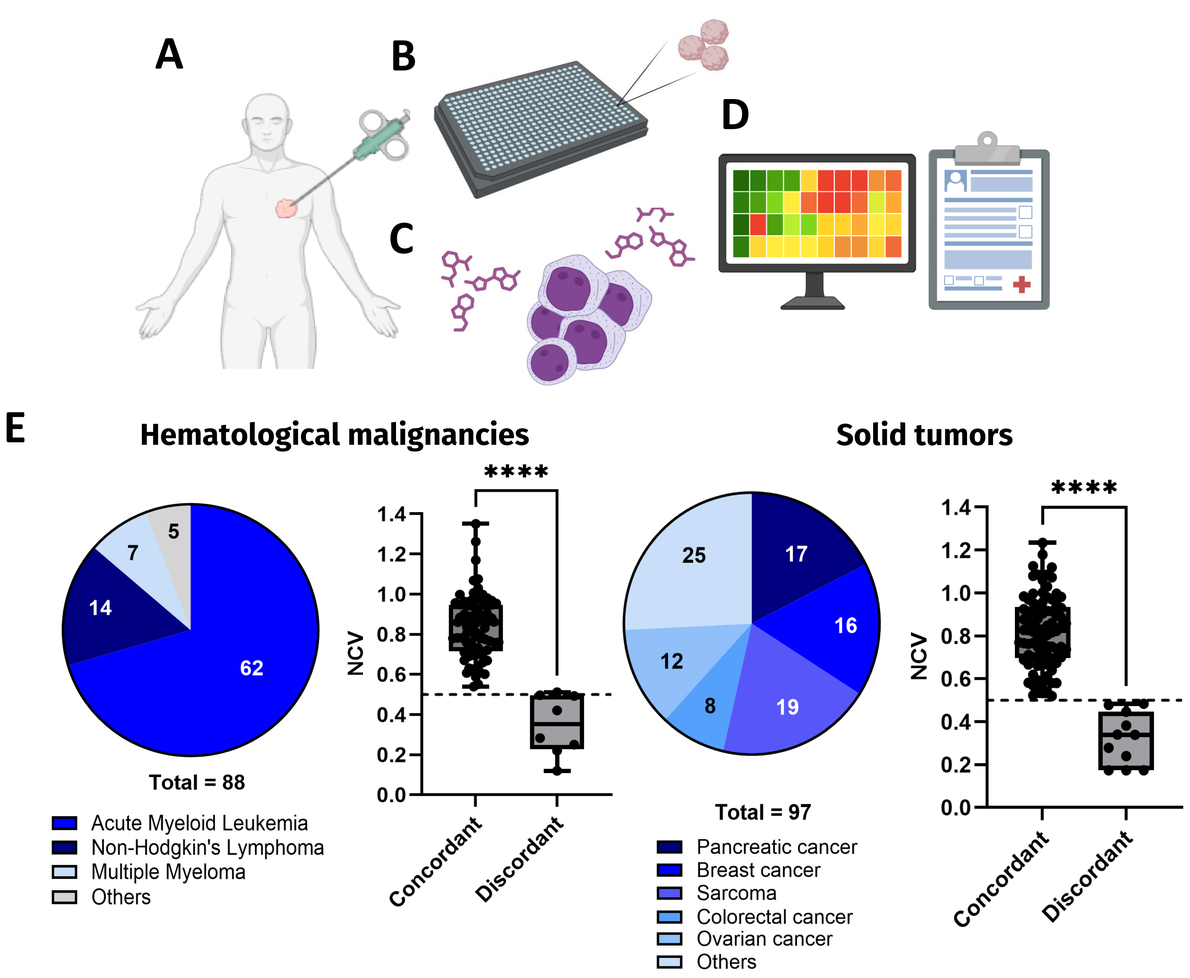


Figure 1. The workflow for Optim.AI®. (A) Live tumor specimens were collected from patients. **(B)** The cancer cells were isolated and cultured in 384-well plates. (**C)** The malignant cells are co-cultured directly with a panel of cancer drugs, which exert a direct cytotoxic effect on the cancer cells. **(D)** Cell viability data are analyzed and processed via a proprietary small data AI platform. The sensitivity score of each drug and its combination is reported in the NCV value. **(E)** With an established normalized cell viability (NCV) cut-off of 0.5, 92% of hematological malignancies and 89% of solid tumors (p-value < 0.0001) demonstrated concordance to prior line(s) of treatment. Statistical analysis was determined using Wilcoxon rank sum test (Adopted from AACR poster[1, 2])

Clinical Case Illustration

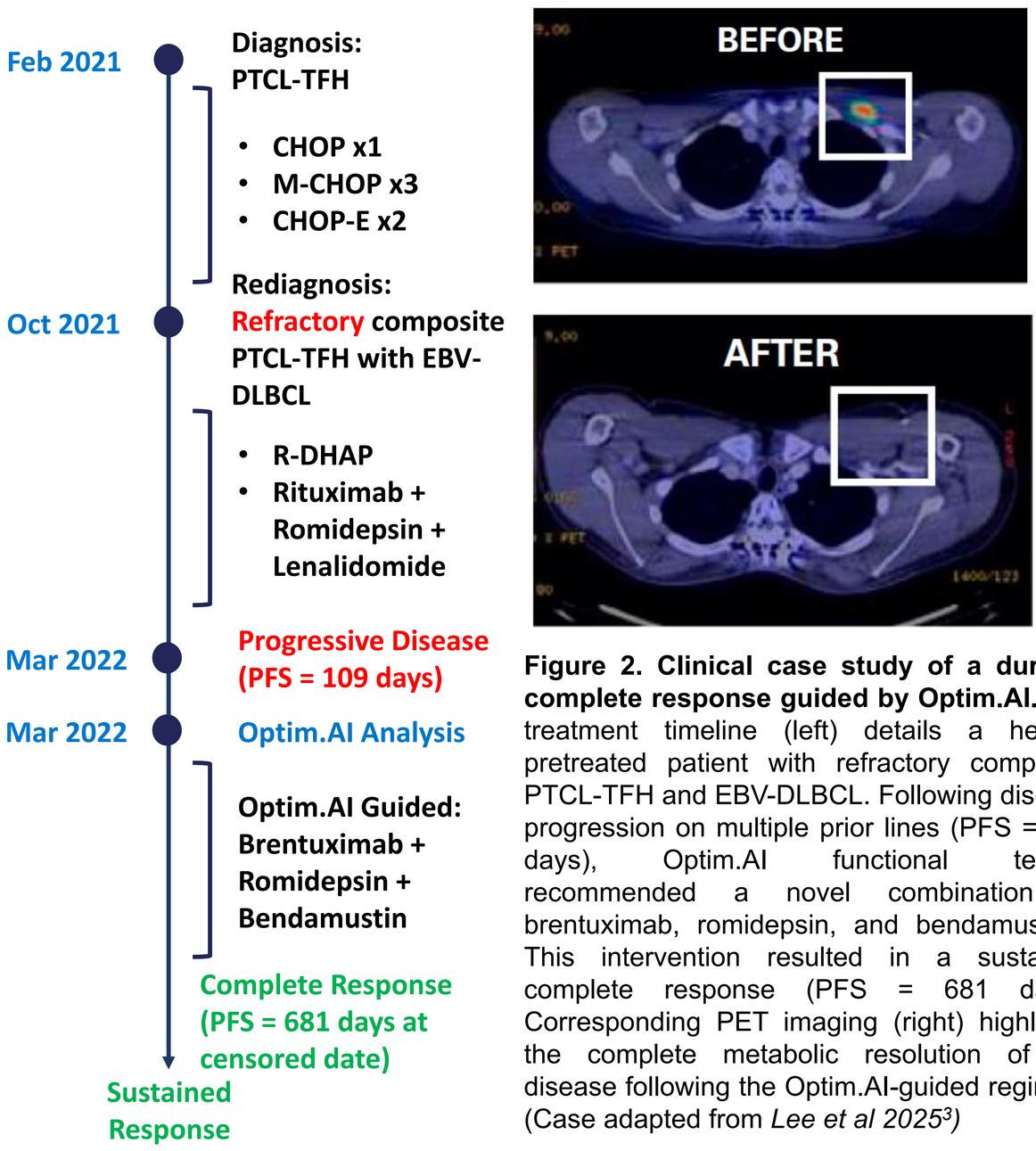
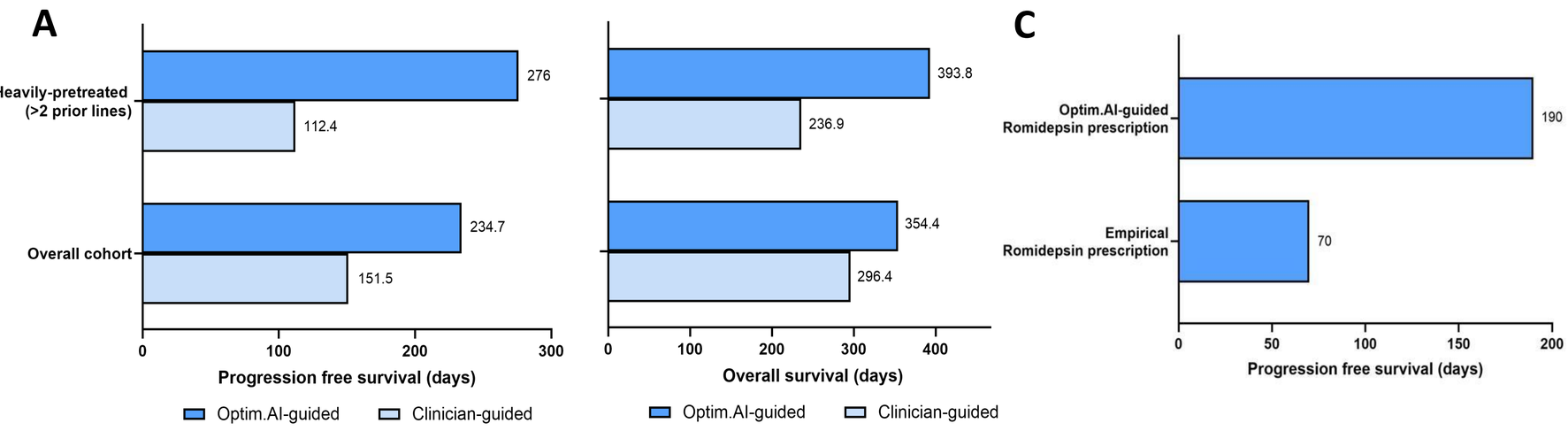


Figure 2. Clinical case study of a durable complete response guided by Optim.AI. The treatment timeline (left) details a heavily pretreated patient with refractory composite PTCL-TFH and EBV-DLBCL. Following disease progression on multiple prior lines (PFS = 109 days), Optim.AI functional testing recommended a novel combination of brentuximab, romidepsin, and bendamustine. This intervention resulted in a sustained complete response (PFS = 681 days). Corresponding PET imaging (right) highlights the complete metabolic resolution of the disease following the Optim.AI-guided regimen. (Case adapted from *Lee et al 2025[3])*

Results & Economic Evaluation



B

	Physician- Guided	Optim.AI-Guided			
	Drug Cost (SGD)	Drug Cost (SGD)	Incremental cost (SGD)	QALD	ICER (SGD/ QALY)
Test cost only			5500.00	52.5	38264. 3
Test cost + drug	6377.14	18587.59	17710.44	52.5	123215.30
Test cost + drug in >2L prior	8281.18	18147.27	15366.10	126.4	44376.22

Figure 3. Optim.AI maximizes clinical and economic value, particularly in heavily pretreated patients (> 2 prior lines of therapy).(A) Guided treatment improved mean Overall Survival and Progression-Free Survival across the overall cohort, with the most profound clinical benefit observed in late-line settings. **(B)** While Optim.AI is cost-effective overall when evaluating the test cost alone, factoring in total drug costs shows the highest economic value in heavily pretreated patients, yielding +126.4 QALDs at an ICER of SGD 44,376/QALY. **(C)** This cost-effectiveness is driven by optimizing the use of high-cost targeted therapies; for example, guided prescription of romidepsin extended median PFS to 190 days compared to 70 days after empirical prescription..

Conclusions

- **Improved Clinical Outcomes & Value**: Optim.AI-guided treatment significantly improves overall and progression-free survival in relapsed/refractory NHL while remaining highly cost-effective compared to empirical standard of care.
- **Maximized Benefit in Late-Line Settings**: The strategy delivers its greatest economic and clinical value in heavily pretreated patients (>2 prior lines) by optimizing the efficacy of high-cost targeted therapies and preventing wasted expenditure.

References

1. Ho WT, et al; Abstract 7850: Real-world concordance analysis of functional drug sensitivity testing in solid cancers with prospective observational case series of pancreatic cancer. Presented at AACR 2026
2. Rashid et al Abstract 2517: Real-world clinical performance of a combinatorial functional precision platform, Optim.AI™, in hematological malignancies. Presented at AACR 2026
3. Lee RX, et al.; Prospective clinical validation of a combinatorial functional precision medicine platform in relapsed/refractory Non-Hodgkin's Lymphoma; JPO Precis. Oncol. 2025 Jun; 9:e2400780.

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