Prediction of immune checkpoint inhibitor response in non-small cell lung cancer patients using a microbiome-based biomarker

AUTHORS

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INTRODUCTION

- Despite advances in immunotherapy, a significant number of non-small cell lung cancer (NSCLC) patients **do not respond to immune checkpoint inhibitor (ICI) therapies** or **develop immune related adverse events (irAEs)**, leading to treatment discontinuation.
- Recent research indicates that the **microbial signature** may predict **treatment success rates** and thus aid in **optimizing patient selection.**
- **BiomeOne®** is a **tumor-agnostic** CE-IVD marked medical device that uses stool samples to analyze the **intestinal microbiome (Figure 1)**.
- The aim of our study was to evaluate the **prognostic potential of BiomeOne®** in a cohort of NSCLC patients treated with ICI.

RESULTS

- A **total of 42** stage III/IV NSCLC patients (age 48-83 years, mean 64.86 ± 9.33; 59,52% male; 26% in stage III and 74% in stage IV) from **two institutions** were enrolled in this study.
- 100% of the patients received PD1/PDL1 therapy; **50%** of patients had some **immune-related adverse events.**
- The BiomeOne® test had an overall **sensitivity of 80,6%** and a **specificity of 54,5%** in predicting the response to ICI therapy in this cohort (see **Table 1**).

Sample classification	Clinical Responder (CR + PR)	Clinical Non-responder (SD + PD)	**Total**
BiomeOne: Responder	**25**	**5**	**30**
BiomeOne: Non-Responder	**6**	**6**	**12**
Total	**31**	**11**	**42**

Table 1. BiomeOne® identified a total of 25/31 clinical responders, and a total of 5/11 non-responders, based on the microbial profile of the baseline stool samples, prior to therapy initiation.

CONCLUSION

The newly developed non-invasive stool test can be used in clinical practice as a predictive test of the ICI response in NSCLC patients. To confirm these results, biomarker analysis in a larger patient cohort is required.

METHODS

- We recruited patients with **unresectable stage III and IV NSCLC** who underwent first line ICI therapy at two institutions.
- Patients who received systemic antibiotic treatment within 30 days prior to treatment initiation were excluded.
- Stool samples were collected prior to ICI therapy using an at-home collection kit.
- After DNA extraction, stool samples underwent **16S rRNA sequencing** and bioinformatic analysis.
- The **microbial profile of each sample** was further analyzed with the proprietary biomarker to **compute the probability of response to ICIs**.
- The patients were classified as **responders (R) and non-responders (NR)**. Responders were classified as patients with a radiological and clinical response to the immunotherapy, and non-responders were classified as those with a stable or progressive disease after a 12-week follow-up.

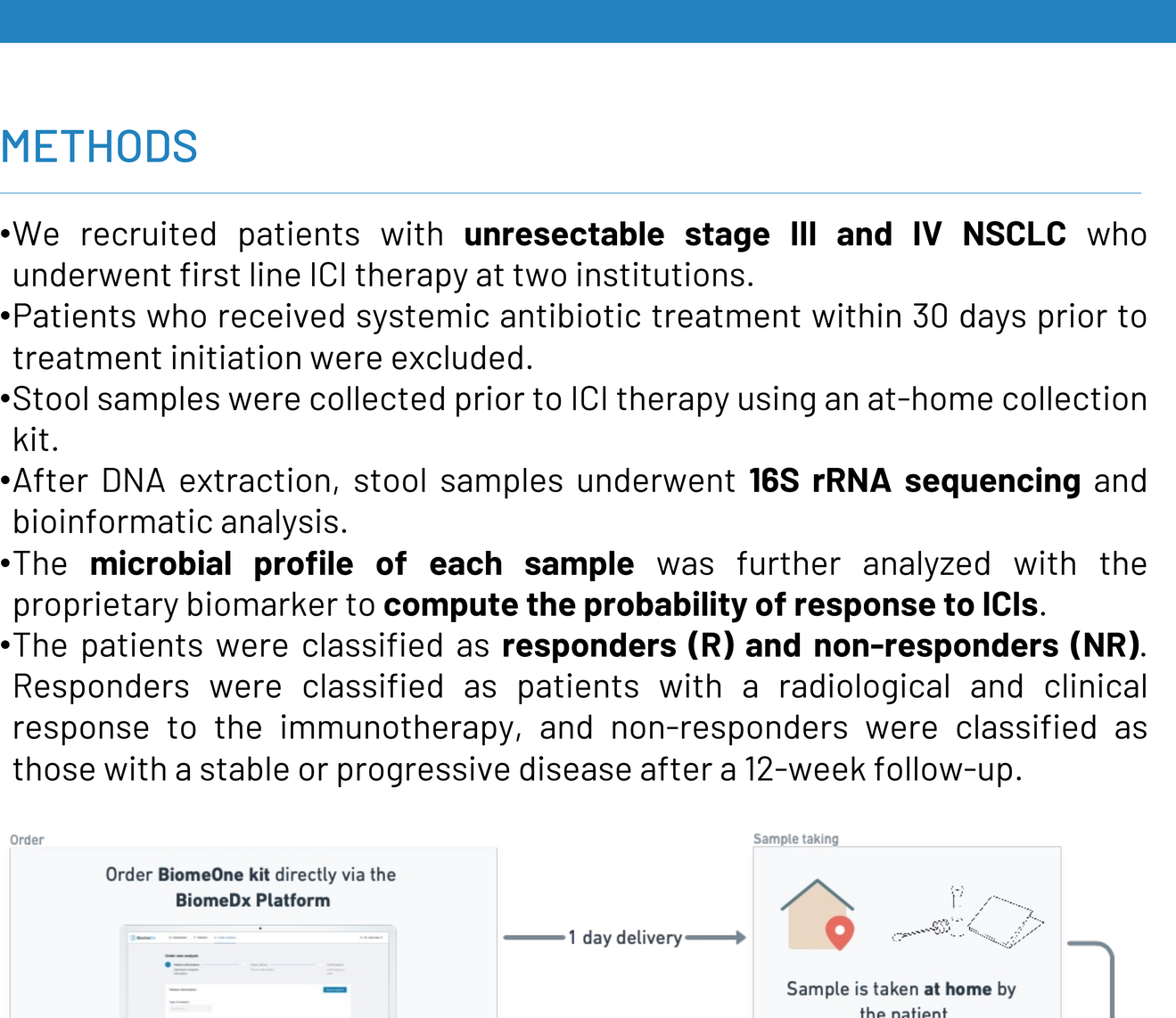

Figure 1. BiomeOne® process. A stool collection kit can be ordered by the doctor and delivered directly to the patient. The at-home collection kit is used by the patient to collect the sample and send it directly to the company for sequencing and bioinformatics analysis. The doctor will receive a report with the probability of response to ICI (CE-IVD), probability of developing irAEs (RUO) and exploratory microbiome results.

Funding: Study sponsored by Biome Diagnostics GmbH. No conflicts of interest to declare.

Acknowledgements: The authors would like to thank the patients for participating in the study and providing the samples.

The authors were fully responsible for all content and editorial decisions, were involved at all stages of poster development and have approved the final version.

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