Application of the microbiome-based prediction test BiomeOne quantifies antibiotic, geographical and health-related effects on response to cancer immunotherapy in a large European cohort

AUTHORS

C. Pacífico[1], D. Inan[1], A. Knabl[1], B. Sladek[1], N. Gasche[1]*

AFFILIATIONS

[1]Biome Diagnostics GmbH, Vienna, Austria.

CONTACT DETAILS

***Corresponding author e-mail address:**
nikolaus.gasche@biome-dx.com

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

biome-dx.com

biomediagnostics

@Biome_Dx

INTRODUCTION

The outcome of cancer immunotherapies is deeply influenced by the crosstalk between the intestinal microbiome and the immune system.
However, several factors associated with the lifestyle and genetics of each individual are known to modulate and even modify the gut microbiome.
As such, we can expect that not everyone can benefit from these therapies.

AIM

In order to understand which factors can modify response to immune checkpoint inhibitors (ICIs), a comprehensive dataset consisting of microbiome profiles and self- reported health data was screened with BiomeOne, a microbiome-based algorithm that predicts response to ICIs prior to therapy initiation.

MATERIALS AND METHODS

A diverse, European microbiome dataset consisting of 9,691 participants aged 18-90 years was screened.
Each sample was classified by BiomeOne as a potential responder (R) or non-responder (NR) to ICIs and attributed a probability of response.
Additional self-reported metadata of the study participants included age, sex, ethnicity, country of residence, antibiotic and probiotic usage, diet, and occurrence of gastrointestinal diseases. Statistical analysis was performed via Wilcoxon, Kruskal-Wallis or two-sample t tests, and statistical significance was defined at $P < 0.05$.

RESULTS

A total of 7,000 samples were classified as Rs, while 2,691 were classified as NRs. Probiotic usage did not seem to impact response ($P = 0.92$), contrarily to antibiotics ($P < 0.01$). Study participants claiming to have used antibiotics in the last 3 months had a significantly lower number of Rs than those who have not taken antibiotics for over a year ($P < 0.01$). Additionally, participants reporting antibiotic usage in the last year had a significantly lower Rs than those not having taken antibiotics for over a year ($P = 0.01$). Interestingly, also participants that reported suffering from inflammatory gastrointestinal diseases had lower probabilities of response to ICIs than those who reported not experiencing inflammatory disturbances ($P < 0.01$). Females seemed to have higher response rates than males ($P = 0.01$). Significant differences in responder abundance was found across Czech Republic, Belgium and Italy ($P = 0.029$). No significant impact of age or ethnicity on the probability of response was identified.

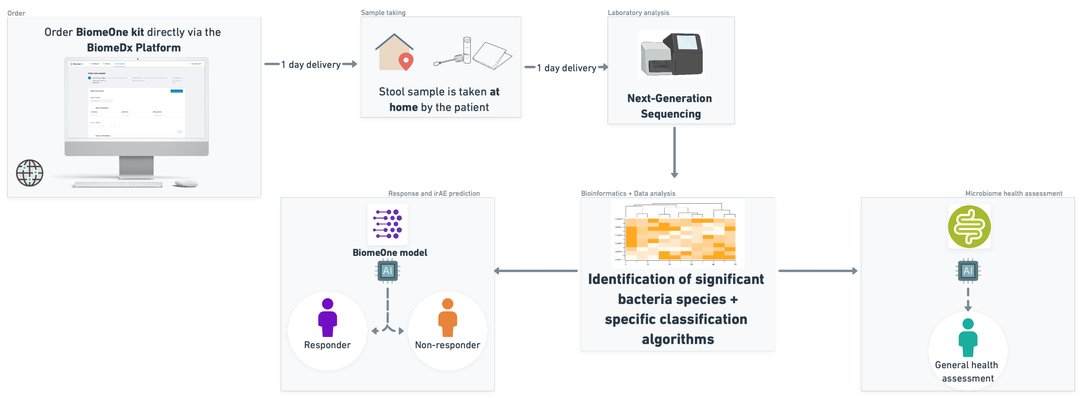

Figure 1. Schematic representation of operational procedure of myBioma and BiomeOne. While myBioma provides a general microbiome health assessment and is considered a lifestyle product, BiomeOne is a CE-IVD medical device that classifies stool samples according to the probability of response to immune checkpoint inhibitor therapy.

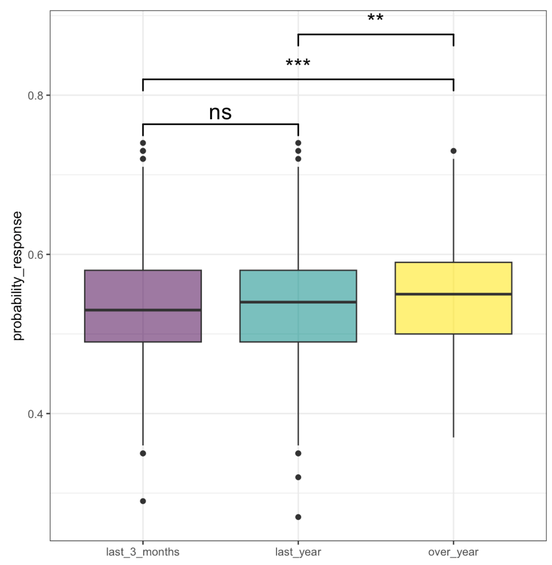

Figure 2. Boxplots show how antibiotic usage significantly impact response rate.

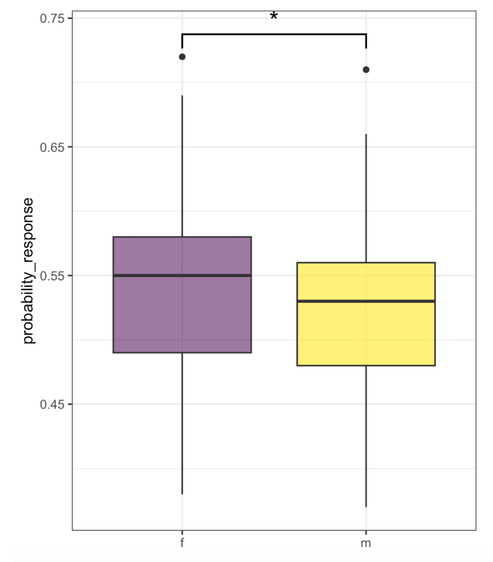

Figure 3. Female participants have a significantly higher rate of responders than males.

CONCLUSION

Our preliminary data suggests that the administration of antibiotics up to a year prior initiation of ICI therapy can modify microbiome composition and lead to a negative outcome. Therefore, therapies aiming to modify the microbiome in order to influence therapeutic outcomes should refrain from using antimicrobials. Further multivariate analysis will be conducted to better understand the impact of other self-reported characteristics on ICI response.

REFERENCES

None.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the myBioma customers for providing their samples for research purposes.