

GA-map[®]: Standardized high multiplex microbiota testing using the xMAP[®] Technology.



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INTRODUCTION

Gut microbiota composition is widely used as a parameter in various clinical research disciplines, ranging from gastrointestinal and metabolic diseases to mental health. By utilizing the xMAP[®]-powered GA-map[®] platform, we developed GA-map[®] Discovery - a standardized microbiota research assay for identification of bacteria signatures and biomarker discovery from gut and oral samples.

METHOD

The previously described GA-map[®] platform¹ combines a pre-selected target approach of bacteria-specific gene sequences, with the high multiplex capacity of the Luminex xMAP[®] Technology (see Figure 1). Signal detection and readout is performed on the Luminex[®] 200™ system, with median fluorescence intensity reported for each target.

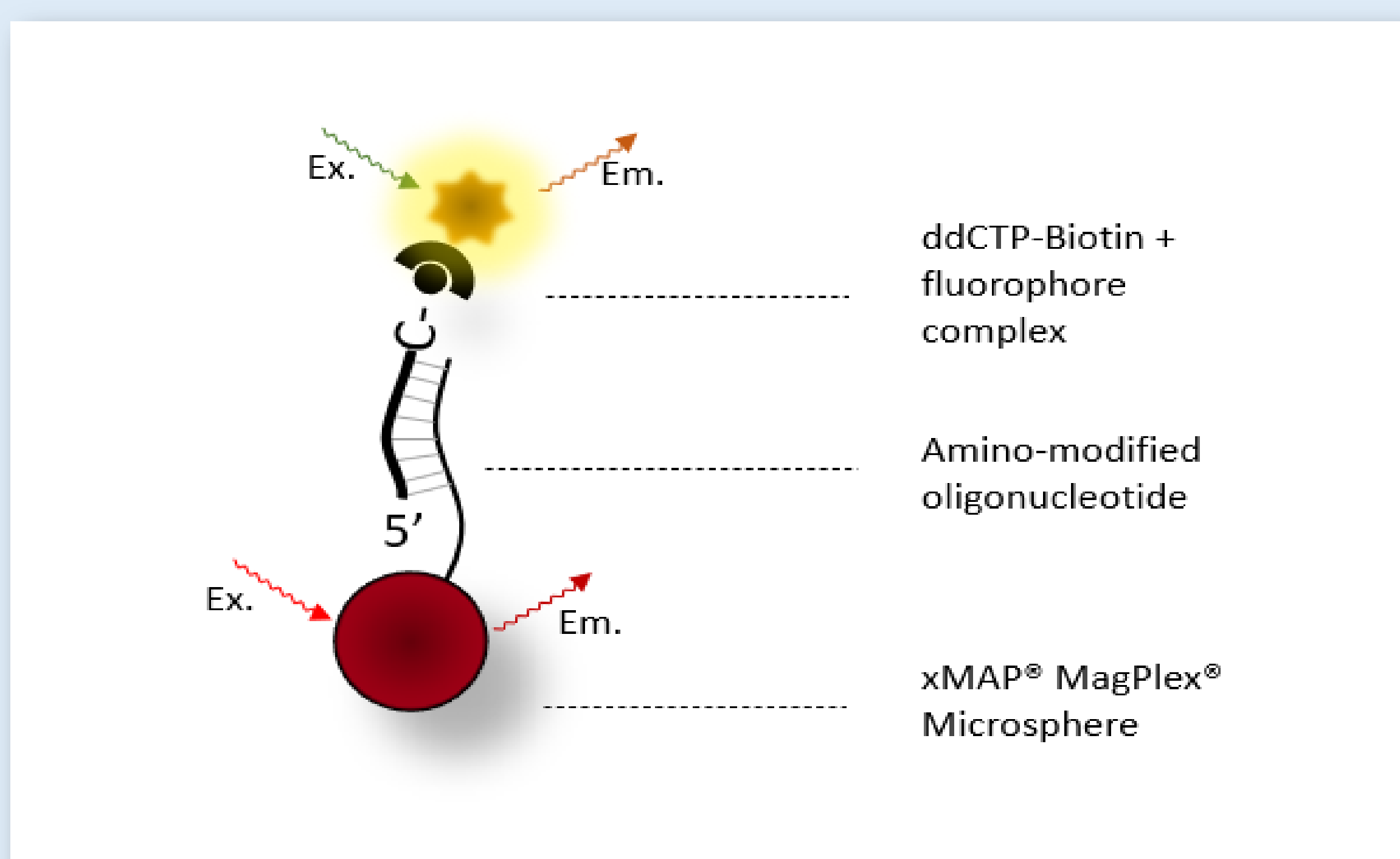


Figure 1. GA-map[®] platform: Specific bacteria groups are targeted through hybridization of short DNA probes to complementary sequences in the bacterial DNA. Multiplex detection is enabled by xMAP MagPlex[®] Microspheres, to which the probes are coupled.

A set of 174 DNA probes was designed to target a range of gut and oral bacteria, selected based on their association with gastrointestinal and metabolic conditions in peer-reviewed research articles. The panel has undergone a series of technical verification tests, documenting the assay's specificity and precision.

REFERENCES

1. Casén C, Vebø HC, Sekelja M, et al. Deviations in human gut microbiota: a novel diagnostic test for determining dysbiosis in patients with IBS or IBD - PubMed (nih.gov). Aliment Pharmacol Ther. 2015;42(1):71-83.

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CONCLUSIONS

We developed a standardized high multiplex microbiota research assay by combining the xMAP[®] Technology with the established GA-map[®] platform. The assay shows great ability to distinguish different sample groups through identification of microbiota signatures and is thus well-suited for comparative clinical studies as well as microbiota-based diagnostic test development.

RESULTS

GA-map[®] Discovery covers a range of bacteria spanning over 110 genera. The high coverage enables accurate distinction of samples from different target groups based on their microbiota composition (Figure 2). The assay has documented high precision (repeatability and reproducibility), with total CV of 1.34% for synthetic template (Figure 3).

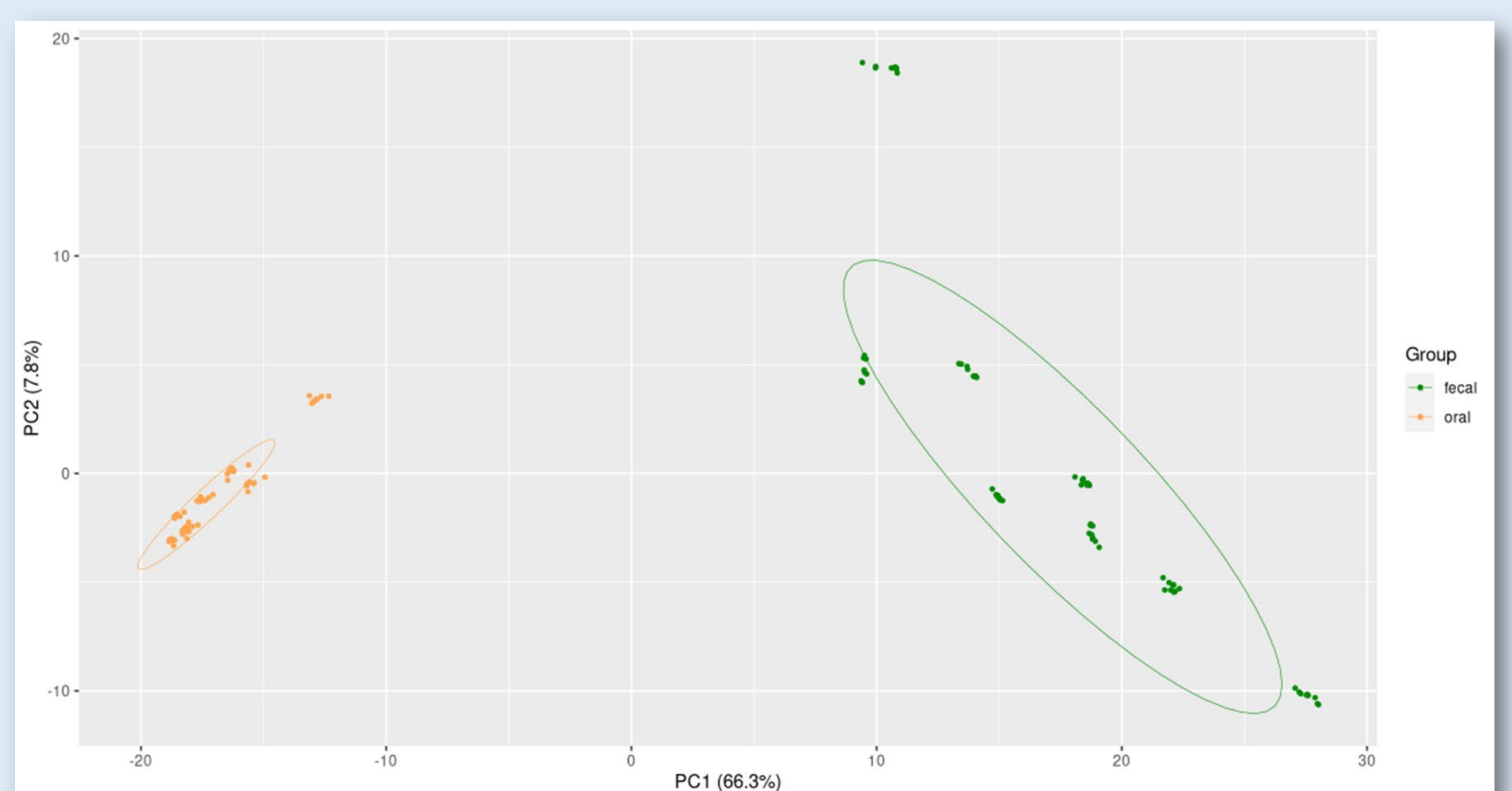


Figure 2. PCA plot of the first two principal components, log transformed signal values for technical replicates of fecal (green) and oral (orange) samples.

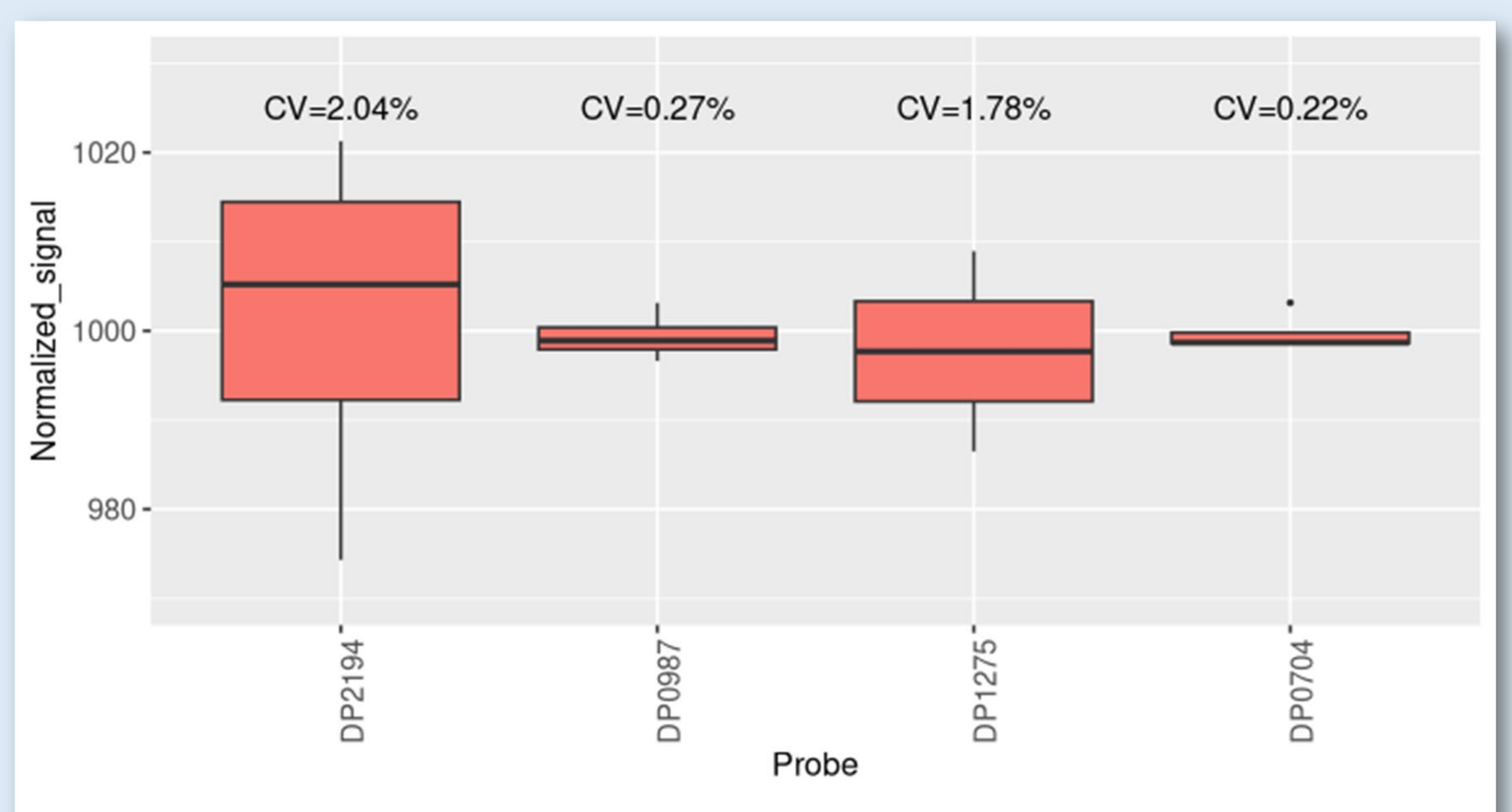


Figure 3. Normalized signal range and CV values for synthetic template of selected DNA probes, targeting *Veillonella* spp., *H. parainfluenzae*, *R. gnavus* and *F. prausnitzii*.