

Orthogonal HOS Similarity Assessment of Biosimilar Using Multi Spectroscopic Technique and Statistical Calculation

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INTRODUCTION

The biosimilar market is expanding and regulatory authorities emphasize the importance of analytical characterization of biosimilars, and recommend orthogonal assessment of the HOS of biosimilars and their innovators using multiple techniques based on different principles¹⁻⁵. Far-UV/CD and FT-IR spectroscopy are orthogonal methods for evaluating secondary structure, and near-UV/CD, Raman and fluorescence spectroscopy are orthogonal for tertiary structure. Comprehensive orthogonal assessment using these methods can provide a firm structural foundation to claims of biosimilarity. Here we report the results of a HOS assessment of a biosimilar and its innovator using cutting edge JASCO instruments. These are the HTCD Plus for far- and near-UV/CD, the FT/IR-4X for infrared, and the NRS-4500 for Raman spectroscopy. We also use the qHOS software, which allows statistical determination of spectral similarity.

EXPERIMENTAL

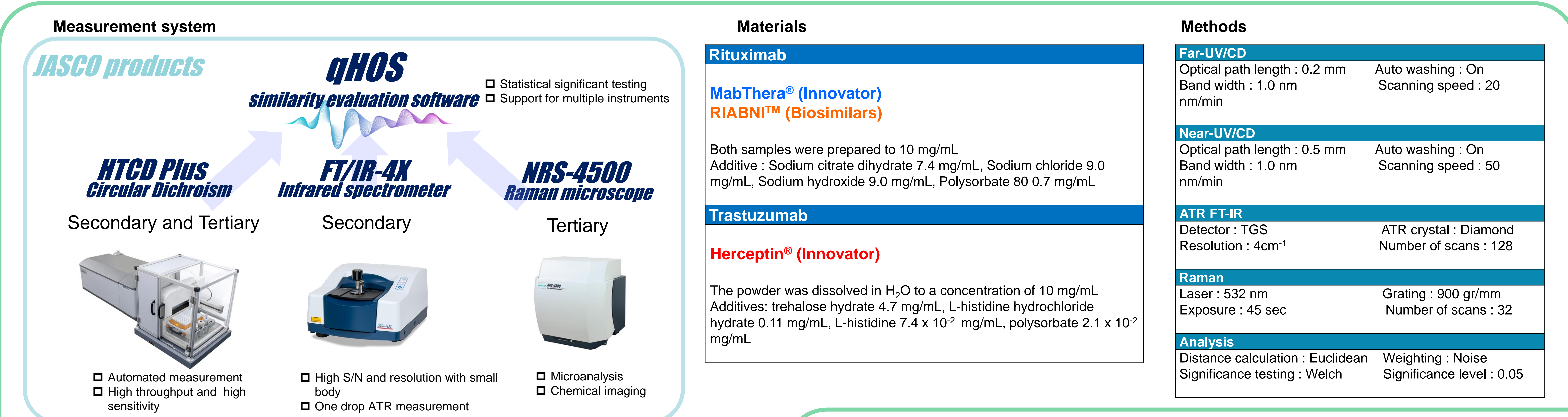
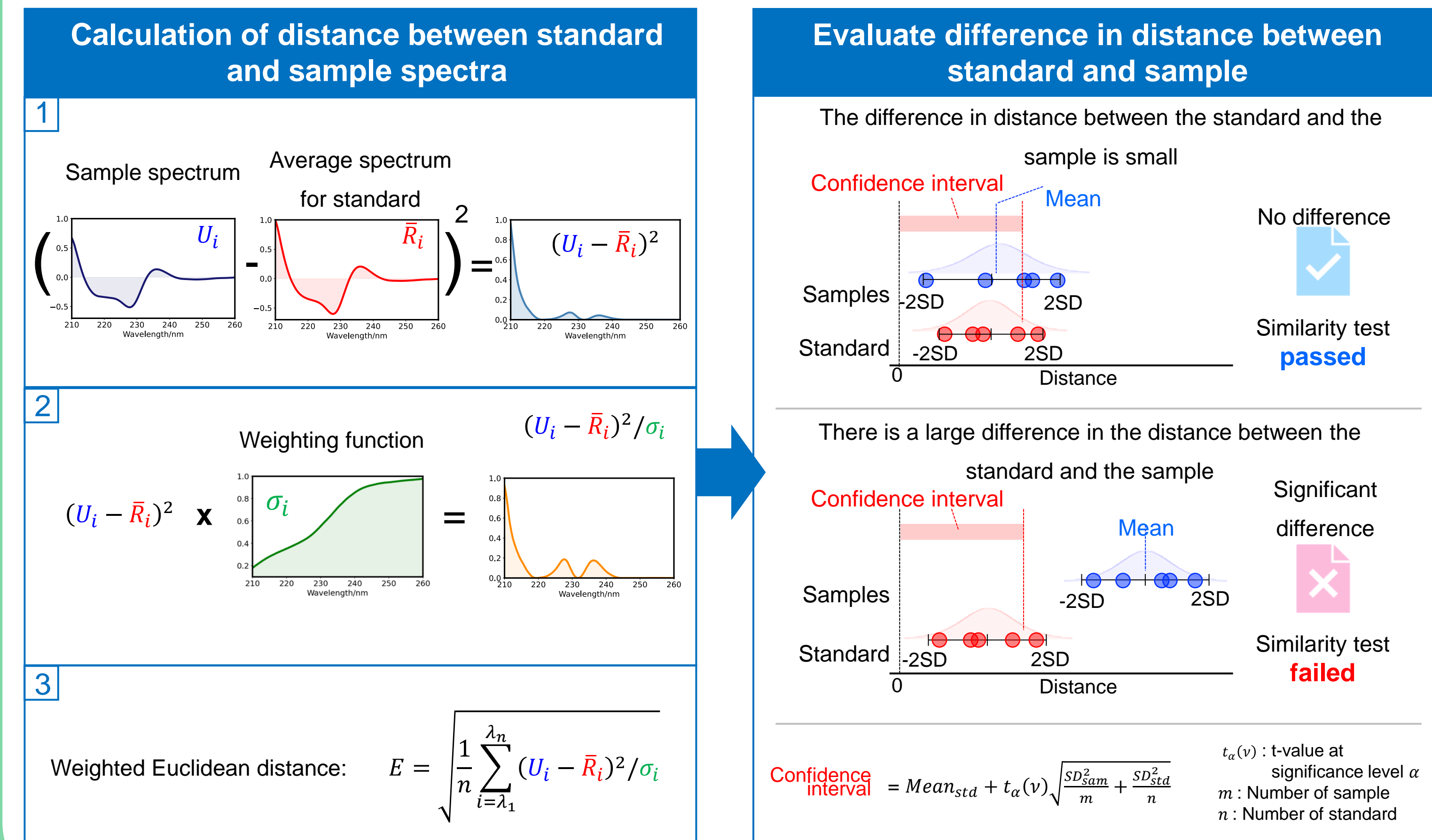


Figure 1. HOS similarity assessment for biosimilar

Similarity testing scheme of the qHOS



RESULTS

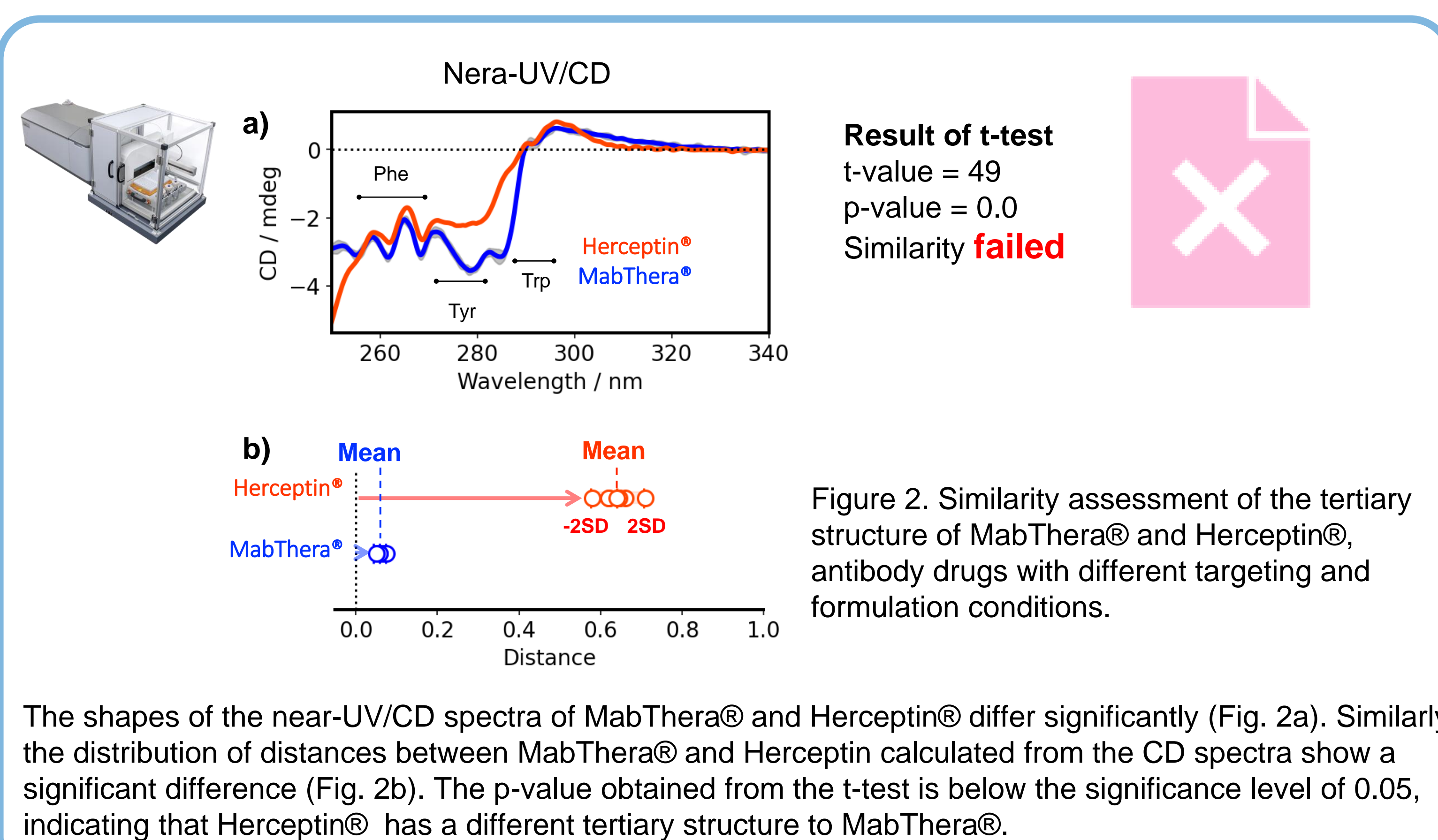


Figure 3. Orthogonal similarity assessment for the secondary structure of MabThera® and RIABNI™

The far-UV/CD and FTIR spectra of the biosimilar RIABNI™ are in excellent agreement with those of the innovator MabThera® (Figs. 3a and 3b), and the distributions of the distances between MabThera® and RIABNI™ are close to each other (Figs. 3c and 3d). The p-value is larger than the significance level of 0.05.

CONCLUSIONS

- We performed orthogonal assessments of the secondary and tertiary structures of a biosimilar and an innovator using HTCD Plus, FT/IR-4X, NRS-4500.
- The similarity of each spectrum was statistically determined using the single qHOS platform.
- The similarity of the HOS for the biosimilar and the innovator was confirmed by orthogonal methods.
- This system can be used not only to evaluate the similarity of biosimilars but also to easily and accurately determine the changes in the HOS of antibody drugs caused by post-translational modifications and external stimuli.

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