



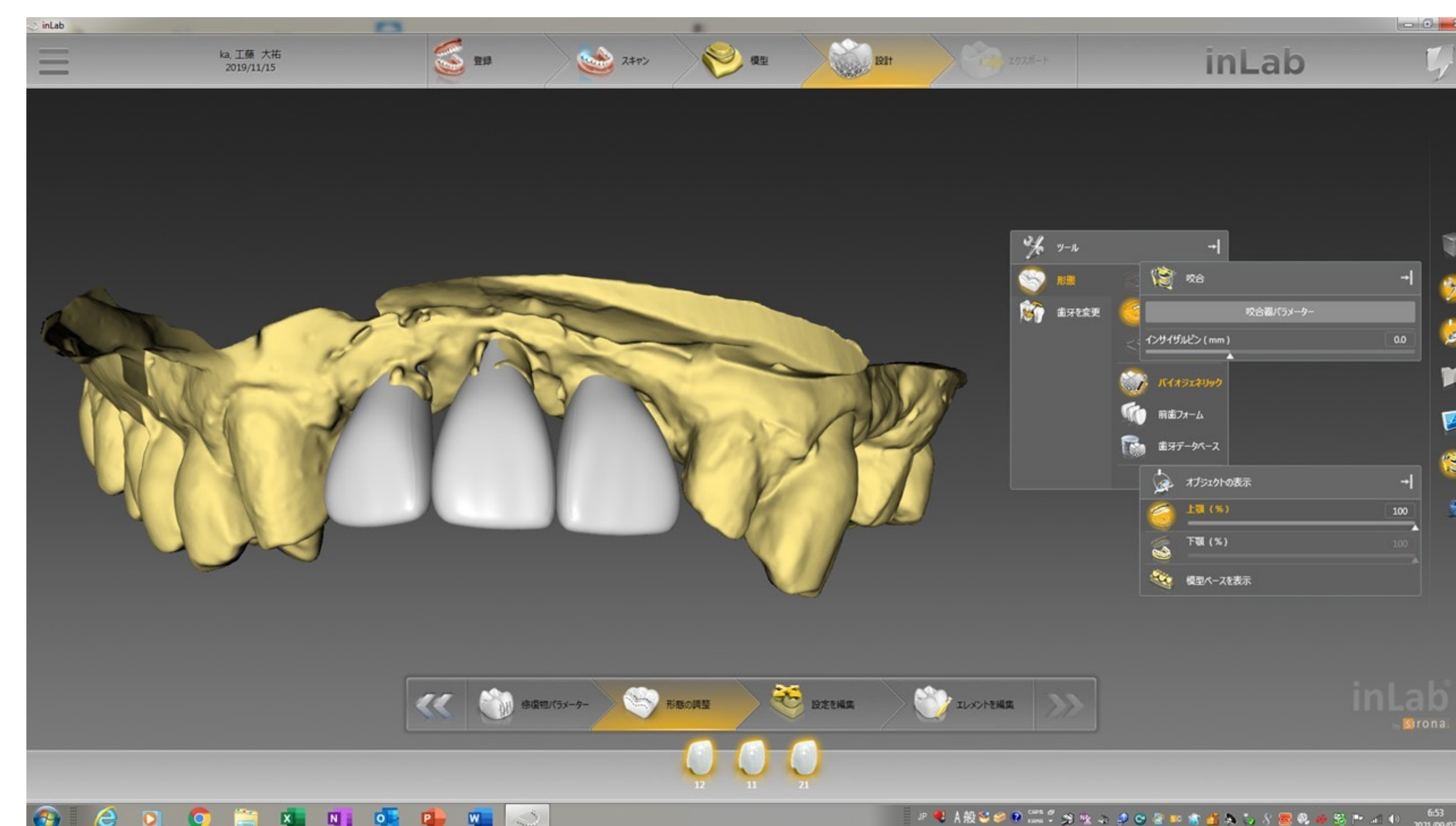
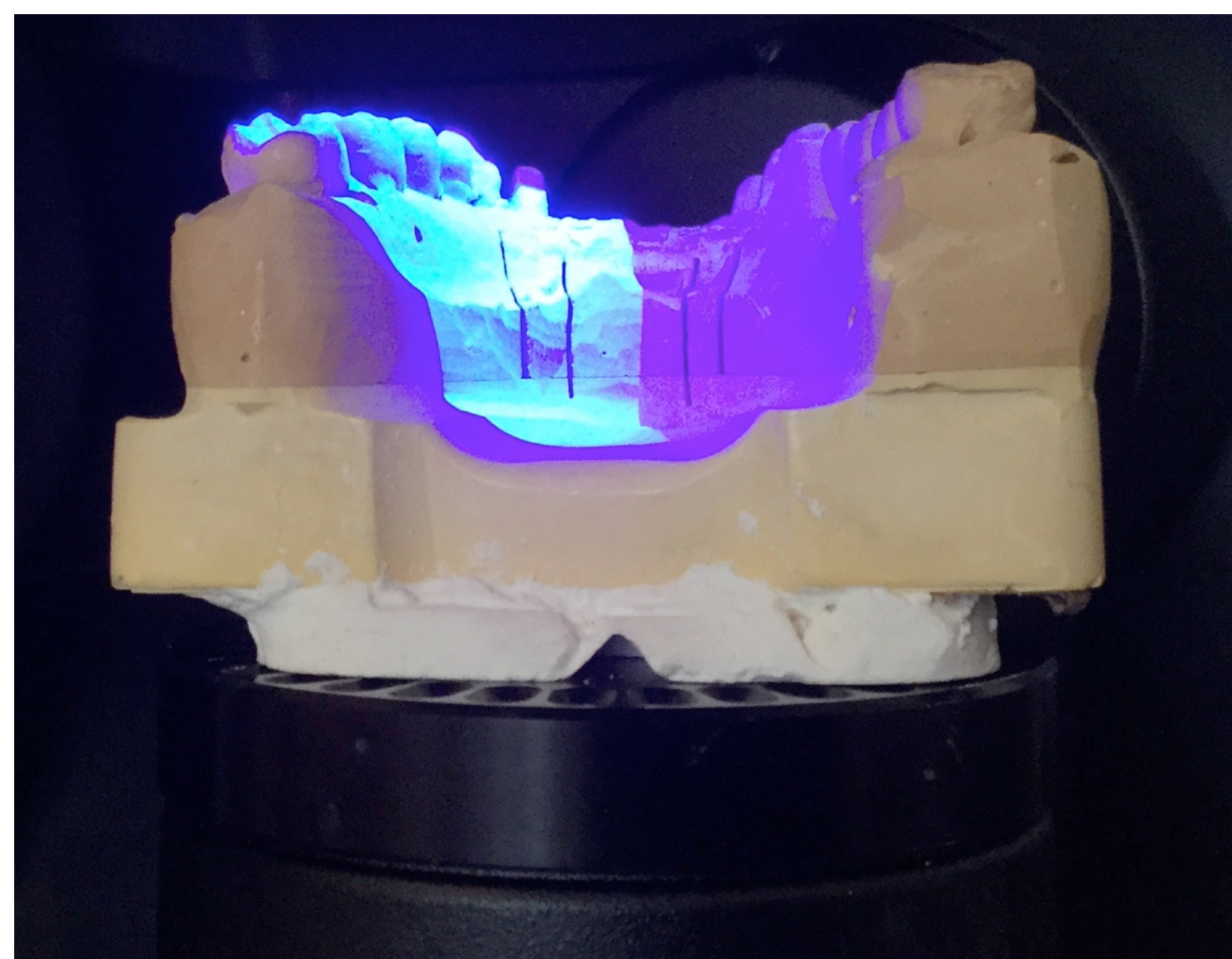
Assessment of the accuracy of the occlusal contact of prostheses fabricated with CAD-CAM and intraorally.



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INTRODUCTION:

Stress on teeth has been known to affect physiological and dental health during mastication. The number of occlusal contacts provides an assessment of prostheses' success. Previous studies have described the number of occlusal contacts on dental health and the masticatory system. There are essential factors for prosthodontic dentistry. Recently, Computer-aided design and computer-aided manufacturing (CAD-CAM) have been introduced to fabricate dental prostheses and implant treatment. However, the ability to reproduce the accuracy of occlusal contact numbers with prostheses fabricated with CAD-CAM is unclear. Therefore, this study aims to assess the ability to reproduce the accuracy of occlusal contact of intraoral prostheses with prostheses fabricated with CAD-CAM.





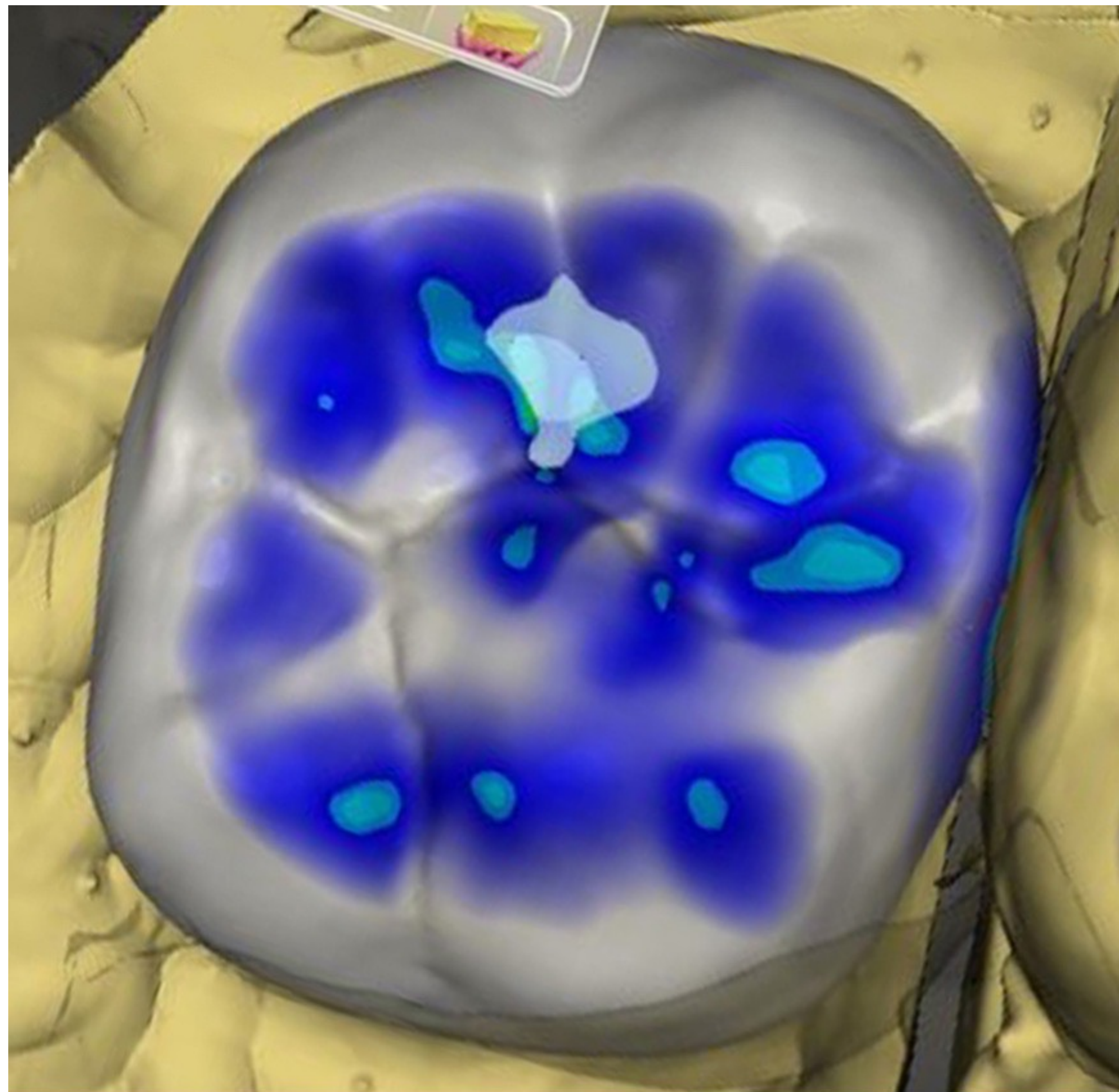
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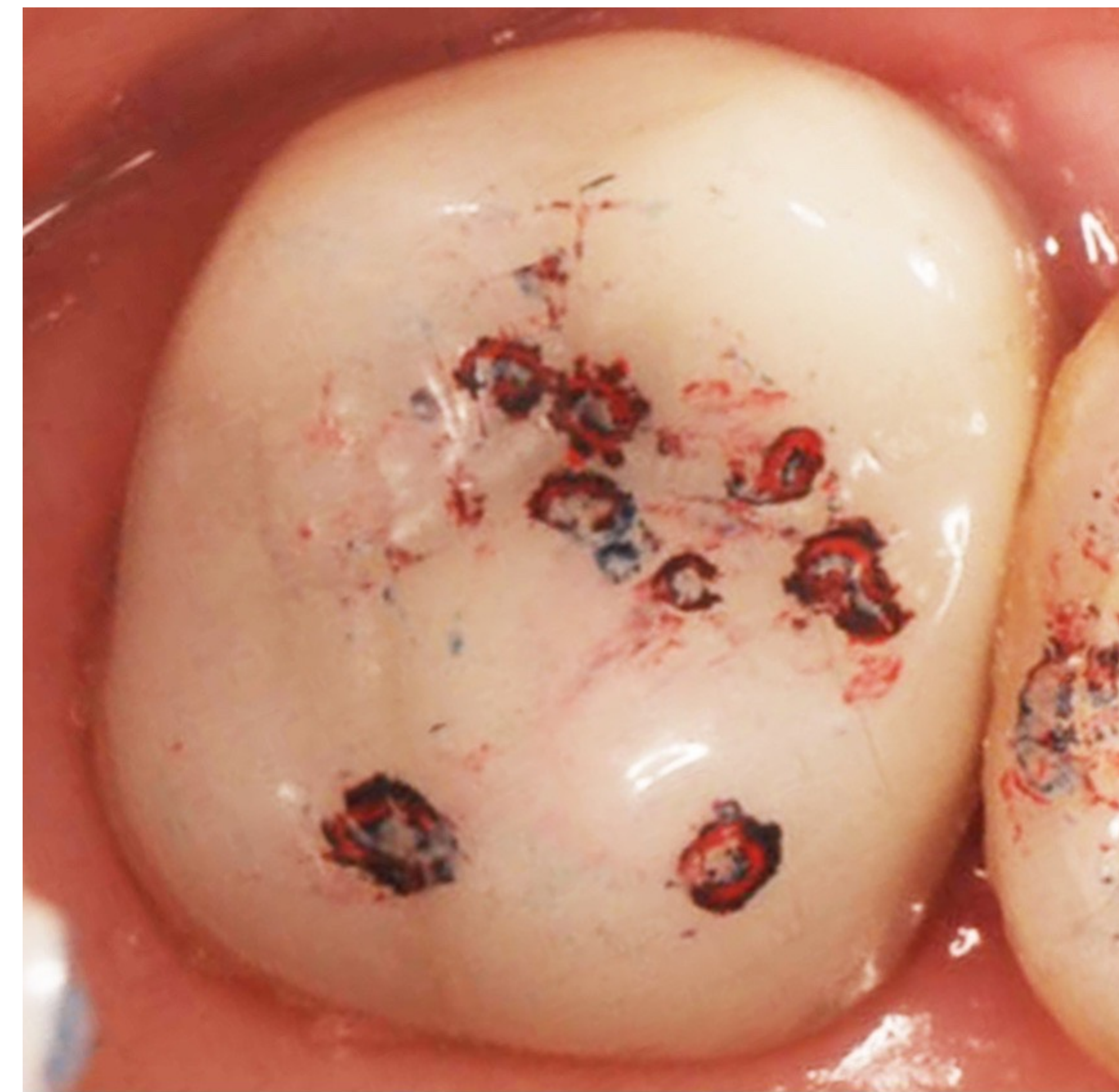
MATERIALS AND METHODS:

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It obtained ethical approval from an official organization, the Japan Institute for Advanced Dentistry. Institutional Review Board (006-31). It fabricated temporary crown and partial fixed dental prostheses with the CAD-CAM (in Eos X5, Sirona in Lab CAD SW, version 1.81, Sirona, in Lab CAM SW 18.1, Sirona, USA) method. Then 45 teeth of 13 patients received those prostheses, and intercuspals occlusion was evaluated and recorded with articulating paper (Red and Blue, 12 μ m), with intraoral photographs taken for each patient. It compared CAD software and intraoral photographs to determine intercuspals occlusion. These recorded the number of occlusal contacts (**OCN**). They determined discrepancies between intraoral prostheses and those fabricated with CAD software. Statistical analysis with descriptive statistics, normality tests, and Wilcoxon signed-rank test/Two-tailed ($\alpha=0.05$) was performed with XLSTAT software (Germany)



CAD designed in prosthesis. Temporary Crown



CAM fabricated prosthesis to prepared teeth at intra-orally and check to occlusal contact by articulating paper



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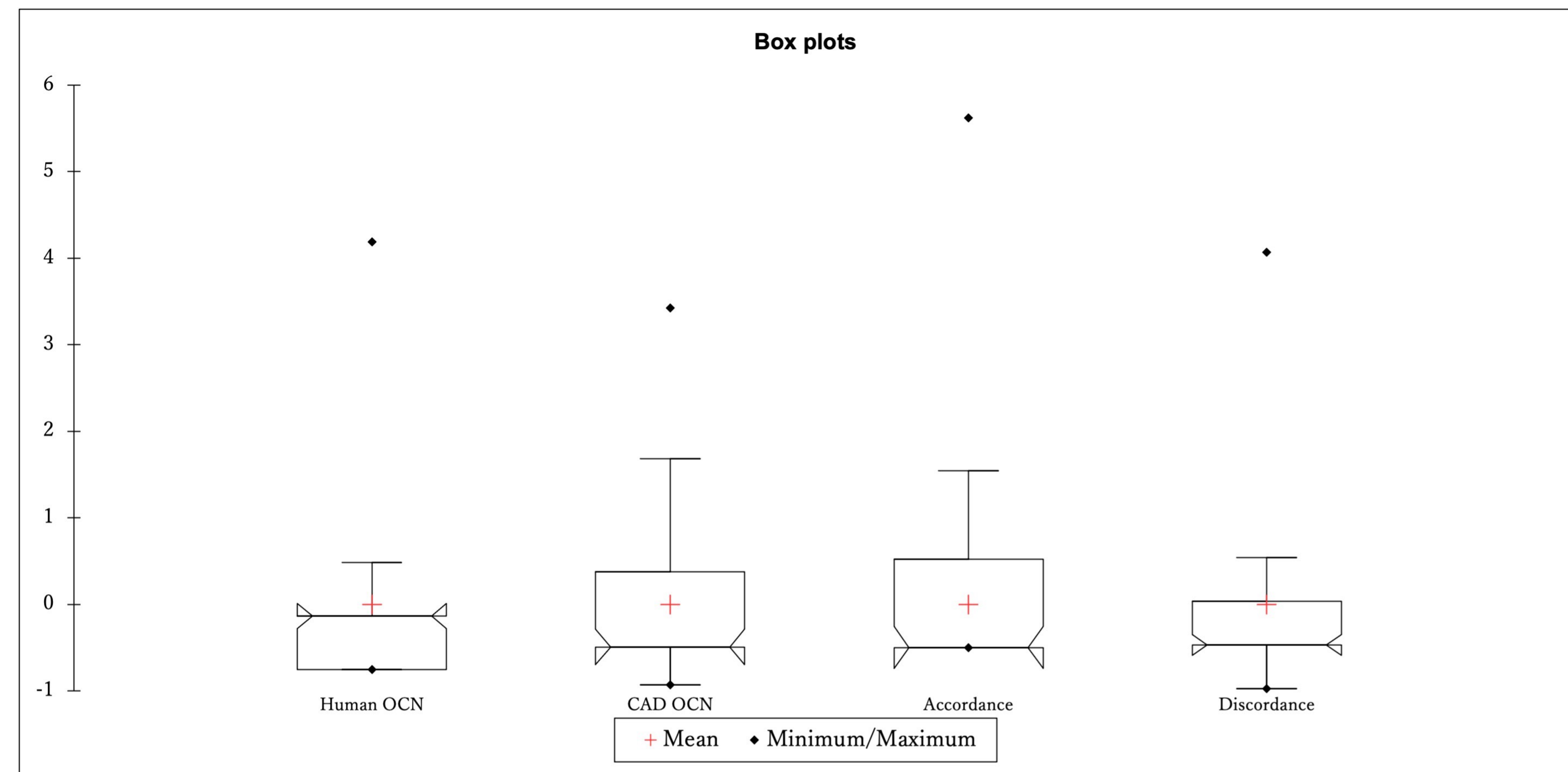


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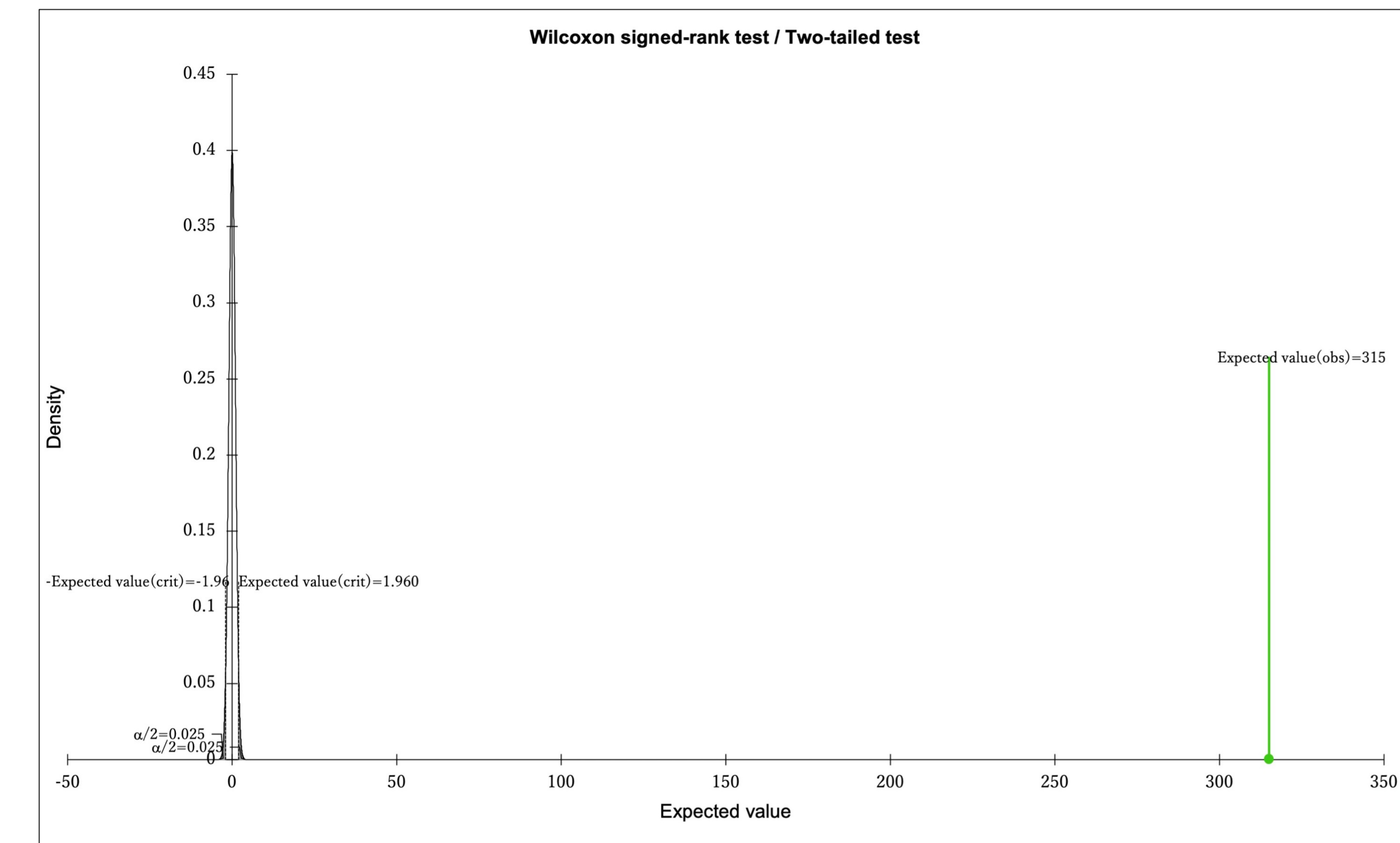
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RESULTS:

For prostheses fabricated with CAD, mean $\pm$ S.D. for **OCN** between occlusal contacts differed from that for intraorally fabricated prostheses. Box plot indicated the outliers of the whole by descriptive statistics. Normality tests showed that the difference was statistically significant. ($P<0.0001$), Wilcoxon's signed-rank test showed a significant difference. ($P = 0.012$)



Box Plot, Mean $\pm$ S.D, Minimum / Maximum



Count of occlusal contacts number between CAD and intraorally. (OCN) Wilcoxon signed-rank tests / Two tailed $\alpha<0.05$.



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Descriptive statistics
(Quantitative data):

RESULTS:

Statistic	Human OCN	CAD OCN
Nbr. of observations	45	45
Nbr. of missing values	0	0
Sum of weights	45	45
Minimum	-0.755	-0.929
Maximum	4.189	3.426
Freq. of minimum	16	6
Freq. of maximum	1	1
Range	4.945	4.356
Median	-0.137	-0.494
Sum	0.000	0.000
Mean	0.000	0.000
Variance (n-1)	1.023	1.023
Standard deviation (n-1)	1.011	1.011
Skewness (Pearson)	2.409	1.908
Skewness (Fisher)	2.493	1.974
Skewness (Bowley)	1.000	1.000
Kurtosis (Pearson)	6.385	3.215
Kurtosis (Fisher)	7.302	3.749
Standard error of the mean	0.151	0.151
Lower bound on mean (95%)	-0.304	-0.304
Upper bound on mean (95%)	0.304	0.304
Standard error of the variance	0.218	0.218
Lower bound on variance (95%)	0.701	0.701
Upper bound on variance (95%)	1.632	1.632
Standard error (Skewness (Fisher))	0.354	0.354
Standard error (Kurtosis (Fisher))	0.695	0.695
Mean absolute deviation	0.647	0.721
Median absolute deviation	0.618	0.436
Harmonic mean	-0.329	-0.392

Normarity tests:

Variable\Test	Shapiro-Wilk	Anderson-Darling	Lilliefors	Jarque-Bera
Human OCN	<0.0001	<0.0001	<0.0001	<0.0001
CAD OCN	<0.0001	<0.0001	<0.0001	<0.0001

Normality tests including Shapiro-Wilk, Anderson-Darling, Lilliefors, Jarque-Bera tests for OCN, OCD. $P < 0.05$.

Wilcoxon signed-rank test / Two-tailed test:

V	164.500
V (standardized)	-2.517
Expected value	315.000
Variance (V)	3576.625
p-value (Two-tailed)	0.012
alpha	0.050

Count of occlusal contacts number between CAD and intraorally. (OCN) Wilcoxon signed-rank tests / Two tailed $\alpha < 0.05$.

CONCLUSION

Within this study, Prostheses designed with CAD software and fabricated with CAM did not accurately reproduce the number of occlusal contacts. Therefore, it is necessary to adjust prostheses at the chair-side for dental clinicians. Furthermore, spending large amounts of time adjusting prostheses at the chair-side causes discomfort for the dentist and increases patient waiting times.

Descriptive Statistics including Pearson, Fisher, Bowley tests for OCN, OCD. $P < 0.05$.