

# Discoloration of Zirconia Crowns Due to Opposing Restorations

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## Introduction and Purpose

- Parents today have a higher demand for esthetic restorations for their children. Multiple companies have designed full coverage zirconia crowns to satisfy these demands.
- Zirconia crowns have been found to have similar success rates as other traditional restorations, but require a more technique sensitive preparation.
- Manufacturers have stated that zirconia crowns are color stable and stain resistant and that any discoloration of these crowns has been contributed to improper techniques during cementation.
- At the UNMC Pediatric Dental Clinic, multiple patients have presented with discolored zirconia crowns, such as those seen in Figure 1. It is believed that the cause of the discoloration is due to opposing restorations.

## Objectives

- The purpose of this study is to evaluate the cause of extrinsic discoloration of zirconia crowns. Based on clinical observations, opposing restorative materials will be tested and the zirconia crowns evaluated for the presence or absence of discoloration.

## Methods

- Lateral excursive movements were recreated using an articulator with a custom incisal guide table. Each zirconia crown was subjected to 100 lateral movements.
- Sample size: 30 Maxillary Zirconia Crowns
- Test Groups:
  - 10 Zirconia vs. Plastic Tooth
  - 10 Zirconia vs. Zirconia Crown
  - 10 Zirconia vs. Stainless Steel Crown
- Crown Preparations and lateral movements were completed by the same researcher.
- Crowns were visually assess for the presence or absence of discoloration.
- Descriptive statistics and analysis were conducted using a Fischer's exact test.



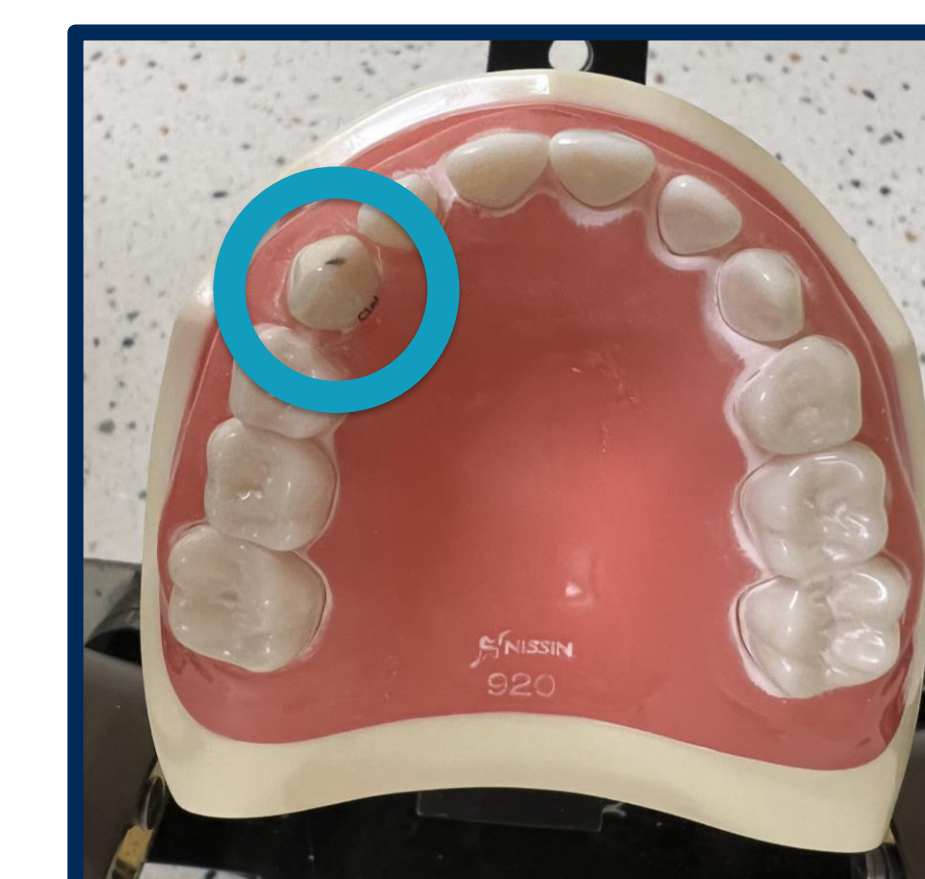
**Figure 1: Clinical Imaged of discolored zirconia crowns**



**Figure 2: Articulator with Custom Incisal Guide Table**



**Figure 3: Lateral Excursive Movement**



**Figure 4: Discoloration Present on Zirconia Crown (Tooth #C)**

## Discussion

- All known causative variables of discoloration were eliminated during this study.
- Study design allowed for accurate and repeatable bite forces for each tested zirconia crown.
- A Fischer's exact test was used to compare the association of restored tooth material with development of discoloration.
- There is statistically significant association between experimental group and result ( $p < 0.0001$ ). The discoloration was absent 100% of the time in the Zirconia/Plastic and Zirconia/Zirconia groups and 0% with the Zirconia/Stainless Steel group.

## Conclusion

- Extrinsic discoloration of zirconia crowns is due to stainless steel crowns on the opposing dentition.
- Limitations; This study would benefit from being reproduced with the use of a chewing simulator and larger sample size.
- Study is a foundation for future clinical data collection and analysis. Future research should also assess different manufacturer's zirconia crowns.
- Implication for contacting manufacturer to discuss findings and recommendation that different materials be tested and used in future products.

## Results

Result	Zirconia/Plastic	Zirconia/Zirconia	Zirconia/SSC
Presence	0	0	10
Absence	10	10	0

Table 1: Tooth treatment and Presence or Absence of Discoloration

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