

## ABSTRACT

**Objective:** Color change in clinical trials is commonly assessed using dental shade tabs ordered in a standard numerical sequence. This study was conducted to ascertain the relevance of a standard shade tab order to personal color perception and preference. **Methods:** A total of 402 adult panelists were instructed to order 16 standard color chips (Vita® Lumin) in terms of “whiteness” into bins arranged linearly. The panelists were instructed to place the whitest tab(s) in the first bin and the least white tab(s) in the last bin, and then, to arrange the remaining tabs in bins according to perceived “whiteness”. Panelist ordering was assessed using paired sample t-tests, and then, this order was compared to the manufacturer’s lightness-based sequence (B1-C4). **Results:** The panelist order demonstrated statistically significant ( $p < 0.05$ ) differences between most tab pairs. Three tab pairs (A2-D2, D3-A3, B4-A3.5) were not statistically significantly different. While the majority found B1 and C4 to represent “whiteness” extremes, the panelist order differed from that recommended by the manufacturer. A total of 8 out of 16 tabs were rearranged according to panelist perception, changing the ordering of tabs 3-10 in the standard sequence. These data demonstrate that while shade tabs may be used to differentiate color change, standard sequences may not adequately represent personal color perception or preference, especially in areas involving intermediate color rankings (B2-D3). Alternative scaling may be necessary to assure relevance to personal color perception. **Conclusion: Standard shade tab ordering may not adequately represent personal color perception or preference.**

## OBJECTIVE

Color change in clinical trials is commonly assessed using dental shade tabs ordered in a standard numerical sequence. This study was conducted to ascertain the relevance of a standard shade tab order to personal color perception and preference.

## MATERIALS AND METHODS

A total of 402 adult panelists were instructed to order 16 standard color tabs (Vita® Lumin) in terms of “whiteness” into 31 bins arranged linearly. The panelists were instructed to place the whitest tab(s) in the first bin and the least white tab(s) in the last bin, and then, to arrange the remaining tabs in bins according to perceived “whiteness”. Tabs indistinguishable in terms of whiteness were allowed to be placed in the same bin. Panelists were permitted adequate time to rearrange the tabs until a final arrangement was determined.

Tabs were then compared in a pairwise manner to assess whiteness differences. Specifically, for each pair of tabs the “whiter” tab was the tab which most of the panelists placed in a lower (whiter) bin. Ties were evenly split between the two tabs. A paired-sample t-test was then used to test for a perceived whiteness difference between each pair of tabs. The percents were then tabled and the resulting tab order was then compared to the manufacturer’s lightness-based ordering (B1-C4).

## RESULTS

The resulting panelist chosen whitening ordering yielded agreement ranging from 51% to 100%, with the majority of pairs exceeding 90%. Values statistically significantly greater than 50% indicate a perceived whiteness difference between the pair of tabs. The panelist order demonstrated statistically significant ( $p < 0.05$ ) differences between nearly all (117 out of 120) tab pairs. The three tab pairs which were not statistically significantly different were A2-D2, D3-A3, B4-A3.5, all of which are found towards the center of the manufacturer’s recommended order.

With the new order, the greater the spacing between tabs, the greater the agreement between panelists. Overall most (70%) of the tab pairs had agreement of 90% or greater. Agreement was nearly 100% for tabs separated by 6 spaces or more.

While the majority of panelists found B1 and C4 to represent “whiteness” extremes, the panelist order differed from that recommended by the manufacturer. Table 1 compares the resulting ordering to that provided by the manufacturer. A total of 8 out of 16 tabs were rearranged according to panelist perception, changing the ordering of tabs 3-10 in the standard sequence. These data demonstrate that while shade tabs may be used to differentiate color change, standard sequences may not adequately represent personal color perception or preference, especially in areas involving intermediate color rankings (B2-D3).

**Table 1. Comparison of New Order to Standard Manufacturer's Order**

	<			Whiter					<			<				
<b>New Order</b>	B1	A1	C1	B2	D2	A2	A3	D3	C2	D4	B3	A3.5	B4	C3	A4	C4
<b>Standard Order</b>	B1	A1	B2	D2	A2	C1	C2	D4	A3	D3	B3	A3.5	B4	C3	A4	C4

## CONCLUSION

Standard shade tab ordering may not adequately represent personal color perception or preference.

Alternative scaling may be more representative of personal color perception.