

# Shear bond strength to silver diamine fluoride treated dentin

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## ABSTRACT

**Objectives:** To measure and compare the shear bond strength of composite resin to carious dentin before and after treatment with a 38% silver diamine fluoride and potassium iodide (SDF+KI).

**Methods:** The enamel of freshly extracted carious human teeth was removed from all teeth using a model grinder to expose the carious lesion. Soft caries was carefully removed until resistance was felt using a spoon excavator. Gr1 (control) received a coat of Scotchbond Universal (SBU) without prior etchant. Gr2-4 had a coat of SDF (Riva Star) applied followed by scrubbing a KI solution. SBU was then applied directly to Gr2 and applied to Gr3 following 15sec phosphoric acid etching. Gr4 was stored in PBS for 2 weeks and then received a coat of SBU without etchant. A 1.5mm diameter tube containing Filtek Supreme Ultra was applied over hard but carious dentin, and light-cured with a LED curing light (Deep Cure, irradiance >1000mW/cm<sup>2</sup>). All specimens were then stored in PBS/98°F in an incubator then placed into a fixture attached to the Instron Universal Testing machine. A shear load was applied (1mm/min) until failure. Shear bond strength was calculated. Data analyzed with analysis of variance (ANOVA) ( $\alpha=0.05$ ).

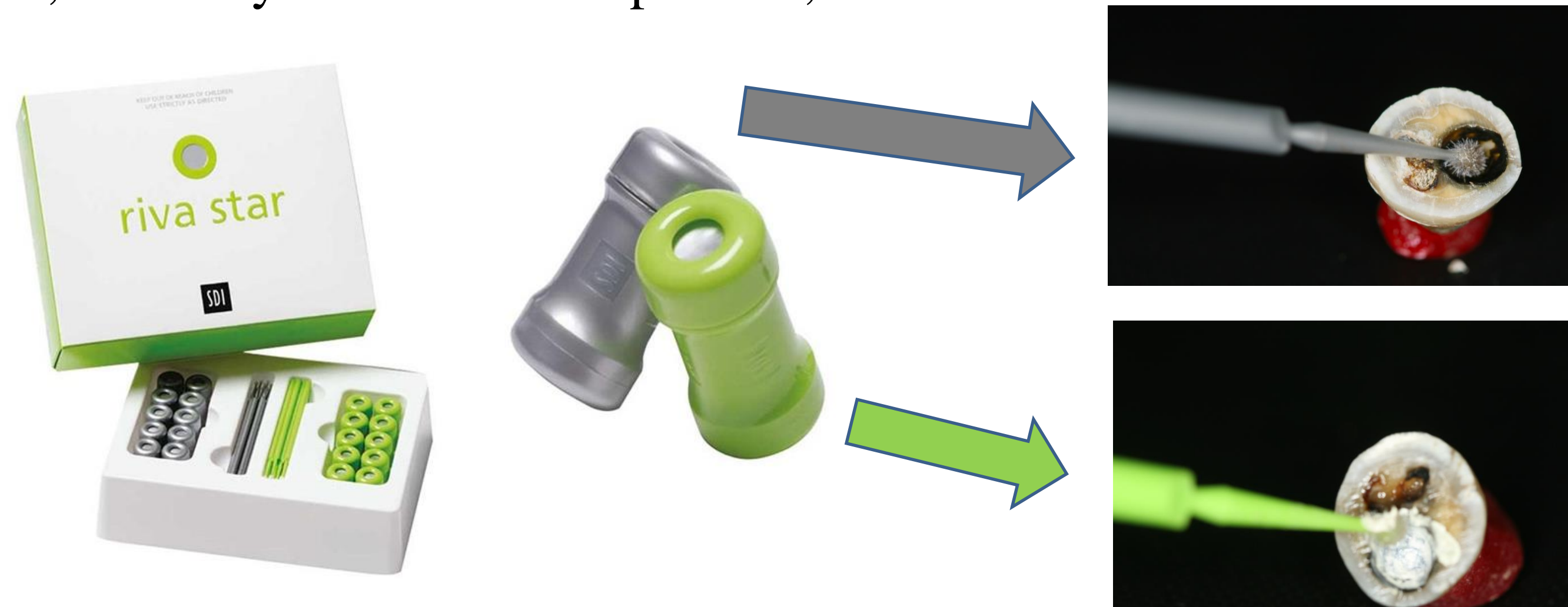
**Results:** No statistical difference was found between groups ( $p>0.05$ ) (mean $\pm$ SD): Gr1 (12.9 $\pm$ 7.4MPa), Gr2 (16.5 $\pm$ 10.3MPa), Gr3 (12.4 $\pm$ 4.9MPa), Gr4 (14.6 $\pm$ 7.2MPa).

Shear bond strength (MPa)	Carious dentin No Etch, No SDF	SDF, No etch, Bond	SDF, Etch, Bond	Applied SDF set for 2 weeks and Bond
	12.9 $\pm$ 7.4	16.5 $\pm$ 10.3	12.4 $\pm$ 4.9	14.6 $\pm$ 7.2

**Conclusion:** Within the limitations of this study it can be concluded that applications of Riva Star (SDF+KI) does not affect bond strength of a Universal Adhesive (SBU) in either a self-etch or total-etch mode. Delayed application of the adhesive after SDF+KI does not affect the bond of the adhesive to carious dentin.

## INTRODUCTION

- Silver diamine fluoride (SDF), a clear liquid that combines the antibacterial effects of silver and the remineralizing effects of fluoride, is a safe and effective therapeutic agent for managing caries lesions in young children. The clinical application of this material has been limited by black staining on teeth which can cause esthetic concern. Immediate application of potassium iodide (KI) reacts with free silver ions (remaining after the application of SDF) to produce silver iodide, a creamy white reaction product, as distinct from a black tooth surface.<sup>1</sup>



- Many studies have been done to determine shear bond strength of GIC and composite to normal caries-free dentin. Selvaraj et al. (2016)<sup>2</sup> and Quock et al. (2012)<sup>3</sup> reported no decrease in the bond strength to SDF-treated dentin; whereas Lutgen et al. (2018)<sup>4</sup>, Kucukyilmaz et al. (2016)<sup>5</sup>, Knight et al. (2006)<sup>6</sup>, and Soeno et al. (2001) reported a decrease in shear bond strength to SDF-treated dentin. But there is a lack of information to show what effect the application of KI after SDF treatment will have on the bond strength of composite to caries-affected dentin. The objective of this study is to measure and compare the shear bond strength of composite resin to carious dentin before and after treatment with a 38% silver diamine fluoride and potassium iodide (SDF+KI).

## MATERIALS AND METHODS



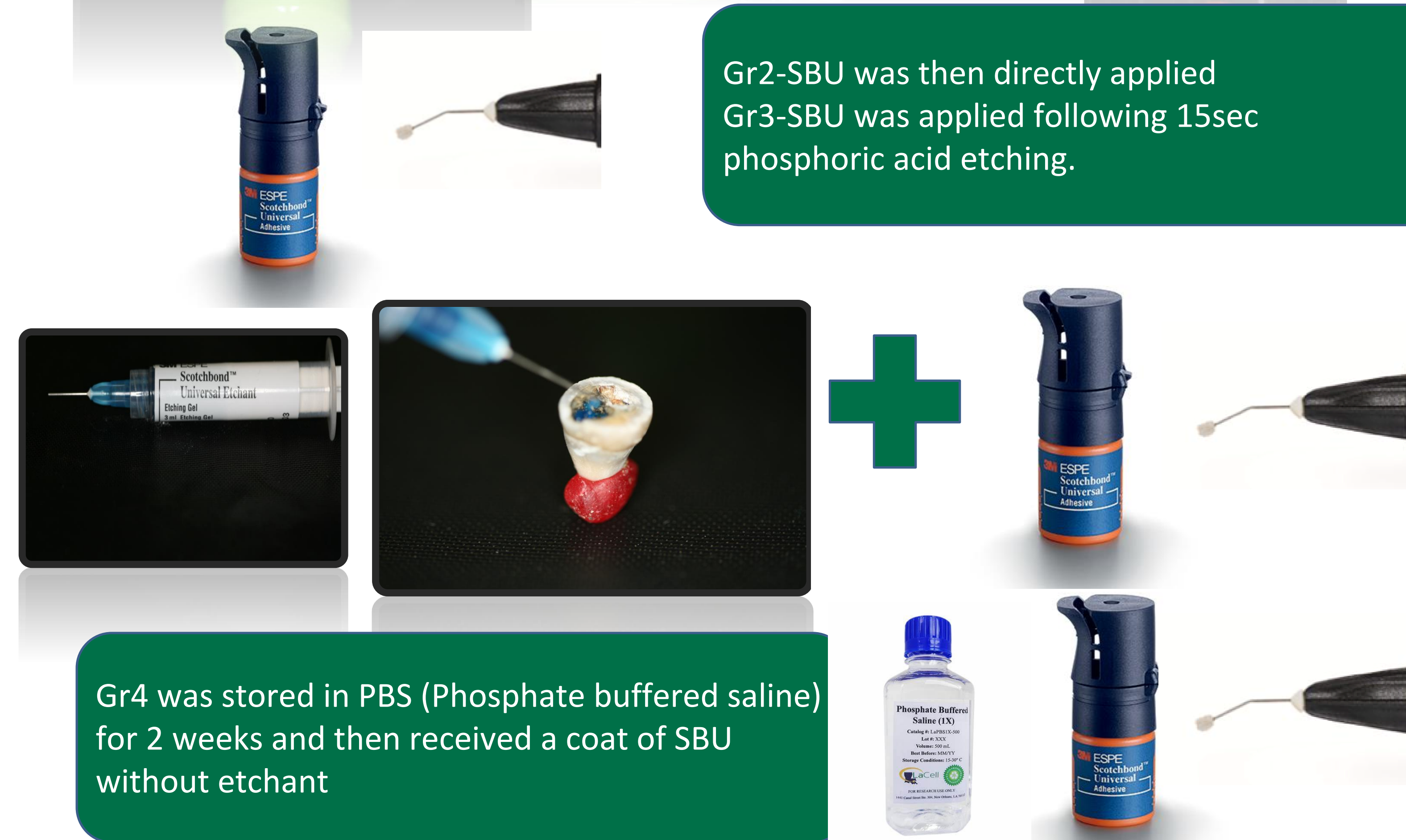
The enamel of freshly extracted carious human teeth was removed from all teeth using a model grinder to expose the carious lesion. Soft caries was carefully removed until resistance was felt using a spoon excavator.

Gr-1 (control) was bonded to carious dentin using Scotchbond Universal (SBU) in a self-etch mode.

For Gr 2-4, Silver Diamine fluoride (Riva Star) was applied, scrubbed for 20 seconds and a solution of potassium iodide applied and scrubbed until the SDF turned clear.



Gr2-SBU was then directly applied  
Gr3-SBU was applied following 15sec phosphoric acid etching.



Gr4 was stored in PBS (Phosphate buffered saline) for 2 weeks and then received a coat of SBU without etchant

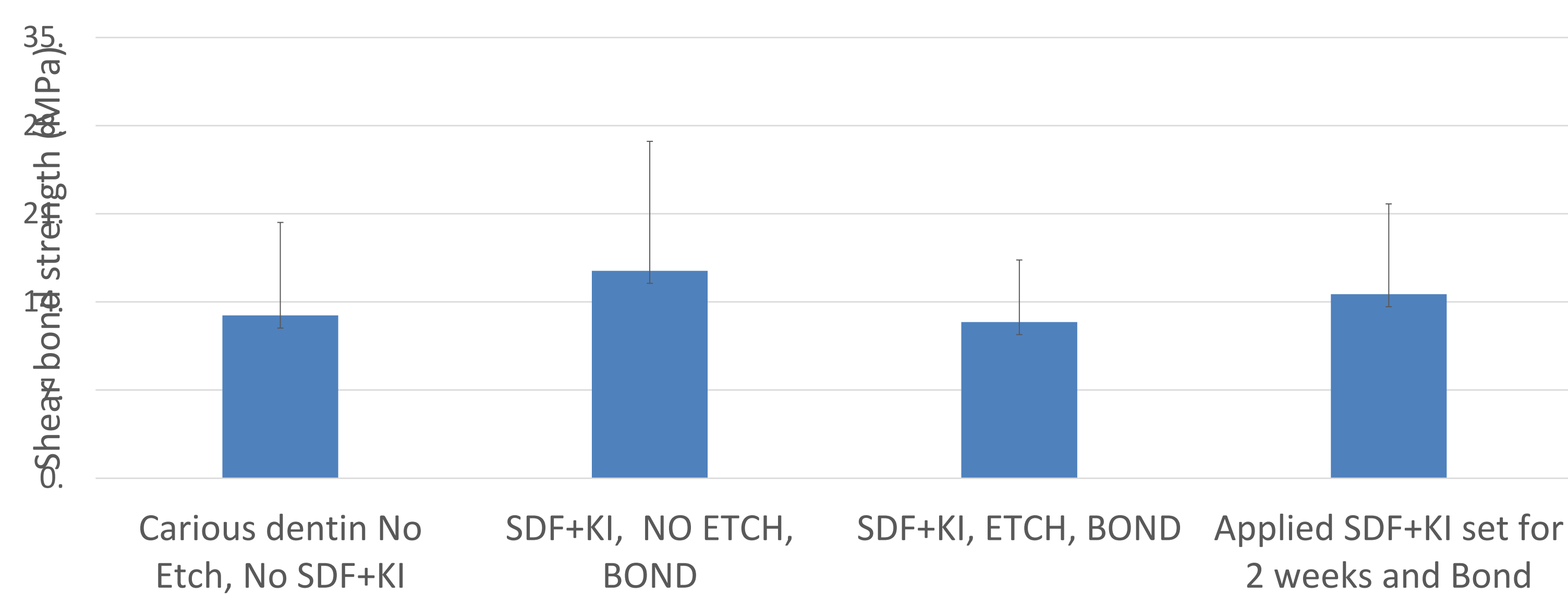
For all groups a tube (1.5mm diameter) filled with Filtek Supreme Ultra (A2) was applied over the bonding area and light-cured with a LED curing light/Deep Cure with an irradiance > 1000mW/cm<sup>2</sup>.



## RESULTS

A 1 way ANOVA found no difference in shear bond strength ( $p>0.05$ ).

Shear bond strength to SDF+KI treated dentin



## CONCLUSIONS

- Applications of Riva Star (SDF+KI) does not affect bond strength of a Universal Adhesive (SBU) in either a self-etch or total-etch mode.
- Delayed application of the adhesive after SDF+KI does not affect the bond of the adhesive to carious dentin.

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