Influence of Dental Curing Lights on Tensile Bond Strength

M.ARATA[1], T.ORI[1], K.TASHIRO[1], H.NISHITANI[1], T.YAMAMOTO[1], A.SENDA[2], J.TAGAMI[3], N.MATSUZAWA[4] and Y.MOMOI[4]
1 : SUN MEDICAL CO., LTD. 2 : Aichi-Gakuin University, Nagoya, Japan
3 : Tokyo Medical & Dental University, Japan 4 : Tsurumi University, Yokohama, Japan

Objectives

The purpose of this study is to evaluate the influence of dental curing lights on the tensile bond strength (TBS) of thin film formed bonding systems to dentin.

Materials and Method

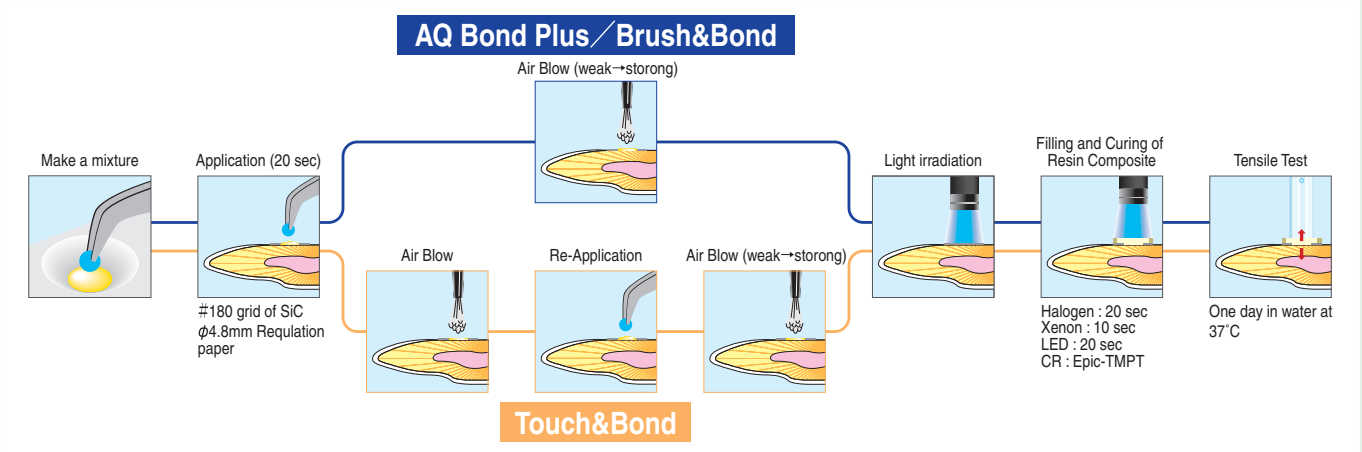


Fig.1 Procedure for Test

Table1. Wavelengths of curing lights※

Type	Name	manufacture	Wavelength (nm)
Halogen	Candelux	J.MORITA MFG CORP.	380-510
	TransluxCL	Kulzer	350-550
	LIGHTEL DP-075	USIO	400-515
	JETLIGHT 1000	J.MORITA USA	400-520
	XL3000	3M	400-520
	Optilux 401	SYBRON DENTAL	375-525
	Optilux 501	SYBRON DENTAL	375-505
Xenon-A	Apollo95E	DMD System	440-500
	ArcLight	Airtechnics	430-500
	Credi8000	3M	440-500
	Flipo	GC	450-500
Xenon-B	ApolloElite430tip	DMD System	400-500
Xenon-C	Credi Ⅱ	3M	440-510
	Arclight Ⅱ M	Airtechnics	360-500
	Nanocure550	DAIWA LIGHTING INC.	390-550
	Q-LUXPLASMA 100	Rolence/Sundental	410-500
	POWER PAC	SANYO Denki	380-510

Type	Name	manufacture	Wavelength (nm)
LED	Luxsomax	Panasonic Heracus Dental	440-495
	L.E.Demetron1	SYBRON DENTAL	450-470
	Radius	OSADA	
	STARIGHT pro	Mectron	440-480
	CoolBlu	Dentalsystem.COM	435-485
	CoolBlu2	Dentalsystem.COM	435-485
	FrushLight	DENICS	440-490
	Eliper freelight	3M ESPE	440-500

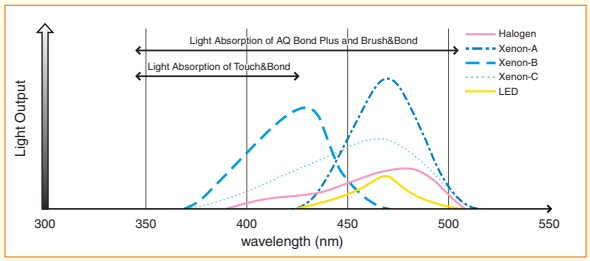
※The data were extracted from manufacturer's brochures.

Touch&Bond
(U.S.A.)

AQ Bond Plus
(JAPAN)

Brush&Bond
(U.S.A.)

Results and Discussion



AQ Bond Plus and Brush&Bond demonstrated over 10MPa of TBS with all types of lights, while Touch&Bond showed a lower TBS with Xenon-A and LED.

Table2. Adhesion strength with each irradiation machine

Type	Name	Touch&Bond		AQ Bond Plus		Brush&Bond	
		Irradiation time (sec)	TBS (MPa)	Irradiation time (sec)	TBS (MPa)	Irradiation time (sec)	TBS (MPa)
Halogen	Candelux	10	12.0 ± 3.1	5	13.4 ± 2.9	5	13.5 ± 1.9
	TransluxCL	10	12.4 ± 2.4	5	13.7 ± 3.4	5	13.2 ± 2.4
	LIGHTEL DP-075	10	12.3 ± 3.3	5	13.5 ± 3.2	5	13.6 ± 2.7
	JETLIGHT 1000	10	10.7 ± 1.8	5	12.8 ± 1.7	5	13.1 ± 2.6
	XL3000	10	10.4 ± 2.6	5	13.1 ± 3.2	5	12.9 ± 1.8
	Optilux 401	10	10.6 ± 2.1	5	13.4 ± 2.9	5	13.6 ± 3.1
	Optilux 501	10	10.8 ± 2.7	5	12.9 ± 2.3	5	13.2 ± 2.4
Xenon-A	Apollo95E	3	6.1 ± 2.2	3	13.3 ± 3.5	3	13.2 ± 2.0
	ArcLight	3	5.3 ± 2.4	3	13.4 ± 3.6	3	14.1 ± 3.1
	Credi8000	3	7.2 ± 3.4	3	13.7 ± 2.6	3	13.7 ± 2.5
	Flipo	3	2.6 ± 2.1	3	12.8 ± 3.2	3	13.3 ± 2.9
Xenon-B	ApolloElite430tip	3	11.4 ± 2.9	3	13.9 ± 3.6	3	14.0 ± 2.6
Xenon-C	Credi Ⅱ	3	10.6 ± 2.4	3	13.4 ± 3.2	3	13.7 ± 3.1
	Arclight Ⅱ M	3	11.3 ± 2.6	3	14.1 ± 2.7	3	13.5 ± 2.3
	Nanocure550	5	10.4 ± 1.9	3	13.2 ± 3.1	3	13.7 ± 2.7
	Q-LUXPLASMA 100	3	10.8 ± 2.1	3	13.7 ± 1.9	3	14.1 ± 2.5
	POWER PAC	3	11.2 ± 3.4	3	13.9 ± 3.4	3	13.9 ± 2.5
LED	Luxsomax	10	5.3 ± 2.4	10	11.3 ± 1.9	10	12.2 ± 2.6
	L.E.Demetron1	5	—	5	11.5 ± 3.1	5	11.7 ± 2.4
		10	5.8 ± 2.7	10	11.3 ± 2.5	10	12.1 ± 3.1
	Radius	5	—	5	11.7 ± 2.4	5	11.4 ± 1.7
		10	6.2 ± 2.4	10	13.2 ± 3.4	10	12.5 ± 3.0
	STARIGHT pro	5	—	5	11.4 ± 1.8	5	11.9 ± 1.8
		10	7.3 ± 2.6	10	11.8 ± 2.7	10	12.2 ± 3.4
	CoolBlu	10	6.4 ± 3.3	10	11.6 ± 2.3	10	11.5 ± 2.2
	CoolBlu2	5	—	5	11.2 ± 3.1	5	11.7 ± 2.7
		10	6.5 ± 2.9	10	12.4 ± 2.6	10	12.2 ± 1.7
	FrushLight	5	—	5	10.4 ± 2.3	5	10.9 ± 2.4
		10	7.1 ± 3.4	10	10.9 ± 3.0	10	11.2 ± 3.1
	Eliper freelight	10	4.5 ± 1.9	10	10.7 ± 3.1	10	11.4 ± 1.9

Significantly different from other systems whithin the same light ($p<0.05$).

Conclusions

It was conclued that the curing lights with their wavelength spectra between 400nm and 420nm should be used for Touch&Bond although AQ Bond Plus and Brush&Bond did not have the restriction in the curing lights.

International Association for Dental Research, Honolulu, Hawaii, March 10-13, 2004