

BIBLIOGRAPHY

- Absi, E.G., Addy, M., *et al.* (1989). Dentine hypersensitivity. The development and evaluation of a replica technique to study sensitive and non-sensitive cervical dentine. *J Clin Periodontol* 16(3): 190-5.
- Atkinson, H.F. and Harcourt, J.K. (1961). Some observations on the peritubular translucent zones in human dentine. *Australian dental journal*: 194-197.
- Bharali, L.A., Burgess, S.A., *et al.* (1988). Reinnervation of sweat glands in the rat hind paw following peripheral nerve injury. *J Auton Nerv Syst* 23(2): 125-9.
- Bishop, M.A. and Yoshida, S. (1992). A permeability barrier to lanthanum and the presence of collagen between odontoblasts in pig molars. *J Anat* 181 (Pt 1): 29-38.
- Boening, K.W., Walter M.H., *et al.* (1998). Clinical significance of surface activation of silicone impression materials. *J Dent* 26(5-6): 447-52.
- Capillary Action, from http://chemwiki.ucdavis.edu/Physical_Chemistry/Physical_Properties_of_Matter/Intermolecular_Forces/Cohesive_And_Adhesive_Forces/Capillary_Action.
- Capillary action, from http://en.wikipedia.org/wiki/Capillary_action.
- Carrigan, P.J., Morse, D.R., *et al.* (1984). A scanning electron microscopic evaluation of human dentinal tubules according to age and location. *J Endod* 10(8): 359-63.
- Cate, A.R.T. (2008). Dentin-Pulp complex. Ten Cate's histology, development, structure and function. Binghamton, Maple-Vail Book Mfg Group: 191-238.
- Ciucchi, B., Bouillaguet, S., *et al.* (1995). Dentinal fluid dynamics in human teeth, in vivo. *J Endod* 21(4): 191-4.

- D'Souza, R. (2002). Development of the pulpodentin complex. Seltzer and Bender's dental pulp. Hargreves, KM. and Goodis, H.E. Chicago, Quintessence publishing: 13-40.
- Erturk, M.S. and Kirzioglu, Z. (2007). In vitro evaluation of dentin permeability of fluorotic primary teeth with a new electronic hydraulic conductance measurement system with photosensors. Arch Oral Biol 52(11): 1057-63.
- Fosse, G., Saele, P.K., *et al.* (1992). Numerical density and distributional pattern of dentin tubules. Acta Odontol Scand 50(4): 201-10.
- Garant, P.R. (2003). Dentin. Oral cells and tissues. Chicago, Quintessence Publishing 25-52.
- Garberoglio, R. and Brannstrom, M. (1976). Scanning electron microscopic investigation of human dentinal tubules. Arch Oral Biol 21(6): 355-62.
- Hirayama, A., Yamada, M., *et al.* (1985). Analytical electron microscopic studies on the dentinal tubules of human deciduous teeth. J Dent Res 64: 743.
- Isokawa, S., Toda, Y., *et al.* (1970). A scanning electron microscopic observation of etched human peritubular dentine. Arch Oral Biol 15(12): 1303-6.
- Itthagarun, A. and Tay, F.R. (2000). Self-contamination of deep dentin by dentin fluid. Am J Dent 13(4): 195-200.
- Johansen, E. (1964). Microstructure of Enamel and Dentin. J Dent Res 43: SUPPL:1007-20.
- Kerdvongbundit, V., Thiradilok, S., *et al.* (2004). The use of the replica technique to record fluid emerging from exposed dentine. Arch Oral Biol 49(8): 613-9.

- Knutsson, G., Jontell, M., *et al.* (1994). Determination of plasma proteins in dentinal fluid from cavities prepared in healthy young human teeth. *Arch Oral Biol* 39(3): 185-90.
- Koutsi, V., Noonan, R.G., *et al.* (1994). The effect of dentin depth on the permeability and ultrastructure of primary molars. *Pediatr Dent* 16(1): 29-35.
- Mendis, B.R. and Darling, A.I. (1979). Distribution with age and attrition of peritubular dentine in the crowns of human teeth. *Arch Oral Biol* 24(2): 131-9.
- Mjor, I.A., Pindborg, J.J. (1973). Dentin and pulp. *Histology of the human tooth*. Copenhagen, Lankans Bogtrykkeri: 45-76.
- Mjor, I.A. (1985). Dentin-predentin complex and its permeability: pathology and treatment overview. *J Dent Res* 64 Spec No: 621-7.
- Mjor, I.A. (2009). Dentin permeability: the basis for understanding pulp reactions and adhesive technology. *Braz Dent J* 20(1): 3-16.
- Nishitani, Y., Yoshiyama, M., *et al.* (2006). Effects of resin hydrophilicity on dentin bond strength. *J Dent Res* 85(11): 1016-21.
- O'Brien, W. (1997). Impression materials. *Dental materials and their selection*, Quintessence publishing: 123-146.
- Orchardson, R. (1978). An electrophysiological investigation of the sensitivity of intradental nerves in the cat to changes in the ionic composition of extracellular fluid. *Arch Oral Biol* 23(6): 471-5.
- Orchardson, R. and Cadden, S.W. (2001). An update on the physiology of the dentine-pulp complex. *Dent Update* 28(4): 200-6, 208-9.

- Outhwaite, W.C., Livingston, M.J., *et al.* (1976). Effects of changes in surface area, thickness, temperature and post-extraction time on human dentine permeability. *Arch Oral Biol* 21(10): 599-603.
- Pashley, D.H., Livingston, M.J., *et al.* (1978). Regional resistances to fluid flow in human dentine in vitro. *Arch Oral Biol* 23(9): 807-10.
- Pashley, D.H., Nelson, R., *et al.* (1982). The effects of plasma and salivary constituents on dentin permeability. *J Dent Res* 61(8): 978-81.
- Pashley, D.H., Kepler, E.E., *et al.* (1984). The effect on dentine permeability of time following cavity preparation in dogs. *Arch Oral Biol* 29(1): 65-8.
- Pashley, D.H. (1985). Dentin-predentin complex and its permeability: physiologic overview. *J Dent Res* 64 Spec No: 613-20.
- Pashley, D.H. (1986). Dentin permeability, dentin sensitivity, and treatment through tubule occlusion. *J Endod* 12(10): 465-74.
- Pashley, D.H., Tay, F.R., *et al.* (2007). From dry bonding to water-wet bonding to ethanol-wet bonding. A review of the interactions between dentin matrix and solvated resins using a macromodel of the hybrid layer. *Am J Dent* 20(1): 7-20.
- Phillips, R.W. (1991). Inelastic impression materials. Compound. Zinc oxide - eugenol. Skinner's science of dental materials. The united state of america: 93.
- Power, J. and Wataha, J. (2008). Impression materials. Dental materials properties and manipulation: 168-201.
- Rensburg, B.G. (1995). Dentine. Oral biology dentine. Chicago, Quintessence publishing: 271-80.
- Rensburg, B.G. (1995). Development of dentine. Oral biology dentine. Chicago, Quintessence publishing: 263-269.

- Sasazaki, H. and OKuda, R. (1995). Effect of etching on the exudation of internal fluids. Proceeding of the International Conference on Dental/Pulp Complex, Tokyo.
- Smith, A.J. (2002). Dentin formation and repair. Seltzer and Bender's dental pulp. Hargreves, KM. and Goodis, H.E. Chicago, Quintessence publishing: 41-60.
- Stetler-Stevenson, W.G. and Veis, A. (1987). Bovine dentin phosphoryn: calcium ion binding properties of a high molecular weight preparation. *Calcif Tissue Int* 40(2): 97-102.
- Sumikawa, D.A., Marshall G.W., *et al.* (1999). Microstructure of primary tooth dentin. *Pediatr Dent* 21(7): 439-44.
- Tanaka, T. (1980). The origin and localization of dentinal fluid in developing rat molar teeth studied with lanthanum as a tracer. *Arch Oral Biol* 25(3): 153-62.
- Thomas, H.F. (1985). The dentin-predentin complex and its permeability: anatomical overview. *J Dent Res* 64 Spec No: 607-12.
- Vongsavan, N. and Matthews, B. (1992). Fluid flow through cat dentine in vivo. *Arch Oral Biol* 37(3): 175-85.
- Warfvinge, J., Dahlen. G., *et al.* (1985). Dental pulp response to bacterial cell wall material. *J Dent Res* 64(8): 1046-50.

APPENDICES



APPENDIX A

Conclusion sizes of fluid droplets on the peripheral area of the unetched dentin surface

Table 9 Conclusion sizes of fluid droplets on the peripheral area of the unetched dentin surface at 0 cmH₂O

Exp	Diameter	No	Diameter x No	$x - \bar{x}$	$(x - \bar{x})^2$
1	4.34	16	69.48	-0.95	0.91
2	7.04	3	21.12	1.75	3.05
3	2.89	13	37.62	-2.40	5.76
4	4.28	26	111.28	-1.01	1.03
5	5.38	4	21.51	0.08	0.01
6	5.80	8	46.39	0.50	0.25
7	9.42	2	18.84	4.13	17.02
8	5.88	4	23.50	0.58	0.34
9	7.34	4	29.38	2.05	4.20
10	7.10	7	49.73	1.81	3.28
11	5.36	5	26.80	0.07	0.004
12	7.85	3	23.55	2.56	6.53
13	5.11	13	66.40	-0.19	0.03
14	7.68	2	15.36	2.39	5.69
15	6.98	5	34.92	1.69	2.85
16	6.57	9	59.15	1.28	1.63
17	3.95	4	15.78	-1.35	1.82
18	6.89	8	55.15	1.60	2.56
19	4.52	9	40.71	-0.77	0.60
20	7.34	3	22.02	2.04	4.18
21	4.71	4	18.84	-0.58	0.34
22	4.95	8	39.60	-0.34	0.12
Sum		160	847.09		62.20
$\Sigma \bar{x}$			<u>5.29</u>		
$\Sigma (x - \bar{x})^2 / N$					0.39
$\sqrt{\Sigma (x - \bar{x})^2 / N}$					<u>0.62</u>

Table 10 Conclusion sizes of fluid droplets on the peripheral area of the unetched dentin surface at 15 cmH₂O

Exp	Diameter	No	Diameter x No	$x - \bar{x}$	$(x - \bar{x})^2$
1	6.54	4	26.16	1.19	1.41
2	5.38	12	64.56	0.03	0.00
3	4.64	11	51.04	-0.71	0.51
4	4.98	19	94.62	-0.37	0.14
5	5.07	13	65.92	-0.28	0.08
6	7.39	7	51.72	2.03	4.14
7	5.06	10	50.59	-0.30	0.09
8	6.93	4	27.71	1.57	2.48
9	4.66	9	41.94	-0.69	0.48
10	6.62	7	46.34	1.27	1.60
11	6.80	3	20.40	1.45	2.09
12	6.36	7	44.52	1.01	1.01
13	3.83	11	42.16	-1.52	2.32
14	5.36	5	26.80	0.01	0.00004
15	7.67	4	30.66	2.31	5.34
16	/	/	/	/	/
17	4.23	11	46.48	-1.13	1.27
18	7.06	3	21.19	1.71	2.92
19	4.85	6	29.10	-0.50	0.25
20	6.56	2	13.12	1.21	1.45
21	7.35	3	22.05	2.00	3.98
22	4.28	8	34.24	-1.07	1.15
Sum		159	851.30		32.72
$\Sigma \bar{x}$			<u>5.35</u>		
$\Sigma (x - \bar{x})^2 / N$					0.21
$\sqrt{\Sigma (x - \bar{x})^2 / N}$					<u>0.45</u>

Table 11 Conclusion sizes of fluid droplets on the peripheral area of the unetched dentin surface at 30 cmH₂O

Exp	Diameter	No	Diameter x No	$x - \bar{x}$	$(x - \bar{x})^2$
1	5.08	8	40.64	-0.79	0.63
2	6.05	8	48.40	0.18	0.03
3	4.71	4	18.84	-1.16	1.35
4	5.21	22	114.62	-0.66	0.44
5	6.12	10	61.20	0.25	0.06
6	7.95	5	39.73	2.07	4.30
7	5.58	7	39.06	-0.29	0.09
8	4.59	7	32.13	-1.28	1.64
9	6.69	3	20.07	0.82	0.67
10	6.62	5	33.10	0.75	0.56
11	4.72	3	14.16	-1.15	1.33
12	7.05	5	35.23	1.17	1.38
13	6.38	12	76.56	0.51	0.26
14	7.33	4	29.32	1.46	2.13
15	8.40	5	42.01	2.53	6.40
16	4.87	10	48.67	-1.01	1.01
17	3.80	10	38.05	-2.07	4.27
18	5.98	7	41.86	0.11	0.01
19	7.45	8	59.56	1.57	2.47
20	7.21	5	36.03	1.33	1.78
21	6.76	10	67.58	0.89	0.78
22	4.37	6	26.22	-1.50	2.26
Sum		164	963.02		33.84
$\Sigma \bar{x}$			<u>5.87</u>		
$\Sigma (x - \bar{x})^2 / N$					0.21
$\sqrt{\Sigma (x - \bar{x})^2 / N}$					<u>0.45</u>

Table 12 Conclusion sizes of fluid droplets on the peripheral area of the unetched dentin surface at 45 cmH₂O

Exp	Diameter	No	Diameter x No	$x - \bar{x}$	$(x - \bar{x})^2$
1	7.00	5	35.00	0.49	0.24
2	7.40	4	29.60	0.89	0.79
3	5.75	4	23.00	-0.76	0.58
4	6.54	4	26.16	0.03	0.001
5	5.70	5	28.51	-0.81	0.65
6	5.16	7	36.12	-1.35	1.82
7	7.44	4	29.76	0.93	0.87
8	6.75	10	67.50	0.24	0.06
9	6.97	9	62.75	0.46	0.21
10	7.71	5	38.56	1.20	1.44
11	5.19	4	20.76	-1.32	1.74
12	/	/	/	/	/
13	7.84	5	39.18	1.33	1.76
14	5.20	4	20.80	-1.31	1.71
15	11.85	1	11.85	5.34	28.47
16	/	/	/	/	/
17	4.37	13	56.85	-2.14	4.57
18	7.79	4	31.15	1.28	1.63
19	7.72	6	46.31	1.21	1.46
20	8.92	3	26.75	2.41	5.79
21	8.21	3	24.62	1.70	2.87
22	4.39	2	8.78	-2.12	4.49
Sum		102	663.97		61.16
$\Sigma \bar{x}$			<u>6.51</u>		
$\Sigma (x - \bar{x})^2 / N$					0.60
$\sqrt{\Sigma (x - \bar{x})^2 / N}$					<u>0.77</u>

APPENDIX B

Conclusion sizes of fluid droplets on the central area of the unetched dentin surface

Table 13 Conclusion sizes of fluid droplets on the central area of the unetched dentin surface at 0 cmH₂O

Exp	Diameter	No	Diameter x No	$x - \bar{x}$	$(x - \bar{x})^2$
1	4.62	16	73.92	0.91	0.83
2	6.16	10	61.55	0.63	0.39
3	3.09	13	40.17	2.44	5.95
4	/	/	/	/	/
5	/	/	/	/	/
6	5.06	4	20.26	0.47	0.22
7	6.73	8	53.84	1.20	1.44
8	/	/	/	/	/
9	/	/	/	/	/
10	6.55	1	6.55	1.02	1.03
11	7.23	8	57.83	1.70	2.89
12	7.02	5	35.08	1.49	2.21
13	/	/	/	/	/
14	/	/	/	/	/
15	6.88	4	27.52	1.35	1.83
16	5.87	14	82.20	0.34	0.12
Sum		83	458.90		16.90
$\Sigma \bar{x}$			<u>5.53</u>		
$\Sigma (x - \bar{x})^2 / N$					0.20
$\sqrt{\Sigma (x - \bar{x})^2 / N}$					<u>0.45</u>

Table 14 Conclusion sizes of fluid droplets on the central area of the unetched dentin surface at 15 cmH₂O

Exp	Diameter	No	Diameter x No	$x - \bar{x}$	$(x - \bar{x})^2$
1	5.65	9	50.84	0.04	0.001
2	6.34	10	63.45	0.73	0.54
3	4.21	22	92.55	-1.40	1.97
4	/	/	/	/	/
5	/	/	/	/	/
6	/	/	/	/	/
7	7.35	8	58.77	1.74	3.01
8	/	/	/	/	/
9	6.28	11	69.06	0.67	0.44
10	6.77	4	27.07	1.16	1.34
11	/	/	/	/	/
12	5.66	12	67.98	0.05	0.003
13	/	/	/	/	/
14	5.96	7	41.73	0.35	0.12
15	6.97	5	34.85	1.36	1.85
16	4.57	12	54.81	-1.04	1.09
Sum		100	561.08		10.37
$\Sigma \bar{x}$			<u>5.61</u>		
$\Sigma (x - \bar{x})^2 / N$					0.10
$\sqrt{\Sigma (x - \bar{x})^2 / N}$					<u>0.32</u>

Table 15 Conclusion sizes of fluid droplets on the central area of the unetched dentin surface at 30 cmH₂O

Exp	Diameter	No	Diameter x No	$x - \bar{x}$	$(x - \bar{x})^2$
1	5.79	16	92.58	-0.04	0.002
2	7.49	10	74.89	1.66	2.76
3	3.78	28	105.79	-2.05	4.20
4	/	/	/	/	/
5	/	/	/	/	/
6	5.56	13	72.22	-0.27	0.07
7	7.51	8	60.06	1.68	2.82
8	6.07	12	72.87	0.25	0.06
9	6.52	12	78.28	0.70	0.48
10	7.33	5	36.63	1.50	2.24
11	/	/	/	/	/
12	5.73	13	74.48	-0.10	0.01
13	8.97	4	35.86	3.14	9.85
14	/	/	/	/	/
15	/	/	/	/	/
16	5.95	12	71.39	0.12	0.01
Sum		133	775.02		22.51
$\Sigma \bar{x}$			<u>5.83</u>		
$\Sigma (x - \bar{x})^2 / N$					0.17
$\sqrt{\Sigma (x - \bar{x})^2 / N}$					<u>0.41</u>

Table 16 Conclusion sizes of fluid droplets on the central area of the unetched dentin surface at 45 cmH₂O

Exp	Diameter	No	Diameter x No	$x - \bar{x}$	$(x - \bar{x})^2$
1	5.44	16	86.97	1.37	1.88
2	10.50	4	41.99	3.69	13.61
3	11.44	5	57.19	4.63	21.45
4	5.58	18	100.47	1.23	1.50
5	7.51	8	60.07	0.70	0.49
6	9.38	5	46.88	2.57	6.60
7	8.73	7	61.09	1.92	3.69
8	/	/	/	/	/
9	/	/	/	/	/
10	5.77	7	40.40	1.04	1.07
11	/	/	/	/	/
12	5.28	12	63.39	1.52	2.32
13	/	/	/	/	/
14	/	/	/	/	/
15	/	/	/	/	/
16	6.75	5	33.76	0.05	0.003
Sum		87	592.19		52.62
$\Sigma \bar{x}$			<u>6.81</u>		
$\Sigma (x - \bar{x})^2 / N$					0.60
$\sqrt{\Sigma (x - \bar{x})^2 / N}$					<u>0.78</u>

APPENDIX C

Conclusion sizes of dentinal tubules on the etched dentin surface

Table 17 Conclusion sizes of dentinal tubules on the etched dentin surface at 0 cmH₂O

Exp	Diameter	No	Diameter x No	$x - \bar{x}$	$(x - \bar{x})^2$
1	2.61	12	31.33	0.15	0.0225147
2	2.75	21	57.78	0.29	0.0847165
3	1.96	32	62.61	0.50	0.2539771
4	2.80	21	58.89	0.34	0.1181159
5	2.63	14	36.89	0.17	0.0303718
6	2.10	22	46.13	0.36	0.1321682
7	3.00	16	48.03	0.54	0.2928919
8	2.46	4	9.84	0.00	0.0000001
9	2.13	9	19.18	0.33	0.1083184
10	3.03	11	33.29	0.57	0.3198371
11	2.54	3	7.63	0.08	0.0068833
12	2.43	7	16.98	0.04	0.0012509
13	2.48	3	7.43	0.01	0.0002141
14	2.17	6	13.01	0.29	0.0857715
15	2.43	6	14.57	0.03	0.0010262
16	2.46	10	24.59	0.00	0.0000019
17	1.90	24	45.48	0.57	0.396406
18	3.23	12	38.78	0.77	0.5949022
19	2.75	5	13.75	0.29	0.0833086
20	2.44	10	24.35	0.03	0.0006435
21	2.20	13	28.57	0.26	0.0689983
22	2.25	7	15.73	0.21	0.0457699
23	2.26	5	11.28	0.21	0.0421759
24	2.82	10	28.17	0.36	0.1268303
25	2.80	6	16.82	0.34	0.1176255
Sum		289	711.05		2.86
$\Sigma \bar{x}$			<u>2.46</u>		
$\Sigma (x - \bar{x})^2 / N$					0.01
$\sqrt{\Sigma (x - \bar{x})^2 / N}$					<u>0.10</u>

Table 18 Conclusion sizes of dentinal tubules on the etched dentin surface at 15 cmH₂O

Exp	Diameter	No	Diameter x No	$x - \bar{x}$	$(x - \bar{x})^2$
1	2.09	11	22.98	-0.33	0.1463141
2	2.90	19	55.12	0.430	0.1848192
3	1.95	40	78.06	-0.520	0.2701625
4	2.70	28	75.58	0.228	0.0520475
5	2.32	5	11.59	-0.154	0.0237612
6	2.53	19	48.16	0.064	0.0040437
7	3.70	6	22.18	1.226	1.5018995
9	2.91	15	43.60	0.436	0.1899011
10	1.74	3	5.23	-0.728	0.5297121
11	2.56	9	23.08	0.093	0.0087045
12	2.14	13	27.87	-0.327	0.1071256
13	2.36	9	21.21	-0.114	0.0131057
14	2.23	6	13.40	-0.238	0.0565551
15	2.98	5	14.90	0.509	0.2589318
16	1.93	12	23.18	-0.539	0.2910386
17	/	/	/	/	/
18	2.55	13	33.11	0.076	0.0057421
19	2.33	7	16.30	-0.143	0.0205319
20	/	/	/	/	/
21	3.14	7	21.98	0.669	0.4473649
22	2.61	11	28.68	0.136	0.0185303
23	2.34	15	35.14	-0.129	0.0165929
24	3.19	3	9.56	0.714	0.5095867
25	2.66	9	23.97	0.192	0.0369357
26	/	/	/	/	/
Sum		265	654.85		4.69
$\Sigma \bar{x}$			<u>2.47</u>		
$\Sigma (x - \bar{x})^2 / N$					0.02
$\sqrt{\Sigma (x - \bar{x})^2 / N}$					<u>0.31</u>

Table 19 Conclusion sizes of dentinal tubules on the etched dentin surface at 30 cmH₂O

Exp	Diameter	No	Diameter x No	$x - \bar{x}$	$(x - \bar{x})^2$
1	2.79	24	67.07	0.312	0.0974852
2	2.38	11	26.16	-0.104	0.0109039
3	2.07	15	31.01	-0.415	0.1723486
4	2.44	20	48.72	-0.046	0.0021297
5	2.34	4	9.37	-0.141	0.0198525
6	2.91	15	43.70	0.431	0.1858174
7	2.44	11	26.84	-0.042	0.0017765
9	2.50	24	60.01	0.018	0.0003337
10	2.23	5	11.13	-0.256	0.0656122
11	2.38	18	42.79	-0.105	0.0110680
12	2.33	2	4.66	-0.155	0.0239163
13	/	/	/	/	/
14	2.20	13	28.59	-0.283	0.0800427
15	2.42	3	7.26	-0.064	0.0040724
16	2.31	3	6.93	-0.172	0.0296352
17	2.36	32	75.40	-0.126	0.0158899
18	2.69	13	34.95	0.206	0.0424064
19	2.45	20	48.95	-0.035	0.0012005
20	2.45	18	44.19	-0.027	0.0007522
21	2.77	4	11.07	0.284	0.0807135
22	2.38	14	33.25	-0.107	0.0114809
23	2.29	8	18.34	-0.190	0.0359667
24	2.79	5	13.93	0.304	0.0923255
25	2.86	13	37.16	0.376	0.1416112
26	2.89	2	5.78	0.405	0.1643095
Sum		297	737.20		1.2916506
$\Sigma \bar{x}$			<u>2.48</u>		
$\Sigma (x - \bar{x})^2 / N$					0.004
$\sqrt{\Sigma (x - \bar{x})^2 / N}$					<u>0.07</u>

Table 20 Conclusion sizes of dentinal tubules on the etched dentin surface at 45 cmH₂O

Exp	Diameter	No	Diameter x No	$x - \bar{x}$	$(x - \bar{x})^2$
1	2.73	14	38.17	0.165	0.0272930
2	2.55	16	40.84	-0.009	0.0000816
3	2.35	30	70.40	-0.215	0.0461058
4	2.67	16	42.67	0.106	0.0111624
5	2.58	3	7.74	0.017	0.0002928
6	2.67	10	26.71	0.109	0.0119415
7	2.88	14	40.28	0.316	0.0995801
9	2.58	12	31.02	0.023	0.0005457
10	2.71	5	13.57	0.152	0.0230364
11	2.58	14	36.06	0.014	0.0002100
12	2.63	6	15.80	0.072	0.0052000
13	2.81	18	50.61	0.250	0.0627222
14	/	/	/	/	/
15	2.53	8	20.21	-0.035	0.0012231
16	/	/	/	/	/
17	2.47	2	4.94	-0.091	0.0083216
18	2.48	5	12.42	-0.077	0.0059633
19	2.93	19	55.62	0.366	0.1340627
20	/	/	/	/	/
21	2.21	15	33.15	-0.352	0.1235916
22	2.35	13	30.56	-0.211	0.0444527
23	2.28	15	34.15	-0.285	0.0811619
24	/	/	/	/	/
25	2.72	10	27.17	0.155	0.0241111
26	2.40	29	69.74	-0.156	0.0244594
Sum		274	701.78		0.7355189
$\Sigma \bar{x}$			<u>2.56</u>		
$\Sigma (x - \bar{x})^2 / N$					0.003
$\sqrt{\Sigma (x - \bar{x})^2 / N}$					<u>0.05</u>

APPENDIX D

Conclusion sizes of dentinal tubules on the etched dentin dry surface

Table 21 Conclusion sizes of dentinal tubules on the central area of the etched dentin dry surface

Exp	Diameter	No	Diameter x No	$x - \bar{x}$	$(x - \bar{x})^2$
1	1.95	25	48.64	-0.82	0.6802
2	2.86	26	74.26	0.09	0.0073
3	3.00	35	104.97	0.23	0.0523
4	3.41	7	23.89	0.64	0.4128
5	2.76	8	22.04	-0.02	0.0002
6	2.94	22	64.66	0.17	0.0285
7	2.97	18	53.40	0.20	0.0385
8	2.45	2	4.91	-0.32	0.1010
9	2.38	15	35.72	-0.39	0.1513
10	3.02	3	9.07	0.25	0.0640
11	3.05	16	48.81	0.28	0.0785
Sum		177	490.36		1.61
$\Sigma \bar{x}$			<u>2.77</u>		
$\Sigma (x - \bar{x})^2 / N$					0.01
$\sqrt{\Sigma (x - \bar{x})^2 / N}$					<u>0.10</u>

Table 22 Conclusion sizes of dentinal tubules on the peripheral area of the etched dentin dry surface

Exp	Diameter	No	Diameter x No	$x - \bar{x}$	$(x - \bar{x})^2$
1	2.28	11	25.04	-0.04	0.00181
2	2.50	9	22.47	0.18	0.03141
3	2.79	23	64.17	0.47	0.22196
4	2.04	6	12.23	-0.28	0.07870
5	1.96	16	31.32	-0.36	0.13082
6	2.38	19	45.21	0.06	0.00367
7	2.31	15	34.70	-0.01	0.00003
8	2.07	4	8.29	-0.25	0.06132
9	2.21	4	8.83	-0.11	0.01268
10	1.64	12	19.65	-0.68	0.46484
11	2.61	14	36.53	0.29	0.08413
Sum		133	308.41		1.09
$\Sigma \bar{x}$			<u>2.32</u>		
$\Sigma (x - \bar{x})^2 / N$					0.01
$\sqrt{\Sigma (x - \bar{x})^2 / N}$					<u>0.09</u>

APPENDIX E

Statistic analysis of sizes of fluid droplets on the peripheral area of the unetched dentin surface at difference pressures

One Way Analysis of Variance

Data source: The peripheral area of unetched dentin surface

Normality Test: Failed ($P < 0.050$)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One Way Analysis of Variance on Ranks

Data source: The peripheral area of unetched dentin surface

Group	N	Missing	Median	25%	75%
0mmH2O160		0	5.150	3.870	6.457
15mmH2O159		0	5.070	4.304	6.412
30mmH2O164		0	5.537	4.398	7.040
45mmH2O102		0	6.338	4.895	7.990

$H = 27.874$ with 3 degrees of freedom. ($P = <0.001$)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference ($P = <0.001$)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

All Pairwise Multiple Comparison Procedures (Dunn's Method) :

Comparison	Diff of Ranks	Q	P<0.05
45mmH2O vs 0mmH2O	103.588	4.837	Yes
45mmH2O vs 15mmH2O	91.962	4.289	Yes
45mmH2O vs 30mmH2O	54.282	2.547	No
30mmH2O vs 0mmH2O	49.306	2.625	No
30mmH2O vs 15mmH2O	37.680	2.003	Do Not Test
15mmH2O vs 0mmH2O	11.626	0.614	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

APPENDIX F

Statistic analysis of sizes of fluid droplets on the central area of the unetched dentin surface at difference pressures

One Way Analysis of Variance

Data source: Unetch Center

Normality Test: Failed ($P < 0.050$)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One Way Analysis of Variance on Ranks

Data source: Unetch Center in Notebook 1

Group	N	Missing	Median	25%	75%
0mmH2O	83	0	4.820	3.392	6.210
15mmH2O	100	0	4.960	3.685	6.270
30mmH2O	133	0	4.620	3.878	6.632
45mmH2O	87	0	5.140	4.210	7.478

H = 8.449 with 3 degrees of freedom. ($P = 0.038$)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference ($P = 0.038$)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

All Pairwise Multiple Comparison Procedures (Dunn's Method) :

Comparison	Diff of Ranks	Q	P<0.05
45mmH2O vs 0mmH2O	47.460	2.656	Yes
45mmH2O vs 30mmH2O	37.350	2.325	No
45mmH2O vs 15mmH2O	36.650	2.146	Do Not Test
15mmH2O vs 0mmH2O	10.810	0.625	No
15mmH2O vs 30mmH2O	0.699	0.0453	Do Not Test
30mmH2O vs 0mmH2O	10.111	0.621	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

APPENDIX G

Statistic analysis of sizes of fluid droplets on the central and peripheral area of the unetched dentin surface at 0 cmH₂O

t-test

Data source: unetched 0cmH₂O (compare peripheral and central)

Normality Test: Failed (P < 0.050)

Test execution ended by user request, Rank Sum Test begun

Mann-Whitney Rank Sum Test Data source: unetched 0cmH₂O (compare peripheral and central)
in Notebook 1

Group	N	Missing	Median	25%	75%
peripheral	47	0	3.945	3.164	5.862
central	59	0	4.795	3.545	6.380

T = 2273.500 n(small)= 47 n(big)= 59 (P = 0.126)

The difference in the median values between the two groups is not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.126)

APPENDIX H

Statistic analysis of sizes of fluid droplets on the central and peripheral area of the unetched dentin surface at 15 cmH₂O

t-test

Data source: unetched 15cmH₂O (compare peripheral and central)

Normality Test: Passed (P = 0.164)

Equal Variance Test: Failed (P < 0.050)

Test execution ended by user request, Rank Sum Test begun

Mann-Whitney Rank Sum Test

Data source: unetched 15cmH₂O (compare peripheral and central)

Group	N	Missing	Median	25%	75%
peripheral	43	0	4.750	4.070	5.190
central	69	0	4.990	3.911	6.053

T = 2244.500 n(small)= 43 n(big)= 69 (P = 0.270)

The difference in the median values between the two groups is not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.270)

APPENDIX I

Statistic analysis of sizes of fluid droplets on the central and peripheral area of the unetched dentin surface at 30 cmH₂O

t-test

Data source: unetched 30cmH₂O (compare peripheral and central)

Normality Test: Failed (P < 0.050)

Test execution ended by user request, Rank Sum Test begun

Mann-Whitney Rank Sum Test

Data source: unetched 30cmH₂O (compare peripheral and central)

Group	N	Missing	Median	25%	75%
border	33	0	4.900	4.002	5.765
central	84	0	4.992	3.953	6.737

T = 1862.500 n(small)= 33 n(big)= 84 (P = 0.611)

The difference in the median values between the two groups is not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.611)

APPENDIX J

Statistic analysis of sizes of fluid droplets on the central and peripheral area of the unetched dentin surface at 45 cmH₂O

t-test

Data source: unetch uncut 45cm compare peripheral and central in Notebook 1

Normality Test: Failed (P < 0.050)

Test execution ended by user request, Rank Sum Test begun

Mann-Whitney Rank Sum Test

Data source: unetch uncut 45cm compare border and central in Notebook 1

Group	N	Missing	Median	25%	75%
border	23	0	5.390	4.513	6.557
central	49	0	6.035	4.648	7.759

T = 739.000 n(small)= 23 n(big)= 49 (P = 0.227)

The difference in the median values between the two groups is not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.227)

APPENDIX K

Statistic analysis of sizes of dentinal tubule of etched dentin surface at difference pressure

One Way Analysis of Variance

Data source: etched dentin

Normality Test: Failed ($P < 0.050$)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One Way Analysis of Variance on Ranks

Data source: Data 1 in Notebook 1

Group	N	Missing	Median	25%	75%
0mmH2O282		0	2.415	2.030	2.795
15mmH2O265		0	2.430	2.034	2.837
30mmH2O297		0	2.475	2.141	2.805
45mmH2O274		0	2.563	2.210	2.895

H = 10.030 with 3 degrees of freedom. ($P = 0.018$)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference ($P = 0.018$)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

All Pairwise Multiple Comparison Procedures (Dunn's Method) :

Comparison	Diff of Ranks	Q	P<0.05
45mmH2O vs 0mmH2O	81.874	2.989	Yes
45mmH2O vs 15mmH2O	66.087	2.376	No
45mmH2O vs 30mmH2O	54.601	2.019	Do Not Test
30mmH2O vs 0mmH2O	27.274	1.016	No
30mmH2O vs 15mmH2O	11.487	0.421	Do Not Test
15mmH2O vs 0mmH2O	15.787	0.571	Do Not Test

Note: The multiple comparisons on ranks do not include an adjustment for ties.

APPENDIX L

Statistic analysis of sizes of dentinal tubule of etched dentin dry surface

t-test

Data source: etched dentin dry surface

Normality Test: Passed (P = 0.159)

Equal Variance Test: Passed (P = 0.576)

Group Name	N	Missing	Mean	Std Dev	SEM
central	177	0	2.770	0.554	0.0417
border	133	0	2.327	0.514	0.0446

Difference 0.443

t = 7.184 with 308 degrees of freedom. (P = <0.001)

95 percent confidence interval for difference of means: 0.322 to 0.564

The difference in the mean values of the two groups is greater than would be expected by chance; there is a statistically significant difference between the input groups (P = <0.001).

Power of performed test with alpha = 0.050: 1.000

APPENDIX M

Statistic analysis of sizes of dentinal tubule on the central area of the unetched dentin surface at 0 cmH₂O and dry dentin surface

t-test

Data source: etched dentin and dry dentin surface

Normality Test: Passed (P = 0.161)

Equal Variance Test: Passed (P = 0.198)

Group Name	N	Missing	Mean	Std Dev	SEM
dry surface	266	0	2.811	0.543	0.0333
0mmH ₂ O	240	0	2.458	0.571	0.0368

Difference 0.353

t = 7.132 with 504 degrees of freedom. (P = <0.001)

95 percent confidence interval for difference of means: 0.256 to 0.450

The difference in the mean values of the two groups is greater than would be expected by chance; there is a statistically significant difference between the input groups (P = <0.001).

Power of performed test with alpha = 0.050: 1.000



CIRRICULUM VITAE

Name Ms. Monticha Rangcharoen

Date of Birth 3 January 1982

Education Graduated High School from
Nakhonsawan School in 1999
Graduated Doctor of Dental Surgery
(D. D. S.) from Faculty of Dentistry,
Naresuan University, Phitsanulok in
2005

Grants Faculty of Dentistry, Chiang Mai University
Postgraduation school, Chiang Mai
University

Position held and office Koksamrong Hospital, Lopburi,
Thailand

