

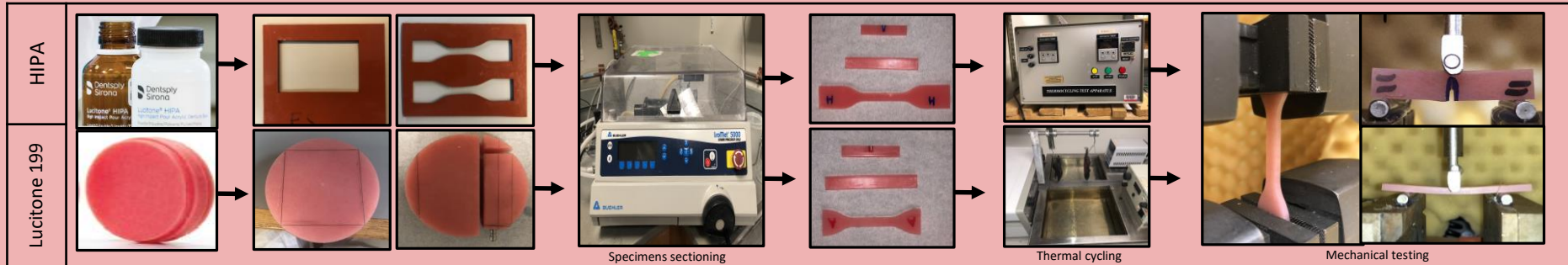
Effect of Thermal Cycling on Mechanical Properties of High Impact Pourable Acrylic (HIPA) and Lucitone 199 Milled Denture Base Materials

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Introduction:

Denture base materials are subjected to multiple stress factors during function in the oral cavity especially thermal changes. Mechanical properties such as flexural strength, fracture toughness, and tensile strength are important properties in evaluation for clinical use. In this study two denture base materials are examined, High Impact Pourable Acrylic (HIPA) and Lucitone 199 disks(DSM),Dentsply Sirona.

Materials and methods:



Results:

Figure1. One-way analysis of flexural strength by material, MPa.

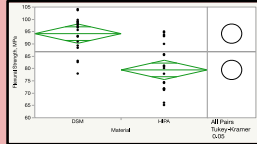


Figure2. One-way analysis of flexural strength by thermocycling, MPa.

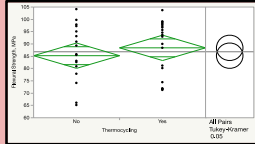


Table1 . Statistical analysis of flexural strength, MPa .

Material	Thermocycling	N	Mean	Std Dev	CV	
DSM	No	10	91.54	8.44	9.23	A
	Yes	10	96.83	4.09	4.18	A
HIPA	No	10	78.90	11.05	14.00	B
	Yes	10	79.99	9.49	11.87	B

Figure3. One-way analysis of fracture toughness, Kmax by material, MPa.m^{1/2} .

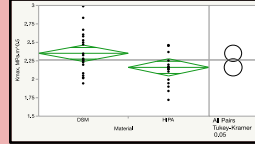


Figure4. One-way analysis of fracture toughness, Kmax by thermocycling, MPa.m^{1/2} .

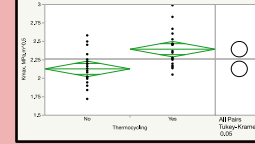


Table2 . Statistical analysis of fracture toughness, MPa.m^{1/2} .

Material	Thermocycling	N	Mean	Std Dev	CV	
DSM	No	10	2.12	0.21	9.49	B
	Yes	10	2.47	0.27	11.25	A
HIPA	No	10	2.04	0.21	10.28	B
	Yes	10	2.29	0.14	6.09	A B

Figure5. One-way analysis of tensile strength by material, MPa.

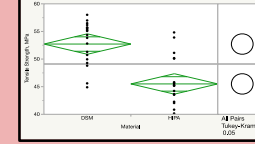


Figure6. One-way analysis of tensile strength by thermocycling, MPa.

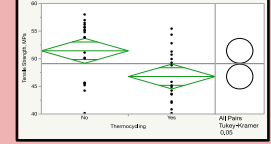


Table3 . Statistical analysis of tensile strength , MPa.

Material	Thermocycling	N	Mean	Std Dev	CV	
DSM	No	10	54.84	3.45	6.29	A
	Yes	10	50.60	3.06	6.05	B
HIPA	No	10	48.04	4.66	9.70	B
	Yes	10	42.96	1.81	4.22	C

Conclusion:

Lucitone 199 denture base material exhibits higher mechanical properties than HIPA. Flexural strength and fracture toughness increased in both materials after thermal cycling. However, tensile strength decreased in both materials after thermal cycling.

Citation Othman Alsulaimani DDS, CAGS, FACP. Yuwei Fan, M.Sc., Ph.D. Russel Giordano, DMD, CAGS, DMSS. Department of Restorative Sciences and Biomaterials, Henry M Goldman School of Dental Medicine.

References

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