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Elastic Memory of Impression Materials in Tension

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Purpose – The mechanical properties of elastomeric impression materials are typically tested in compression although in clinical use, portions of the impression are subjected to tension. The purpose of this study was to determine the elastic memory (elastic recovery) in tension of six addition silicone impression materials at three different initial elongations.

Methods – The addition silicone wash impression materials (Type 2) tested were: **Imprint 3 Ultra-Regular Body** (3M ESPE), **Imprint 3 Regular Body** (3M ESPE), **Examix NDS Regular Type** (GC America), **Aquasil Ultra LV** (DENTSPLY Caulk), **Genie Light Body** (Sultan Healthcare), and **Standout Fast Set Wash** (Kerr Corp.). Flat specimens, 2-mm thick in a dumbbell shape, were made in metal molds and allowed to set in a 35 C water bath for the manufacturers' recommended intraoral setting time. Specimens (n=5) were tested in tension on a universal testing machine (Instron 5866) at a crosshead speed of 200 mm/min. Percent elongation tests were run for three different initial elongations (50%, 100%, and 150%). Permanent deformation (%) was calculated as the final length minus original length divided by original length. Means and standard deviations were analyzed by ANOVA and Fisher's PLSD test (p<0.05).

Results – Means with standard deviations in parentheses (n=5) of permanent deformation in tension at three different initial elongations are listed in the table. Positive values of permanent deformation indicate that the material did not fully recover from the initial elongation. Fisher's PLSD intervals for comparisons of means of permanent deformation among six materials and three initial elongations were 0.10% and 0.07%, respectively. Means with the same letters are not different statistically (p>0.05).

Permanent deformation of six elastomeric impression materials			
Product	Permanent Deformation, % at 50% Elongation	Permanent Deformation, % at 100% Elongation	Permanent Deformation, % at 150% Elongation
Imprint 3 Ultra-Regular Body	-0.05 (0.07)abf	-0.05 (0.07)df	+0.02 (0.04)ef
Imprint 3 Regular Body	-0.12 (0.08)bc	+0.02 (0.04)dg	+0.03 (0.03)eg
Genie Light Body	-0.18 (0.04)c	+0.01 (0.05)d	+0.37 (0.10)
Examix NDS Regular Type	+0.14 (0.08)bc	+0.31 (0.04)	+0.56 (0.03)
Aquasil Ultra LV	-0.01 (0.09)a	+1.18 (0.06)	+2.09 (0.17)
Standout Fast Set Wash	+0.19 (0.15)c	+0.67 (0.18)	+1.20 (0.45)

Conclusions – The values of permanent deformation of all six impression materials were quite low at 50% initial elongation. **Imprint 3 Ultra Regular Body** demonstrated the highest elastic memory (lowest permanent deformation) and the lowest changes when measured at initial elongations of both 100% and 150%. Both **Imprint 3 Regular Body** and **Imprint 3 Ultra Regular Body** demonstrated the highest elastic memory and the lowest change among the six impression materials when measured at 150%. ■

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