



## CFAO GRADUATE STUDENT POSTERBOARD ABSTRACTS

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### Mechanical Properties of Graded Thermodynamic Nickel Titanium Archwires in Torsion

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**Background:** Manufacturers of graded thermodynamic nickel titanium (NiTi) wires claim to deliver differential force levels throughout the arch. No studies evaluating the force delivery characteristics of such wires currently exist.

**Objective:** To evaluate the mechanical properties of graded thermodynamic NiTi wires in torsion and compare them with non-graded thermodynamic NiTi wires.

**Methods:** Two dimensions (0.016 x 0.022 inch and 0.018 x 0.025 inch) of graded thermodynamic NiTi wires (BioForce, GAC) were divided into anterior, premolar, and posterior sections. Each segment (n=6) was activated to ~45° twist in a water bath stabilized at 36°C. The superelastic plateau during deactivation was identified on the load-deflection curve and its mean torsional moment, length and slope was assessed and compared with the control wires (NeoSentalloy, GAC) of the same dimensions.

**Results:** Statistically significant differences in mean force levels were found between the anterior, premolar, and posterior sections of graded thermodynamic NiTi wires compared with control wires and the values increased from anterior to posterior sections of the wire.

**Conclusions:** Graded thermodynamic NiTi wires deliver variable, region-specific torsional moments within the same archwire. Clinicians can use this knowledge to optimize their use for individual requirements of the malocclusion being treated.