

In vivo measurement of the elastic modulus of the human periodontal ligament

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Abstract

The present study was designated to determine the elastic properties of the periodontal ligament (PDL) in human subjects. A maxillary central incisor was experimentally translated so that stress or strain could be uniformly distributed in the PDL by applying a single force passing through the center of resistance. Displacements were measured under different magnitudes of load using a magnet-magnetic sensing system. From the load-displacement relations, Young's modulus of the PDL was calculated. The values determined were approximately 0.12 MPa under load ranging from 0 to 0.5 N, 0.25 MPa within the range of 0.5-1.0 N, 0.44 MPa under load 1.0-1.5 N, and between 0.69 and 0.96 MPa with 1.5-2.0 N. The values of Young's moduli increased almost exponentially with the increment of load due to a non-linear elasticity of the PDL.