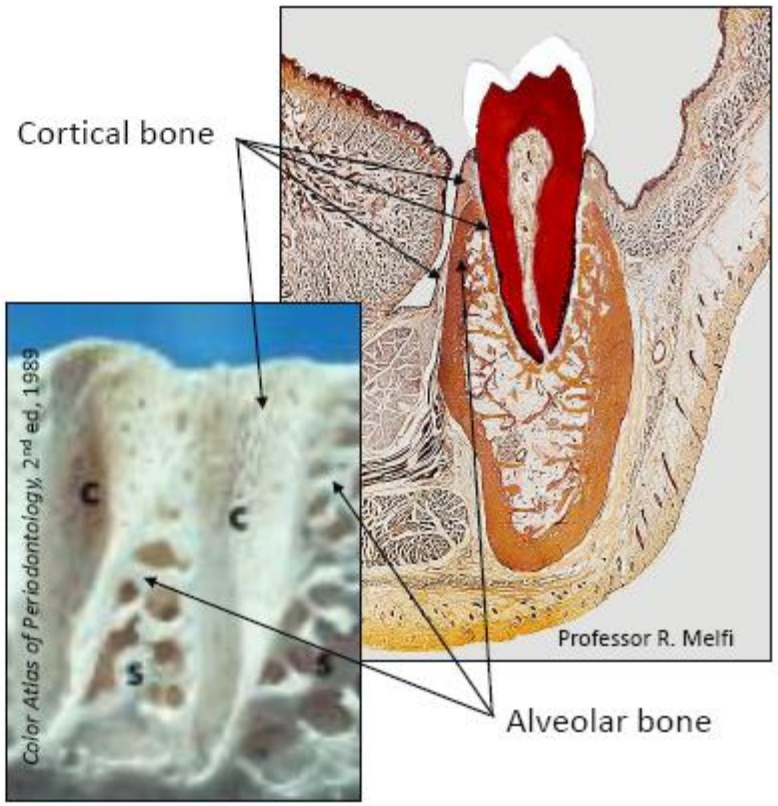
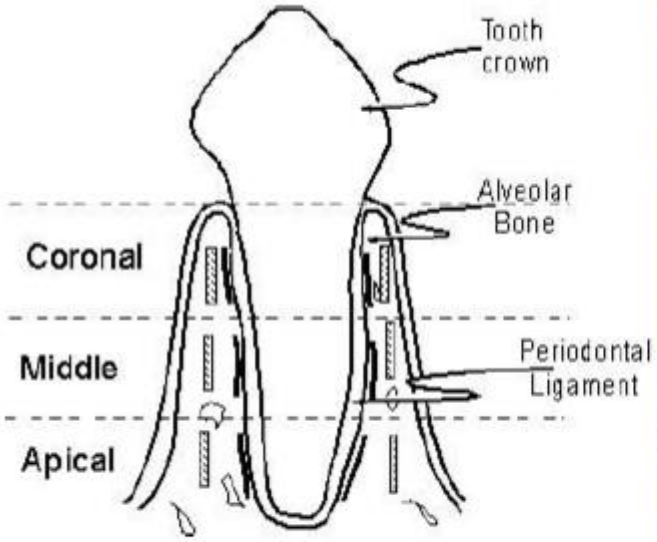
骨头分类

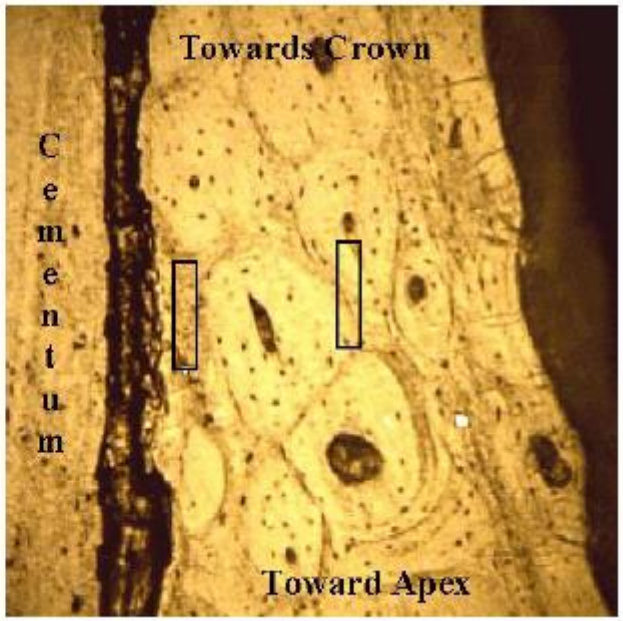
Bone type

The bone supporting a tooth consists of a thin cortical layer, surrounding alveolar bone (trabecular bone with sponge structure)

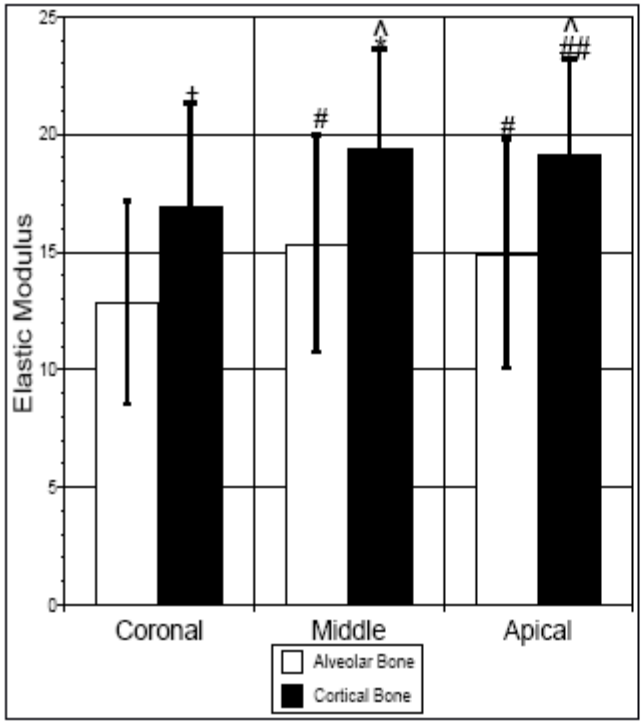


齿槽测试位置


Tooth crown
Alveolar Bone
Coronal
Middle
Periodontal Ligament
Apical

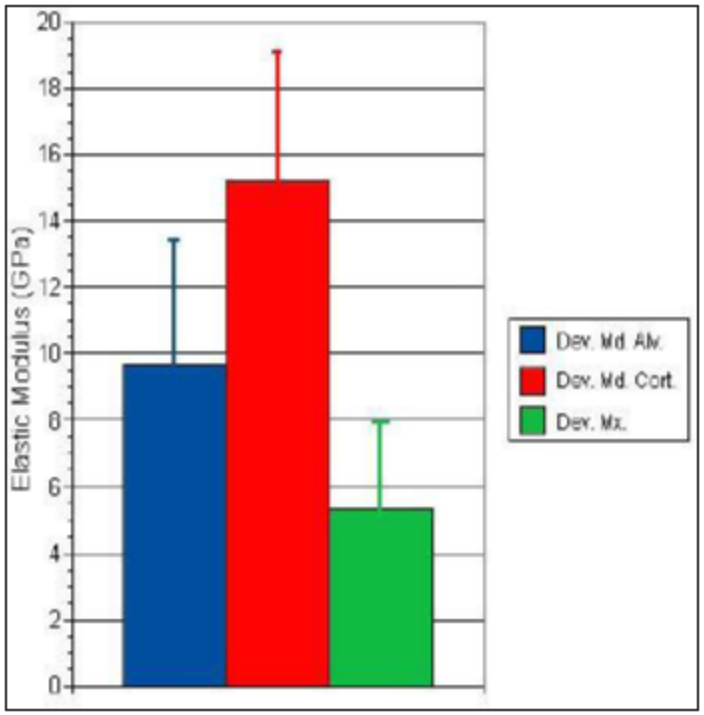

Towards Crown
Cementum
Toward Apex

萌齿测试结果



- 1058 indents on alveolar bone
  586 indents on cortical bone
- n=7 md. premolar teeth
  (dog1, n=2, dog 2, n=5)
- 14-17% decrease in modulus in the coronal region.
- Modulus consistently ~20% lower in alveolar bone (where Tricker's data suggests a 2-3 fold larger remodeling rate)

未萌出牙测试结果



- Approximately 323 indents
- n=2 md developing teeth
  n=1 mx. developing tooth

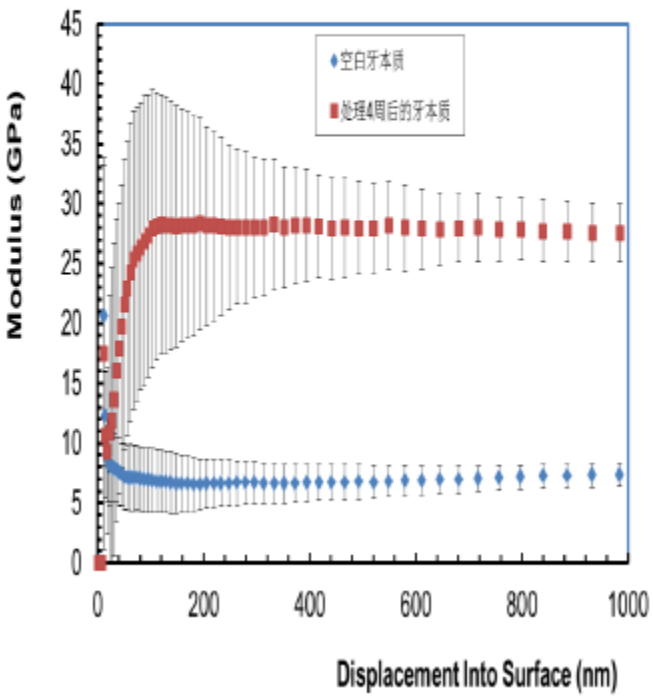
Relative to erupted teeth…

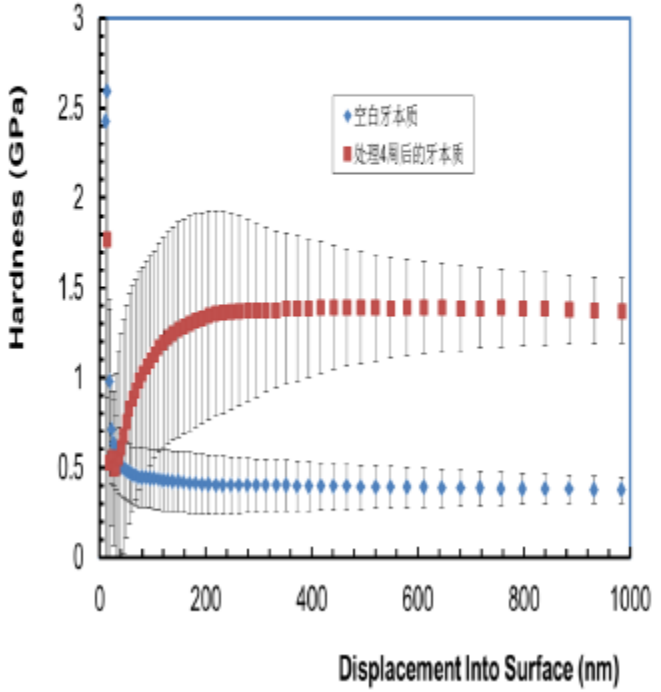
- Modulus ~ 30% less in mandibular alveolar bone
- Modulus ~ 15% less in mandibular cortical bone
- Modulus ~ 65% less in maxillary alveolar bone

Summary (Prof. S. Huja)

- Measured significant differences in Young's modulus in various regions of alveolar process using nanoindentation.
- Strong correlation between age of bone and Young's modulus
- Initial glimpses into the mechanisms for relating bone type, stress history, remodeling, mineralization, and mechanical properties.

牙齿的纳米压痕测试





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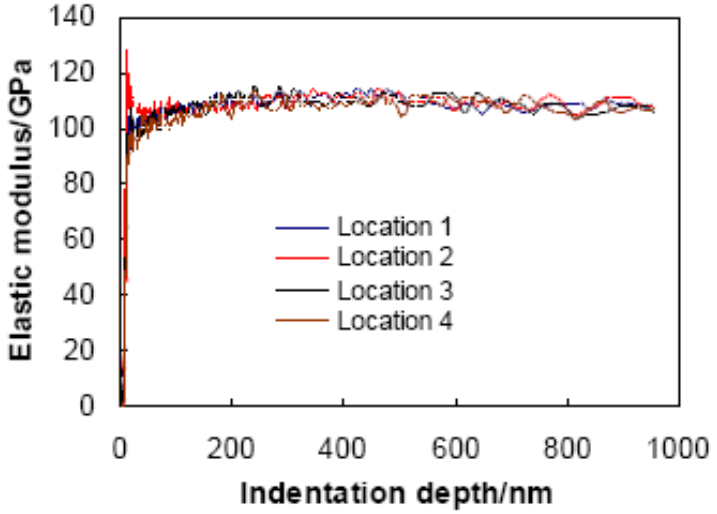
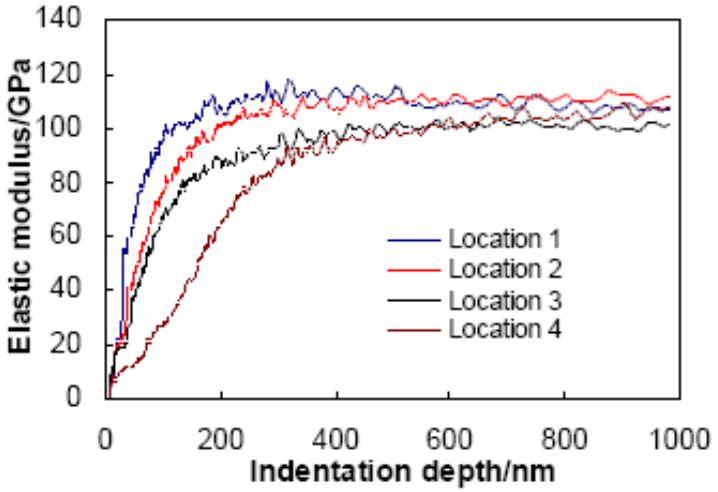
牙齿的纳米压痕测试



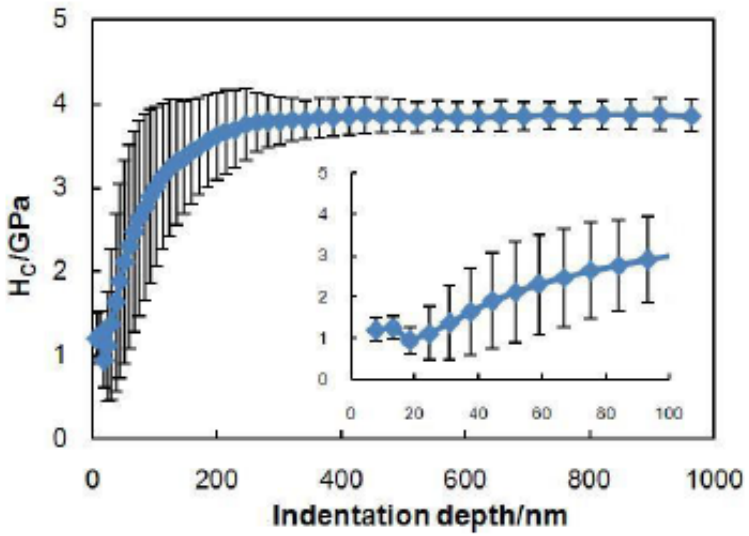
(a) 牙釉质表面CSM测试



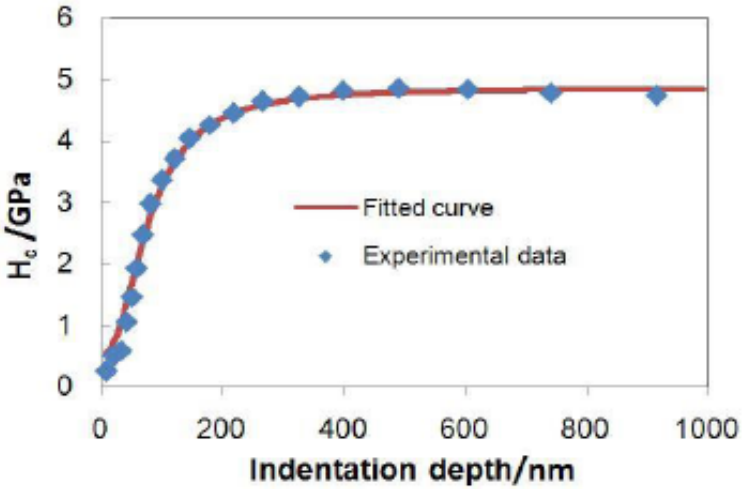
(b）牙釉质表面有唾液吸附膜CSM测试

张亚峰博士 et al , J. Dentistry, 55 (2016) 99–104

通过纳米压痕结果
计算牙釉质表面唾液吸附膜厚度



(a) 实验曲线



(b) 拟合曲线

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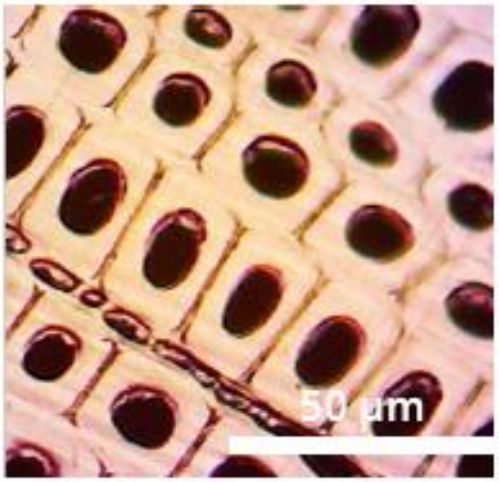
Mechanical Properties Mapping

力学性能成像功能

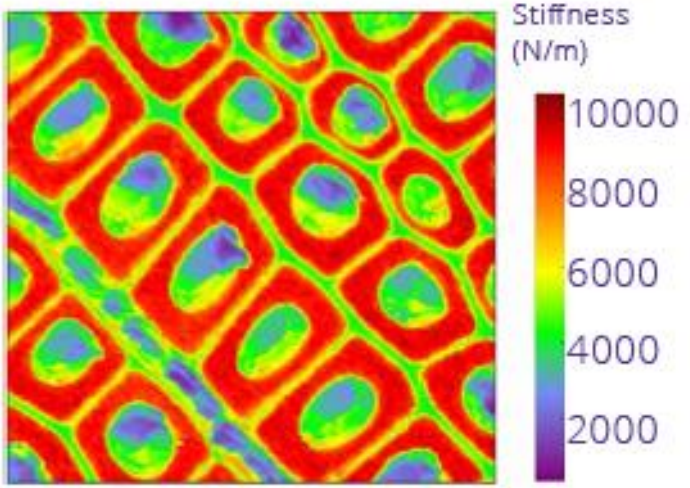
快速压痕技术实现 硬度 和 杨氏模量 的面分布成像

Title: Rapid Mechanical Characterization of Cell via Express Test 快速力学成像-细胞

Microstructure



Stiffness Map (22,500 indents)



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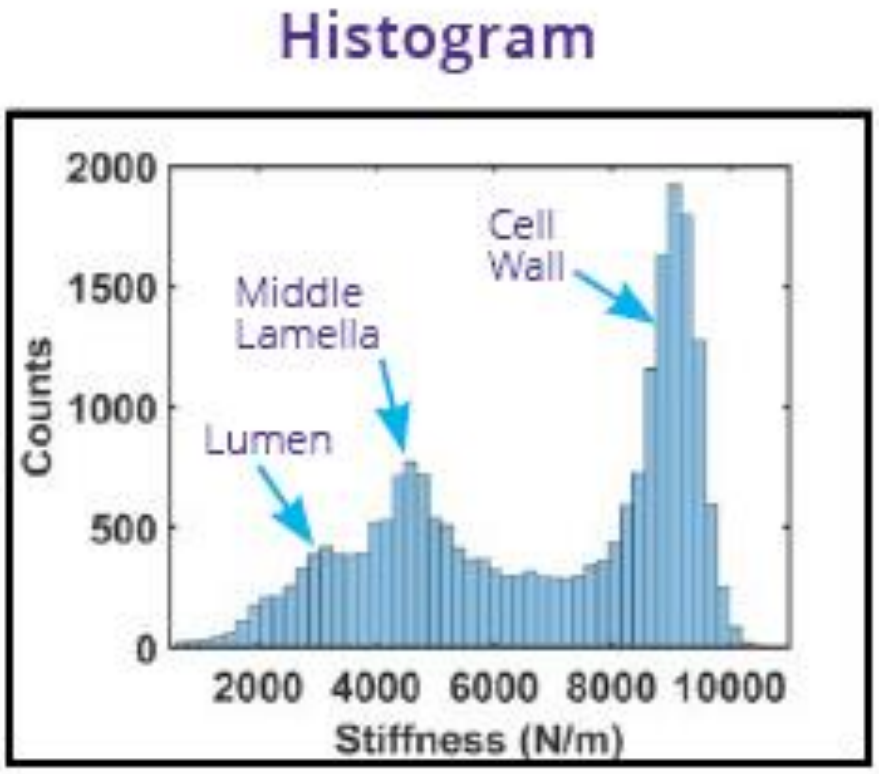
Title: Rapid Mechanical Characterization of Cell via Express Test 快速力学成像-细胞



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Title: Rapid Mechanical Characterization of Cell via Express Test 快速力学成像-细胞

Mean and Standard Deviation

Phase No.	Fraction	Hardness (GPa)	Modulus (GPa)
1	0.21	0.18±0.14	3.45±2.17
2	0.27	0.41±0.19	8.78±2.75
3	0.52	0.51±0.1	16.47±2.28