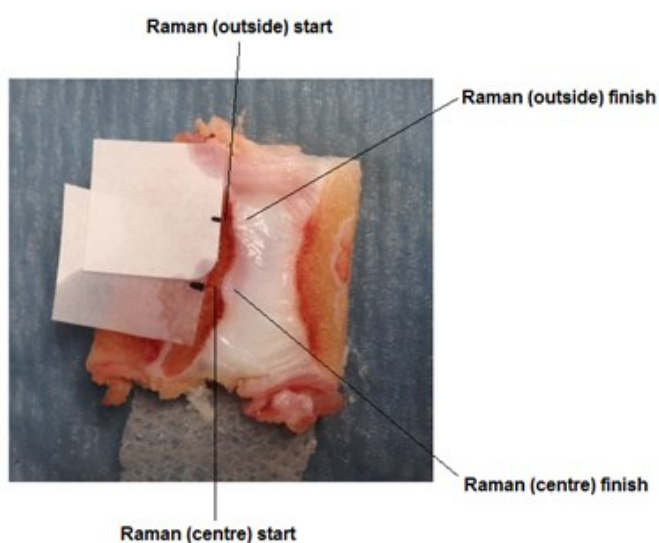


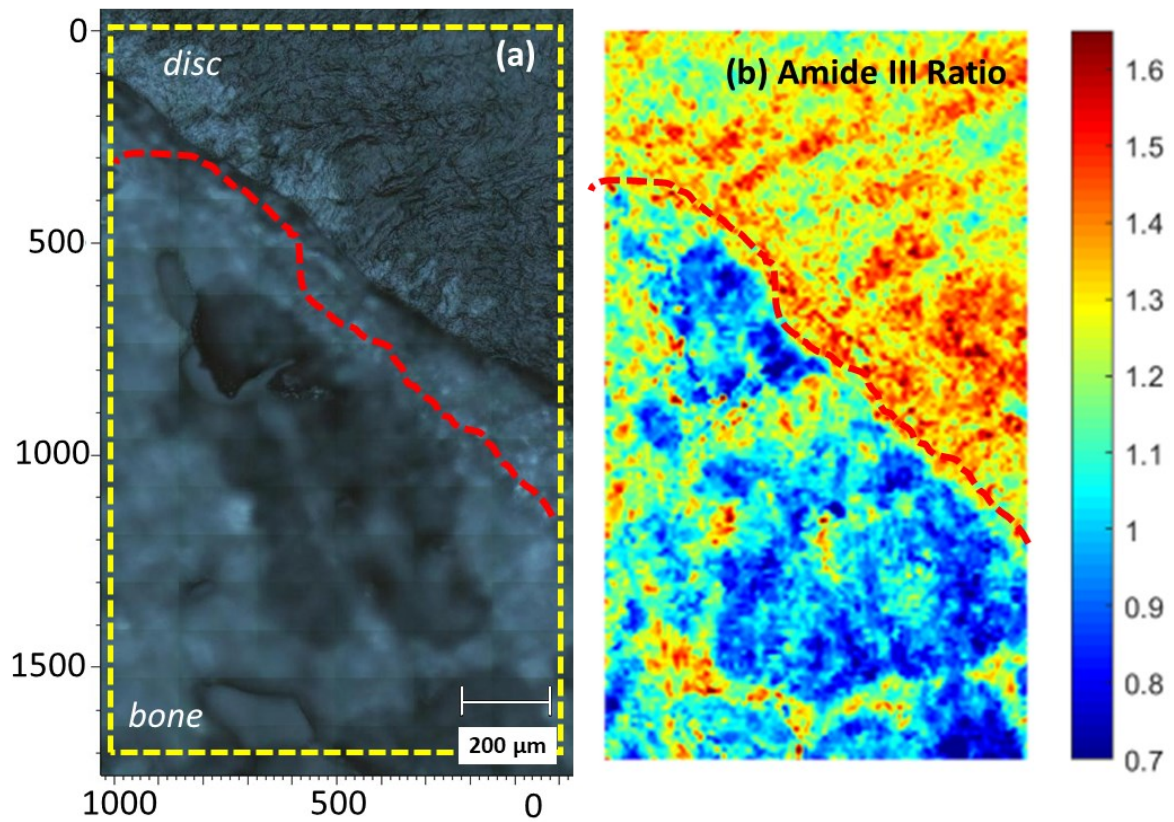
**Supplementary Material:**

**Supplemental Table I.** Average peak height ratio values for bony endplate (Bone), MC, non-MC and intervertebral disc (Disc) under the nucleus and under the annulus.

Peak Ratio	Bone		MC		Non-MC		Disc	
	Nucleus	Annulus	Nucleus	Annulus	Nucleus	Annulus	Nucleus	Annulus
<b>MMR</b>	5.83 ± 0.63	5.12 ± 0.44	2.49 ± 0.37	1.61 ± 0.24	0.41 ± 0.08	0.27 ± 0.03	0.81 ± 0.02	0.25 ± 0.02
<b>Carbonate to Amide I</b>	2.72 ± 0.30	2.13 ± 0.17	0.97 ± 0.13	0.81 ± 0.10	N/A	N/A	N/A	N/A
<b>CS to Amide I</b>	N/A	N/A	N/A	N/A	0.31 ± 0.05	0.29 ± 0.03	0.25 ± 0.05	0.30 ± 0.06
<b>CPR</b>	0.16 ± 0.02	0.15 ± 0.03	0.23 ± 0.21	0.31 ± 0.08	N/A	N/A	N/A	N/A
<b>Phosphate to Amide I</b>	16.47 ± 1.77	13.57 ± 1.26	5.69 ± 0.98	4.29 ± 0.78	1.12 ± 0.23	0.77 ± 0.09	0.67 ± 0.07	0.68 ± 0.10
<b>Prolines to Phe</b>	3.19 ± 0.16	3.26 ± 0.09	2.99 ± 0.18	3.10 ± 0.07	3.24 ± 0.16	3.26 ± 0.09	2.93 ± 0.24	3.09 ± 0.11
<b>PGs to Amide III</b>	0.25 ± 0.02	0.25 ± 0.02	0.29 ± 0.03	0.23 ± 0.02	0.27 ± 0.02	0.25 ± 0.03	0.29 ± 0.03	0.27 ± 0.03



**Supplemental Figure 1:** Positioning of a white label as a guide for along which Raman measurements were acquired (with a direction from the trabecular bone of the vertebral body to the intervertebral disc).



**Supplemental Figure 2:** Raman image ( $1000 \times 1693 \mu\text{m}$ ) generated from Raman mapping of the endplate transition zone at the nucleus (white light image of the sample shown in panel (a)), depicting the intensity of Amide III ratio ( $1245 \text{ cm}^{-1} / 1265 \text{ cm}^{-1}$ ). The yellow subregion marked in panel (a) corresponds to the mapped area with the exact size of the reconstructed image in panel (b). The red dotted line indicates the spectroscopic "tidemark" between bone and cartilage.