

Analytical and Bioanalytical Chemistry

Electronic Supplementary Material

Optical investigation of osteoarthritic human cartilage (ICRS Grade) by confocal Raman spectroscopy: A pilot study

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Table S1 Classification of osteoarthritic cartilage sample

Cartilage section (n=12)	Assignment of ICRS Grade		
	Grade-I	Grade-II	Grade-III
Patient 1 (68 years)	Section-1	Section-2, Section-3	Section-4
Patient 2 (67 years)	Section-5	Section-6, Section-7	Section-8
Patient 3 (70 years)	Section-9, Section-10	Section-11	Section-12

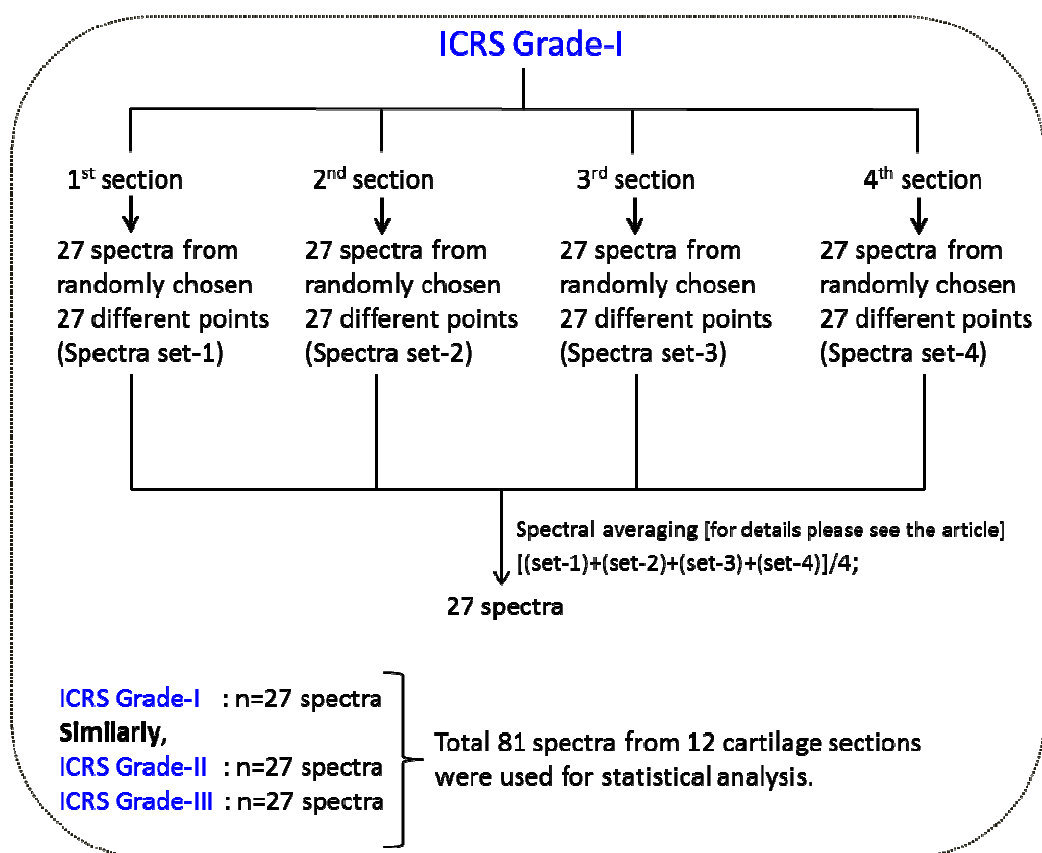


Fig. S1 Acquisition of Raman spectra

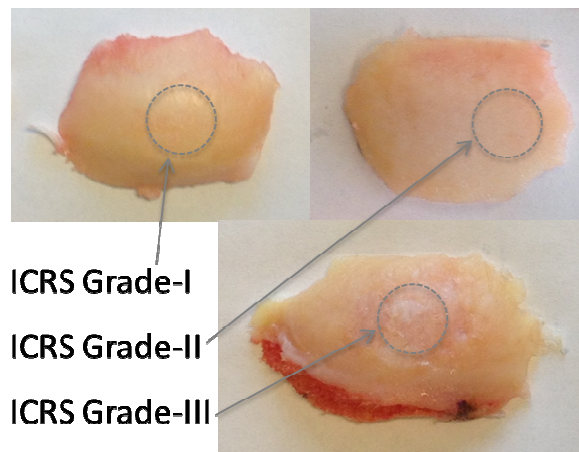


Fig. S2 Typical tissue samples obtained during total replacement knee surgery. Representative areas of ICRS Grades I, II and III are illustrated

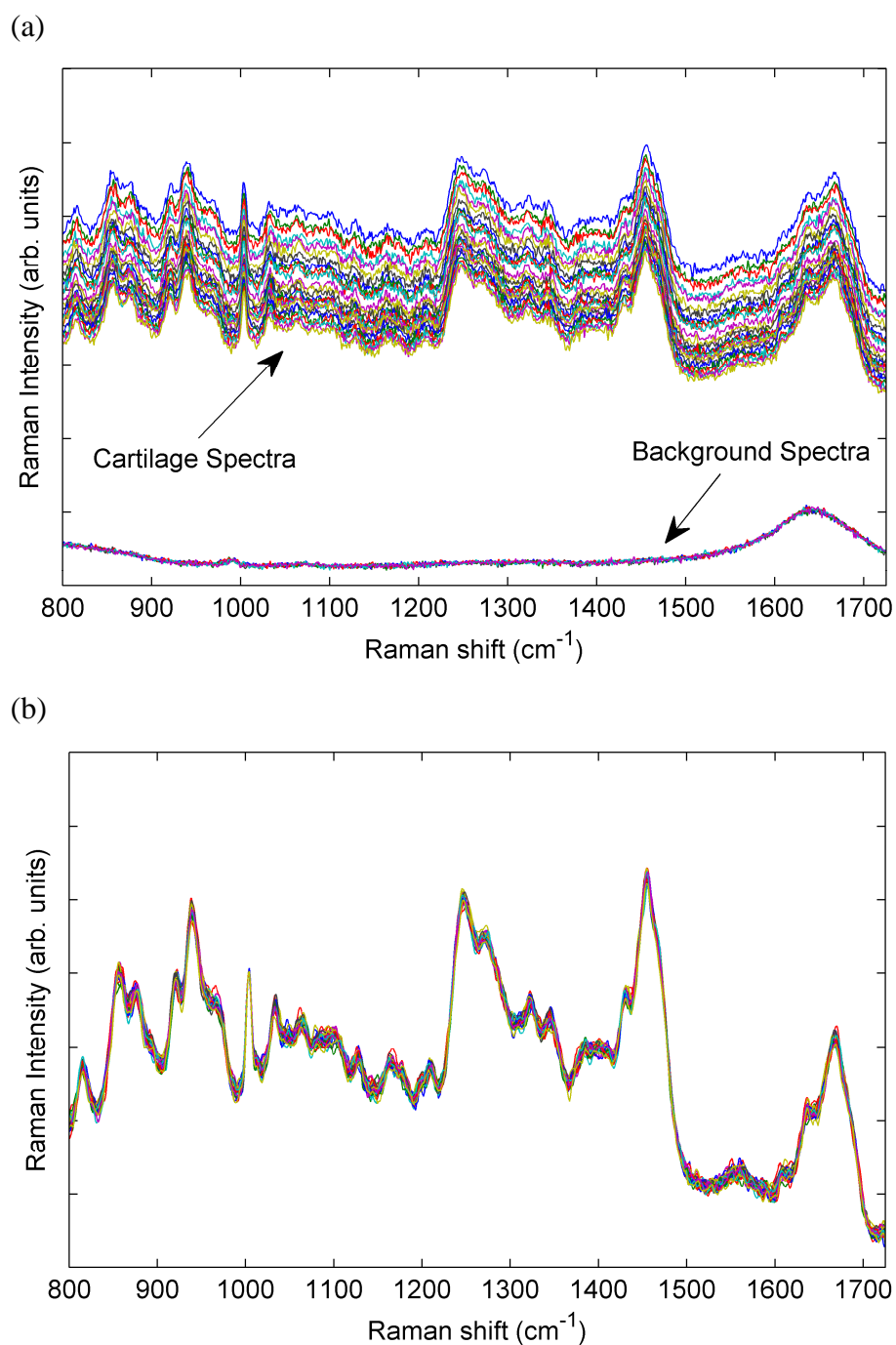


Fig. S3 (a) A typical set of raw data that were acquired from osteoarthritic cartilage. Background data were acquired from the surrounding medium (PBS). (b) Raw data were preprocessed to enhance the comparability and statistical analysis

Table S2 ICRS grading based on the Outbridge score [27-29]

Grade	Property
I	Soft indentation, superficial lesions, fissures and cracks
II	Fraying, lesions extending down to < 50% of cartilage depth
III	Cartilage defects extending down > 50% of cartilage depth, loss of cartilage thickness
IV	Complete loss of cartilage thickness, bone only

Table S3 The OARSI template to assess histopathology grade in osteoarthritis [54]

Grade	Criteria (tissue reaction)
0	Surface and cartilage morphology intact. Matrix: normal architecture. Cells: intact, appropriate orientation
I	Surface intact. Matrix: Superficial zone intact, superficial fibrillation (abrasion). Cells: death, proliferation, hypertrophy superficial zone Reaction must be more than superficial fibrillation only.
II	Above criteria + surface discontinuity, matrix discontinuity at superficial zone. ±Safranin-O depletion into upper 1/3 of cartilage. ±Disorientation of chondron columns. Cells: death, proliferation, hypertrophy
III	Above criteria + vertical fissures into mid zone, branched fissures ±Safranin-O depletion into lower 2/3 of cartilage ±New collagen formation(polarize light microscopy)
IV	Erosion. Delamination of superficial layer, mid layer cyst formation Excavation: matrix loss superficial layer and mid zone
V	Denudation. Sclerotic bone, reparative tissue including fibrocartilage within denuded surface. Microfracture with repair limited to bone surface
VI	Deformation. Bone remodeling (more than osteophytes only). Microfracture with repair extending above the previous surface