



Impact of experimental setup parameters on the measurement of articular cartilage optical properties in the visible and short near-infrared spectral bands: supplement

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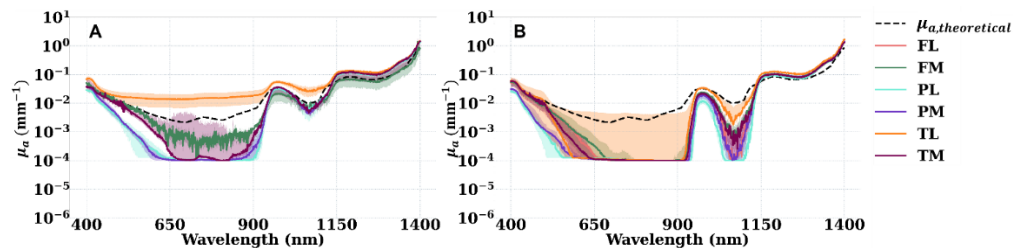
1 Supplementary Material I

2 Observation removal

3 Fig. 1 depicts the absorption coefficient of the samples, distorted due to the morphological
4 irregularity of the samples. These observations were removed at the first step of the analysis as
5 including them would cause deviation in the absorption coefficient of articular cartilage.
6 Furthermore, a theoretical absorption coefficient of articular cartilage with typical values of
7 volume fraction for its components was estimated as follows:

$$8 \quad \mu_{a,theoretical} = \mu_{a,water} \times V_{water} + \mu_{a,collagen} \times V_{collagen} + \mu_{a,elastin} \times V_{elastin} + \mu_{a,lipid} \\ 9 \quad \times V_{lipid},$$

10 where $\mu_{a,theoretical}$ is the theoretical approximation of articular cartilage μ_a . $\mu_{a,water}$,
11 $\mu_{a,collagen}$, $\mu_{a,elastin}$, and $\mu_{a,lipid}$ are the absorption coefficients of water, collagen, elastin and
12 lipid, respectively. V_{water} , $V_{collagen}$, $V_{elastin}$, and V_{lipid} are the volume fractions of water
13 (68%), collagen (30%), elastin (1%), and lipid (1%), respectively. $\mu_{a,theoretical}$ is shown in
14 Fig. 1 to emphasize distortion of μ_a of removed samples. Lack of the features seen in
15 $\mu_{a,theoretical}$, signal flattening, and low values of μ_a ($\leq 10^{-5}$) were considered signal
16 distortion.



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18 **Figure 1.** The signal distortion in the estimated absorption coefficient (μ_a [mm^{-1}]) of the removed articular cartilage samples. The signal saturation is
19 mostly due to morphological irregularity of the samples occurred in the
20 sample preparation stage. Articular cartilage μ_a : (A) air as surrounding
21 medium; (B) the water as surrounding medium. $\mu_{a,theoretical}$ is the
22 theoretical approximation of articular cartilage absorption coefficient. The
23 anatomical locations are the lateral and medial femur (FL, FM), lateral and
24 medial patella (PL, PM), and lateral and medial tibia (TL, TM) of the bovine
25 knee. The dataset is presented as first and third quartiles (shaded area) and
26 median (the solid curve).
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