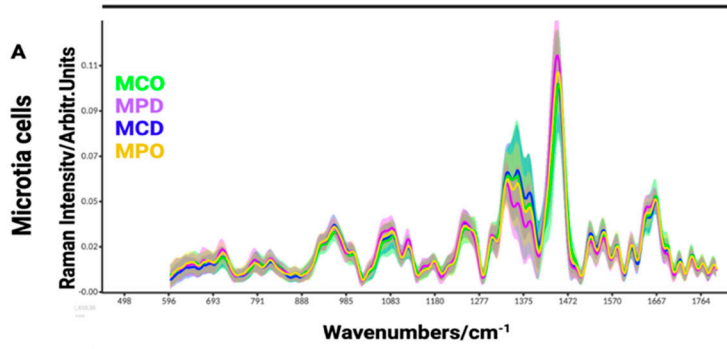
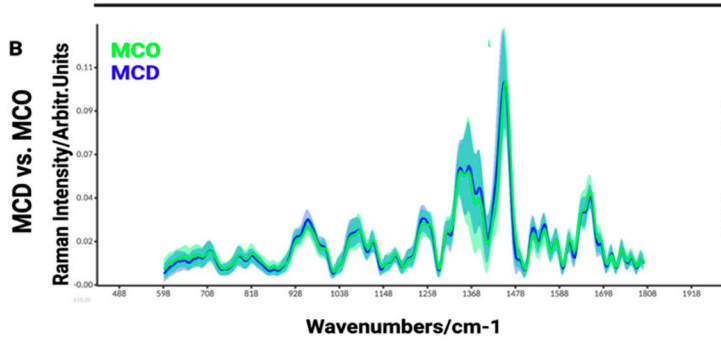


# Raman Spectra with Standard Deviation

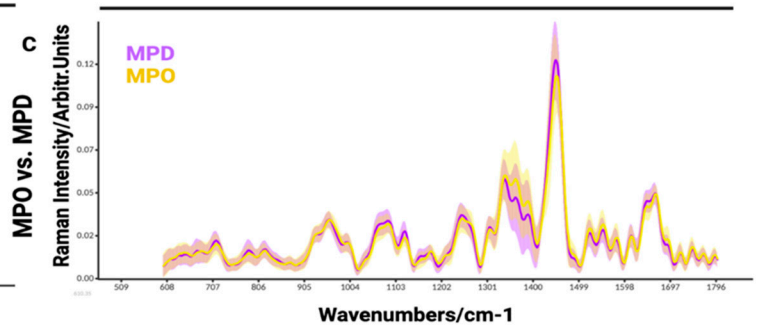
## Group 1



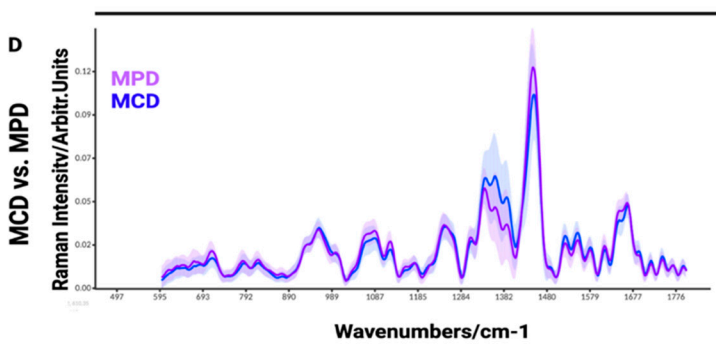
## Group 2



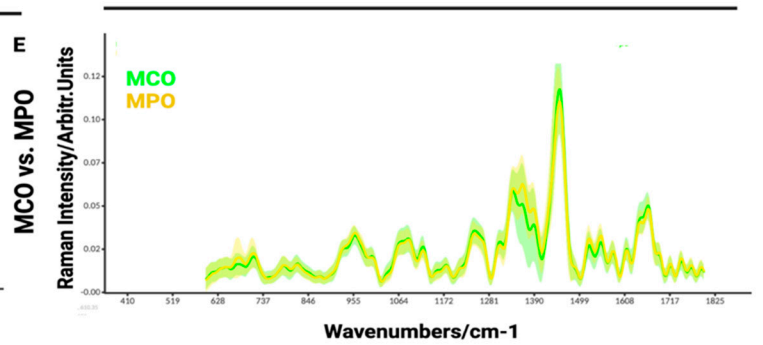
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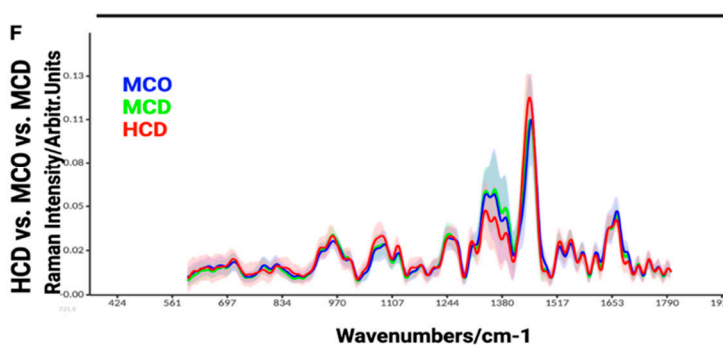
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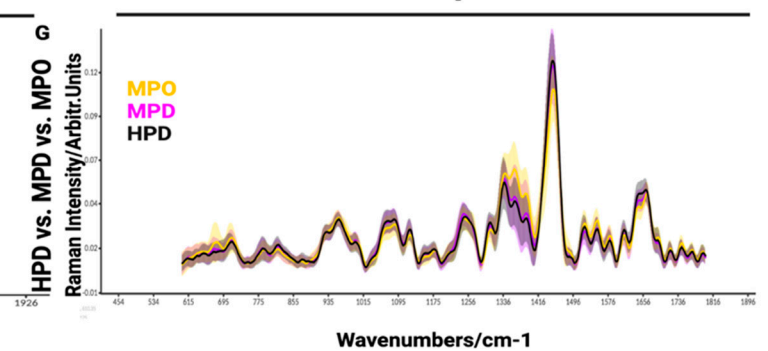
## Group 5



## Group 6



## Group 7



**Figure S1. Visualization of Raman mean spectra with a standard deviation of different cell populations.** (A) Group 1: Comparison between MCD (n=133), MCO (n=177), MPD (n=179) and MPO (n=96), (B) Group 2: Comparison between MCD (n=133) vs. MCO (n=177), (C) Group 3: Comparison of MPD (n=179) vs. MPO (n=96), (D) Group 4: Comparison between MCD (n=133) vs. MPD (n=176), (E) Group 5: Comparison between MCO (n=375) vs. MPO (n=220). (F) Group 6: Comparison between HCD (n=174) vs. MCD (n=133) vs. MCO (n=177), (G) Group 7: Comparison between HPD (n=140) vs. MPD (n=179) vs. MPO (n=96).

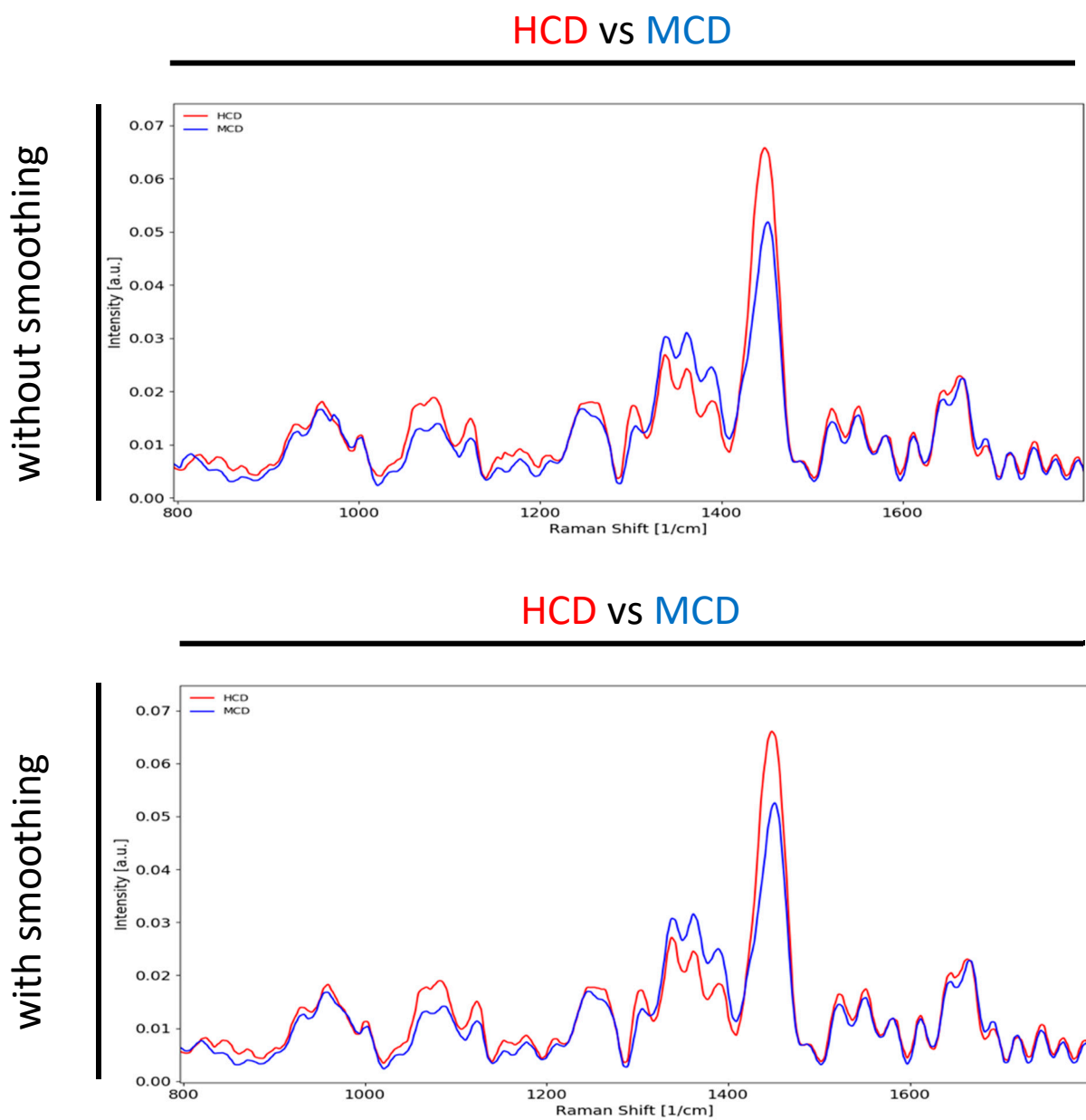
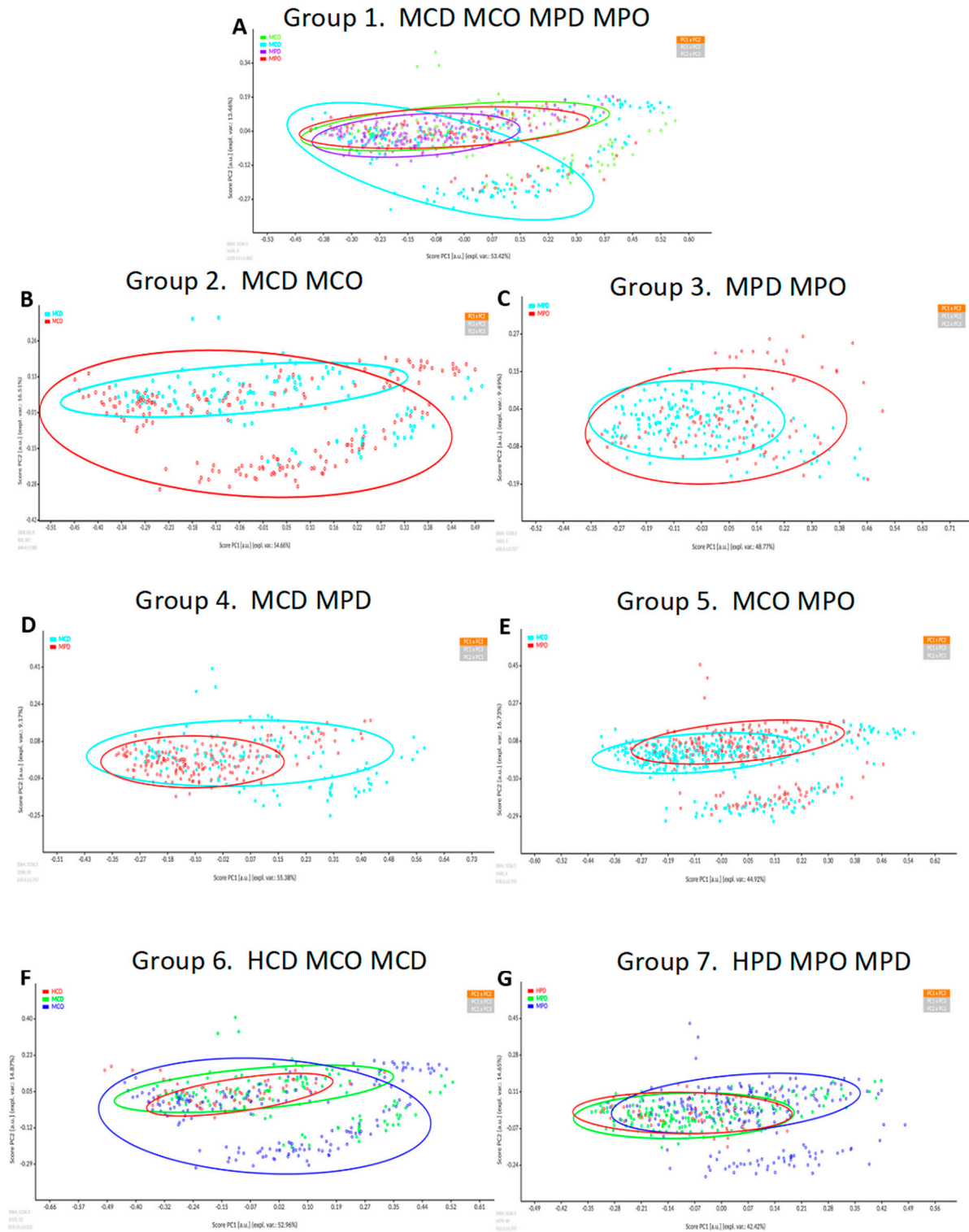


Figure S2. Visualization of HCD vs MCD Raman mean spectra without and with smoothing.

## PCA: PC1 x PC2

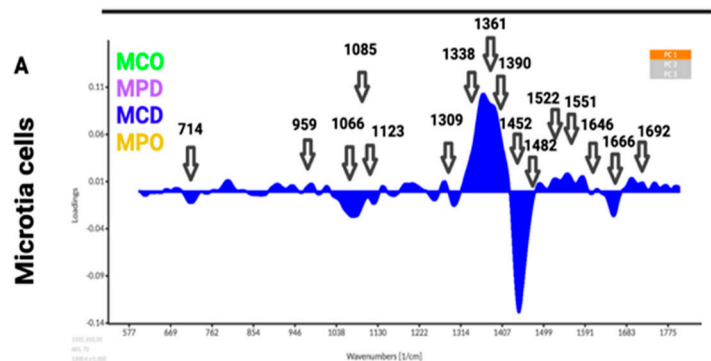


**Figure S3. Visualization of Raman principle component analysis (PCA) in different cell populations.** Results shows the PC1 to PC2 correlation. (A) Group 1: Comparison between MCD (n=133), MCO (n=177), MPD (n=179) and MPO (n=96), (B) Group 2: Comparison between MCD (n=133) vs. MCO (n=177), (C) Group 3: Comparison of MPD (n=179) vs. MPO (n=96), (D) Group 4: Comparison between MCD (n=133) vs. MPD (n=176), (E) Group 5: Comparison between MCO (n=375) vs. MPO (n=220), (F) Group 6: Comparison between HCD (n=174) vs. MCD (n=133) vs. MCO (n=177), (G) Group 7: Comparison between HPD (n=140) vs. MPD (n=179) vs. MPO (n=96).

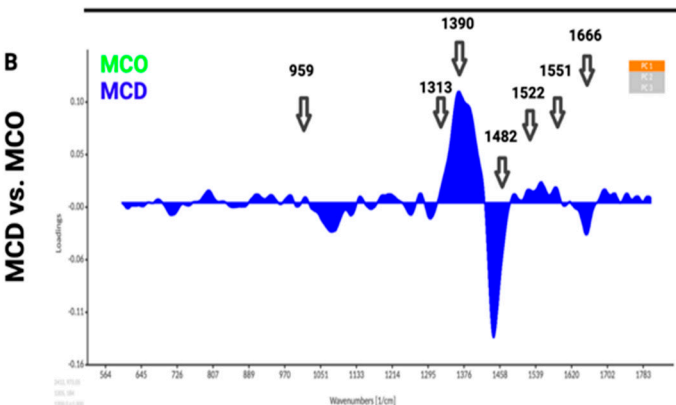
Loadings PC1

Raman Spectra

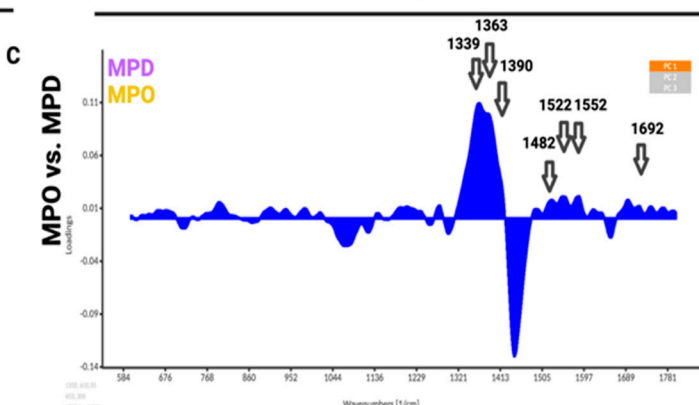
Group 1



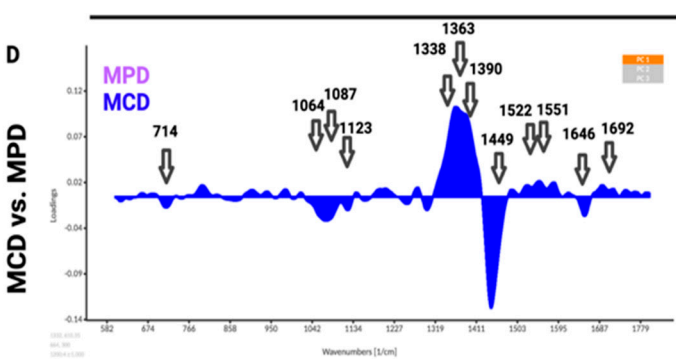
Group 2



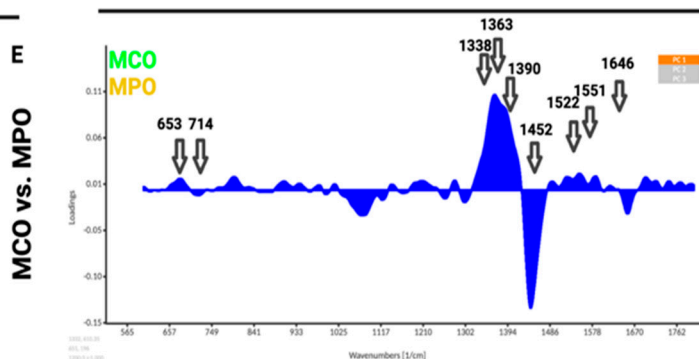
Group 3



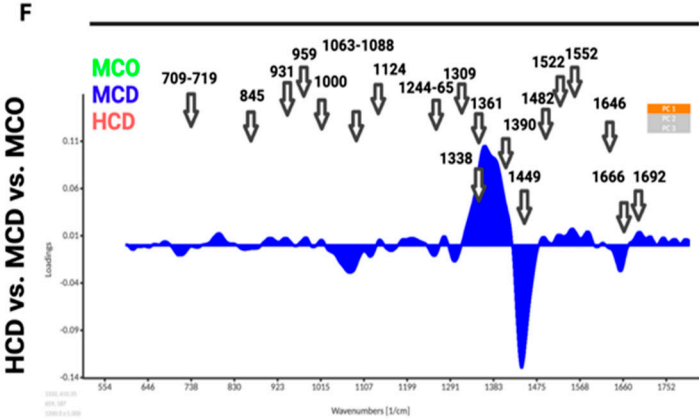
Group 4



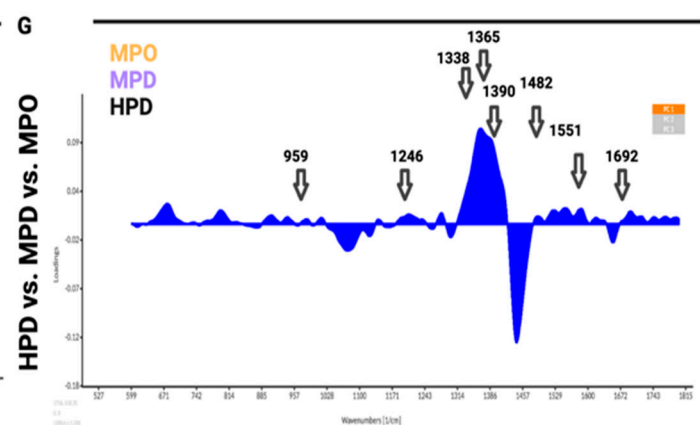
Group 5



Group 6



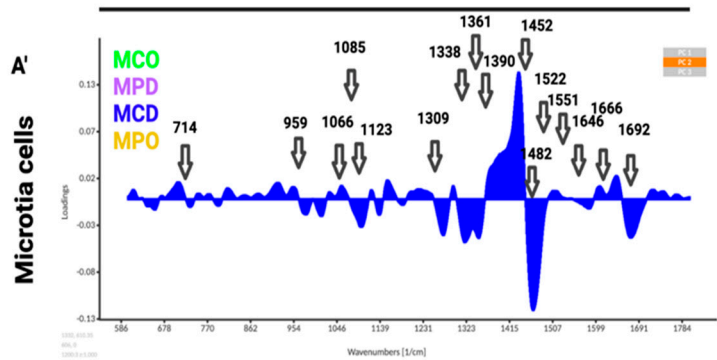
Group 7



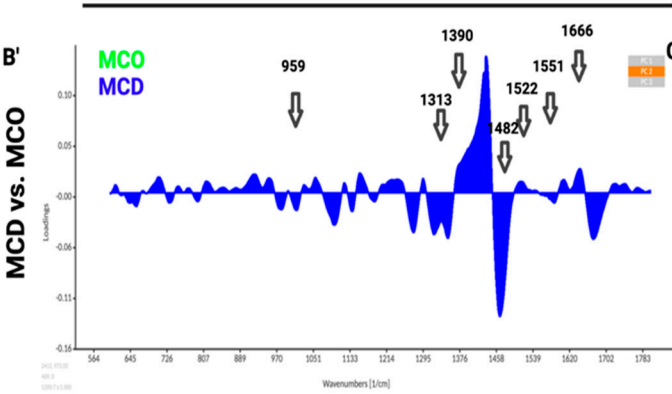
Loadings PC2

Raman Spectra

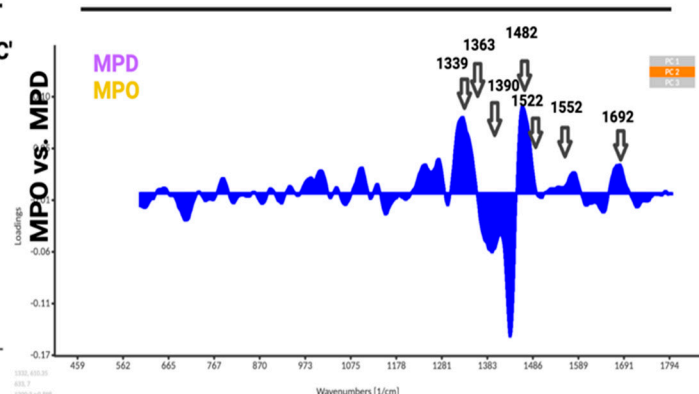
Group 1



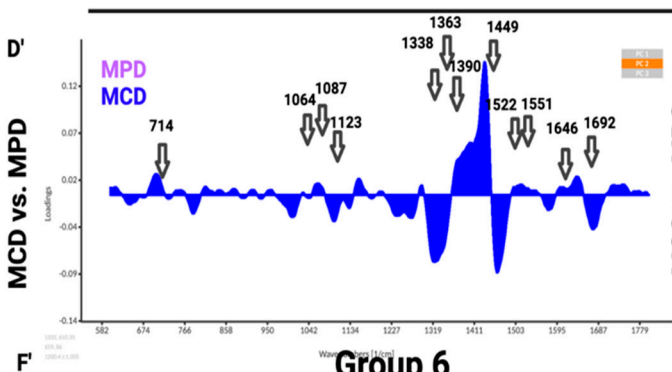
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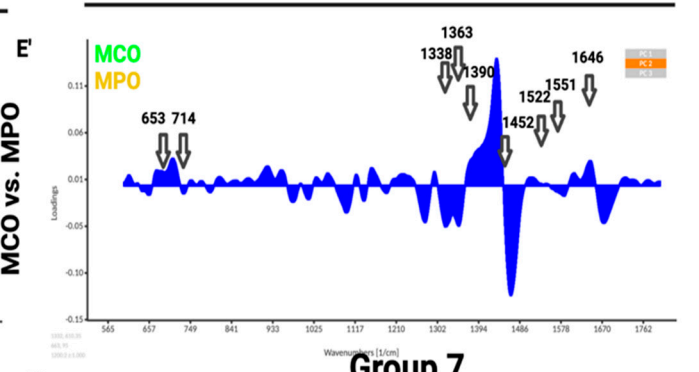
Group 3



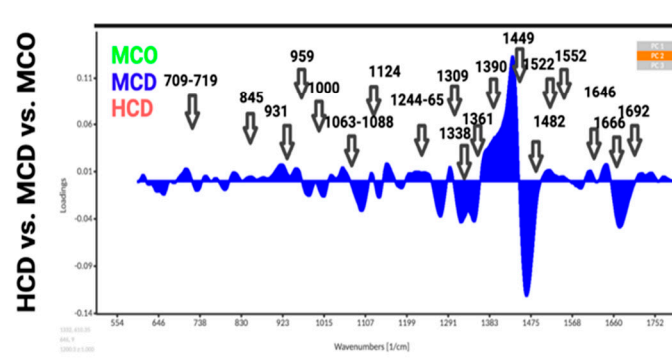
Group 4



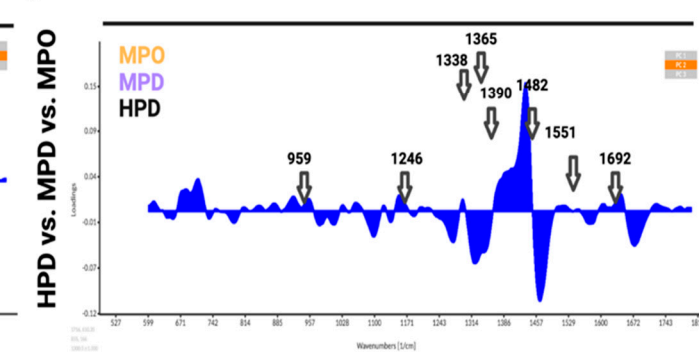
Group 5



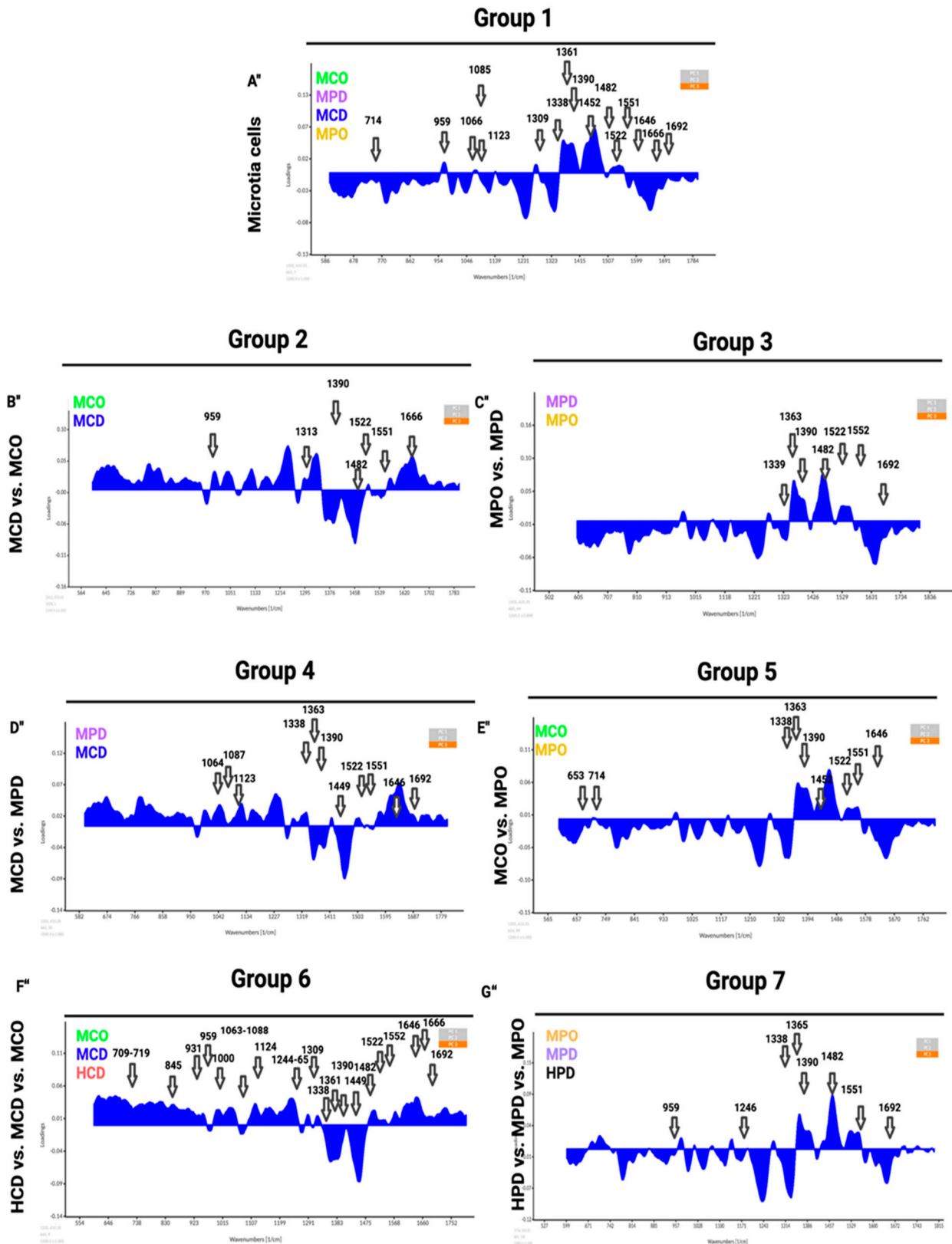
Group 6



Group 7







**Figure S4. Visualization of Raman component (PC1/PC2/PC3) loadings plots of different cell populations.** (A) PC1; A', PC2; A'', PC3) Group 1: Comparison between MCD (n=133), MCO (n=177), MPD (n=179) and MPO (n=96), (B), PC1; B', PC2; B'', PC3) Group 2: Comparison between MCD (n=133) vs. MCO (n=177), (C), PC1; C', PC2; C'', PC3) Group 3: Comparison of MPD (n=179) vs. MPO (n=96), (D, PC1; D', PC2; D'', PC3) Group 4: Comparison between MCD (n=133) vs. MPD (n=176), (E), PC1; E', PC2; E'', PC3) Group 5: Comparison between MCO (n=375) vs. MPO (n=220), (F), PC1; F', PC2; F'', PC3) Group 6: Comparison between HCD (n=174) vs. MCD (n=133) vs. MCO (n=177), (G), PC1; G', PC2; G'', PC3) Group 7: Comparison between HPD (n=140) vs. MPD (n=179) vs. MPO (n=96).

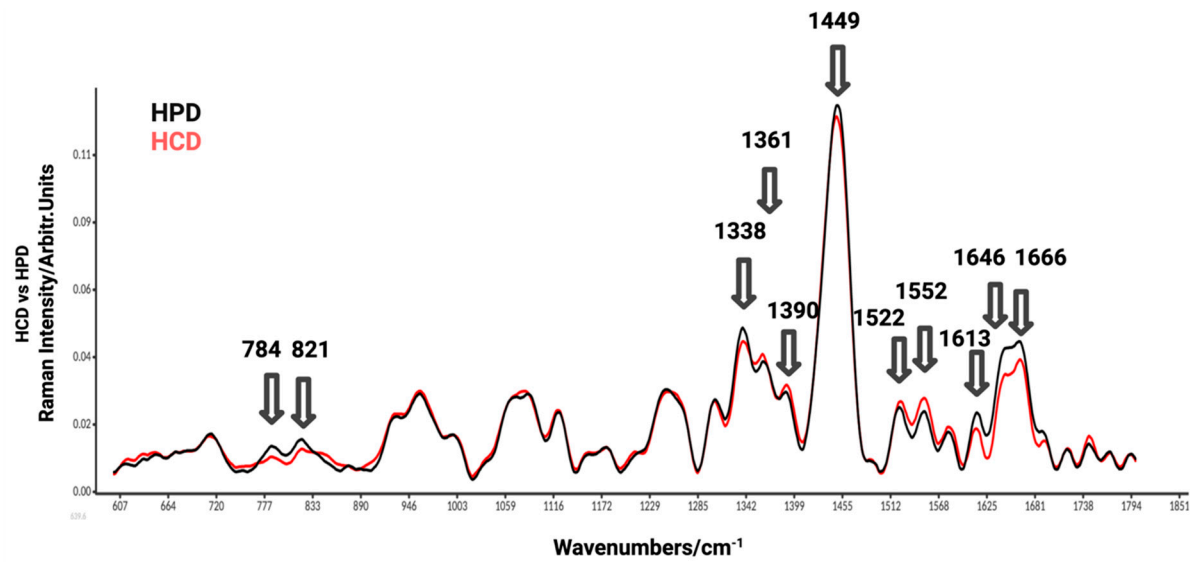
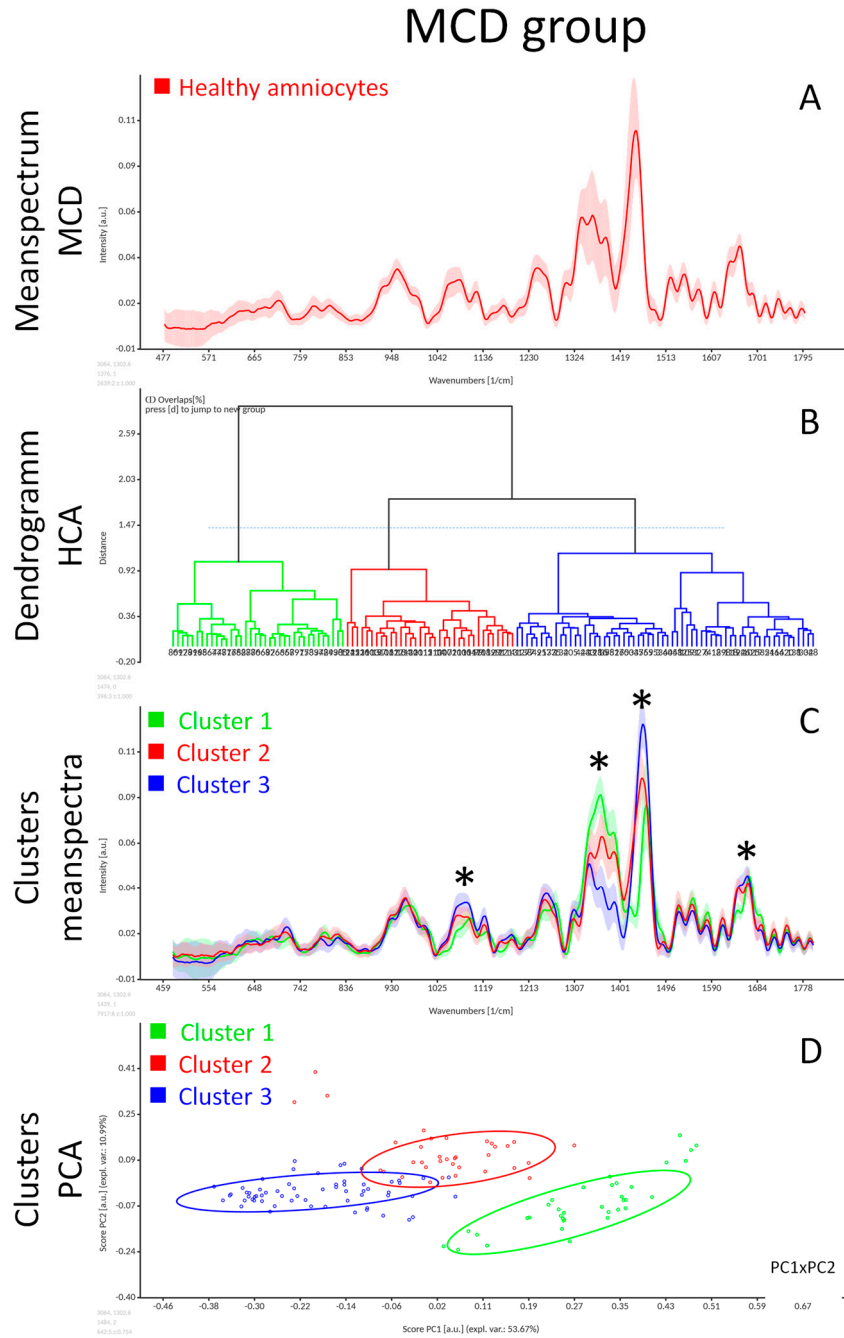
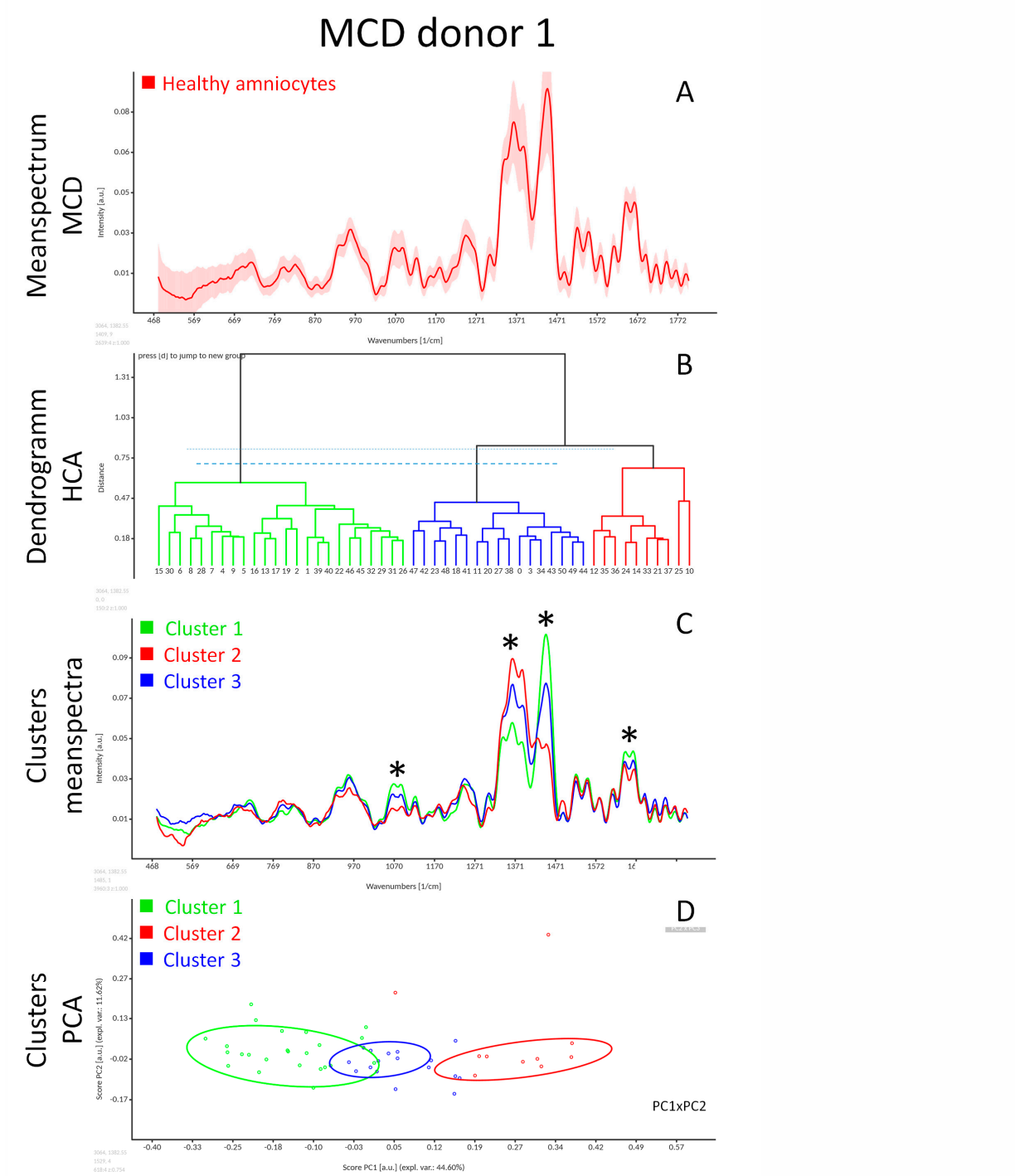


Figure S5: Visualization of Raman mean spectra for healthy chondrocytes (HCD) (red) (n=174; n=6 donors) with healthy perichondrocytes HPD (black) (n=140; n=5 donors).



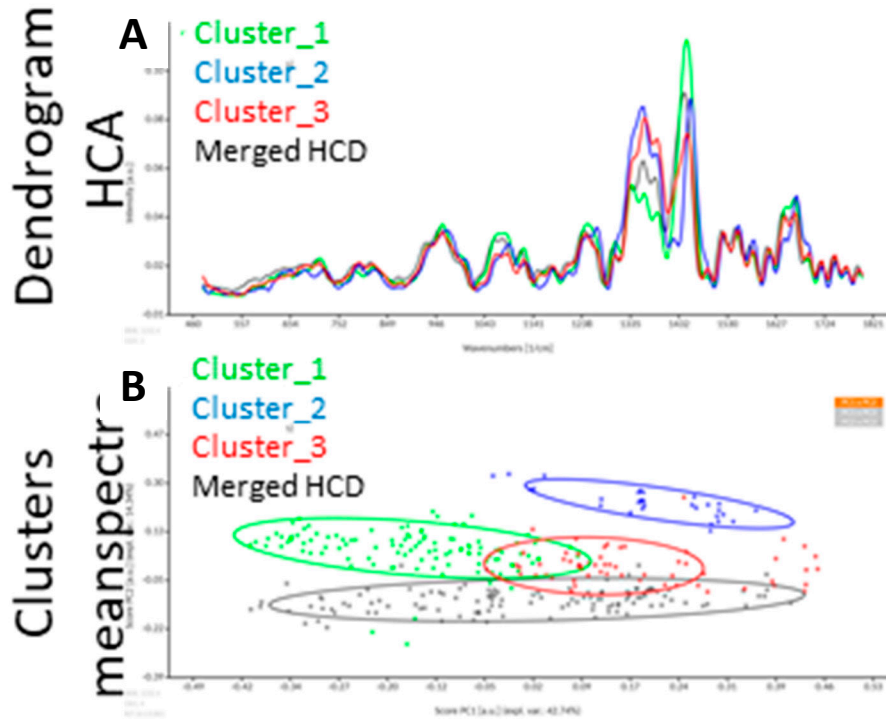
**Figure S6. HCA and PCA of microtia chondrocytes.** The Raman analysis of the merged MCD group is presented. (A) The mean spectrum of MCD group (4 donors, 133 spectra). Shadows represent the standard deviation. (B) HCA of the mean spectrum with the cut off shown indicated by the horizontal, dashed blue line. (C) Mean spectra of the clusters resulting from the HCA of Fig. S6B. The asterisks indicate the high variability in particular spectral regions. (D) PCA analysis with the PC1xPC2 score plot. Each dot represents a Raman measurement, and the ellipses describe 90% confidence interval.



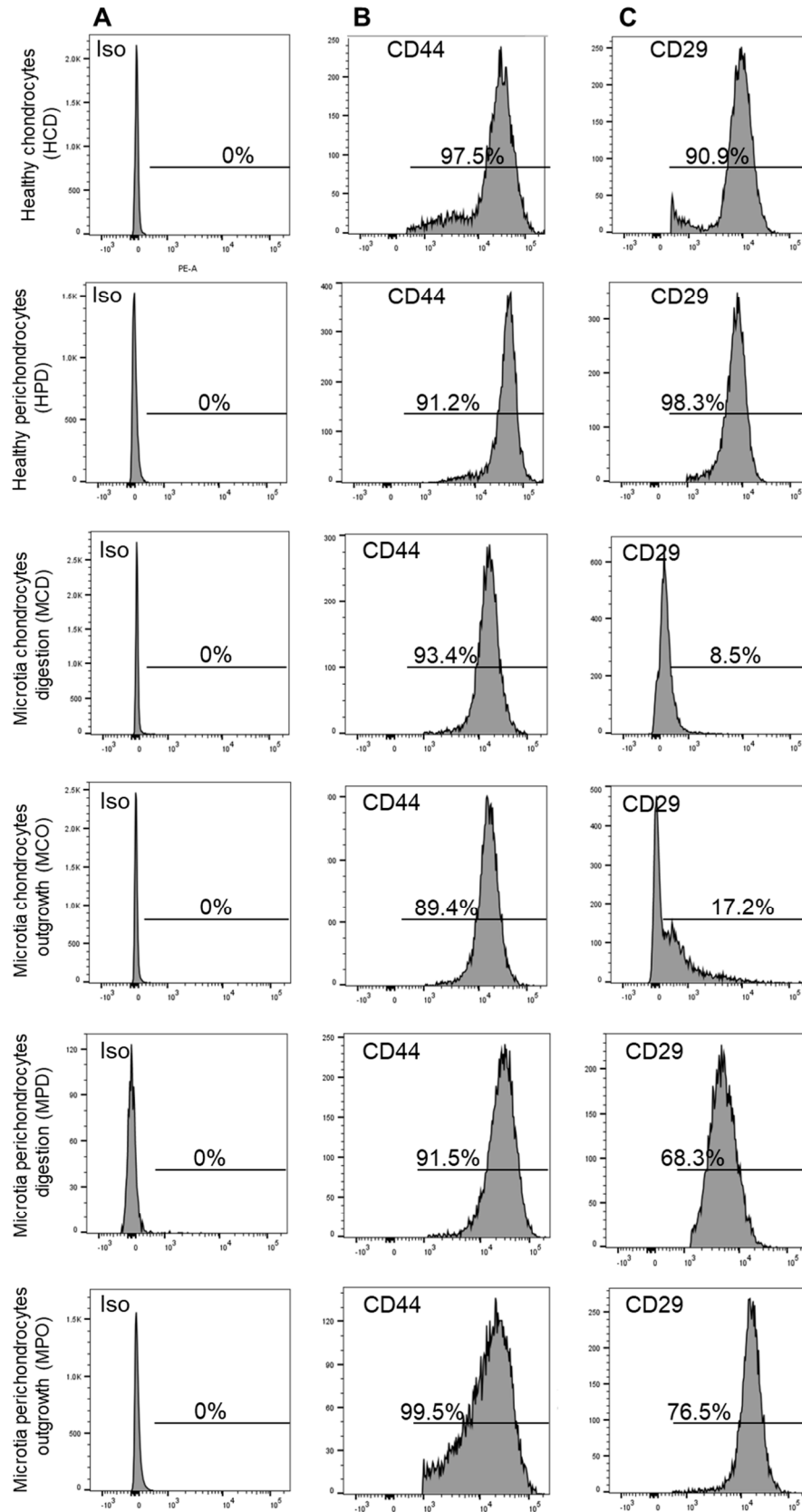


**Figure S7. HCA and PCA of microtia chondrocytes.** The Raman analysis of MCD donor 1 is presented. (A) The mean spectrum of MCD donor 1 (53 spectra). Shadows represent the standard deviation. (B) HCA of the mean spectrum with the cut off shown indicated by the horizontal, dashed blue line. (C) Mean spectra of the clusters resulting from the HCA of Fig. S7B. The asterisks indicate the high variability in particular spectral regions. (D) PCA analysis with the PC1xPC2 score plot. Each dot represents a Raman measurement, and the ellipses describe 90% confidence interval.

# MCD vs HCD



**Figure S8. Comparison of putative MCD subpopulation with healthy chondrocytes.** (A) Mean spectra of the three MCD clusters of Fig. S6 and the HCD population (Fig. 4A). (B) PCA analysis with the PC1xPC2 score plot. Each dot represents a Raman measurement, and the ellipses describe 90% confidence interval.



**Figure S9** Flow cytometric analysis of the expression of CD44 and CD29 markers in healthy and microtia chondrocytes and perichondrocytes isolated by digestion or outgrowth. (A) Isotype controls (B) CD44 and (C) CD29 expression in cultured healthy (HCD) and microtia (MCD and MCO) chondrocytes as well as healthy (HPD) and microtia (MPD and MPO) perichondrocytes; all cells were used at passage 2–3; representative for  $n = 5$  donors.