Electronic Supplementary Material (ESI) for Analyst.

Supplementary information for:

Lensless imaging-based discrimination between tumour cells and blood cells towards circulating tumour cell cultivation

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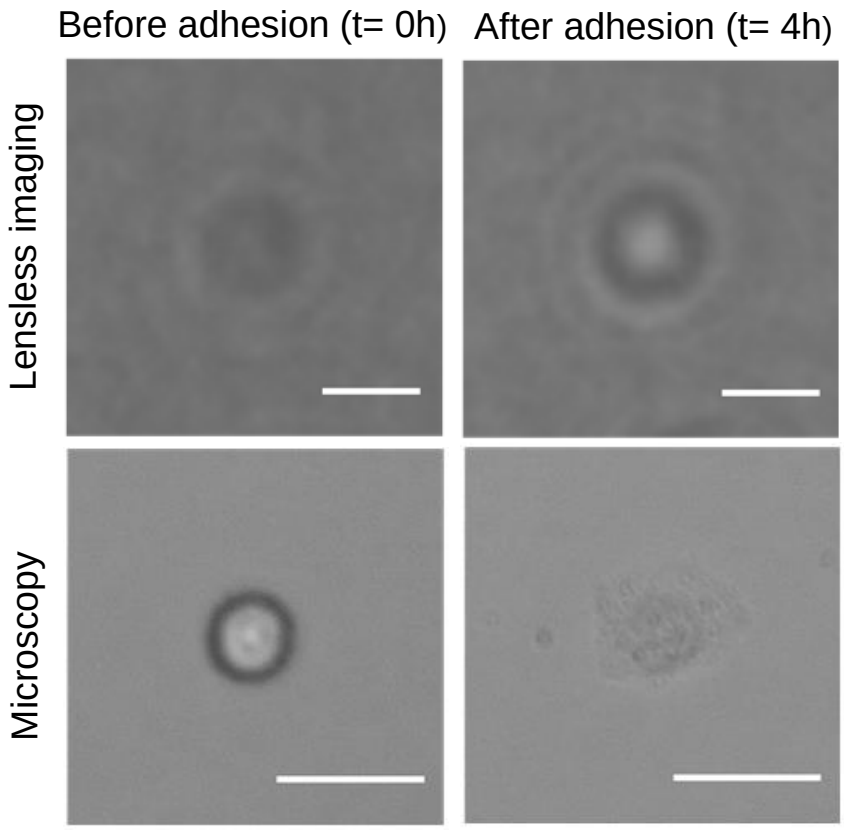
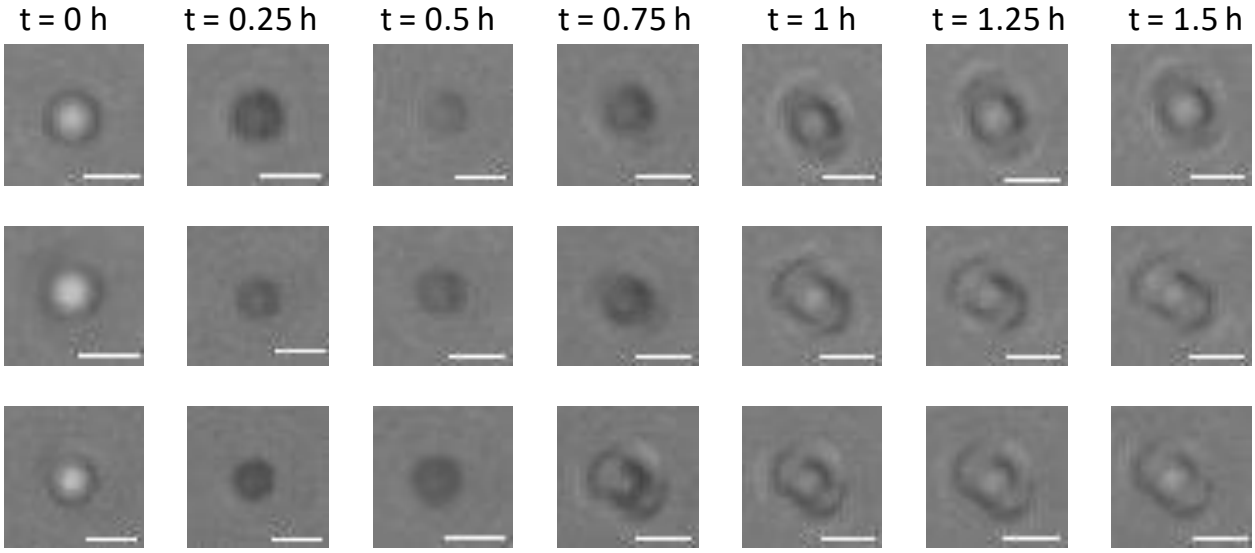


Fig. S1 Typical images of the HeLa cells before and after adhesion analyzed by lensless imaging and microscopy. Scale bar = 50 μm. The cells in the panel of the adhesive cells is identical to that in Fig. 3 (main text).



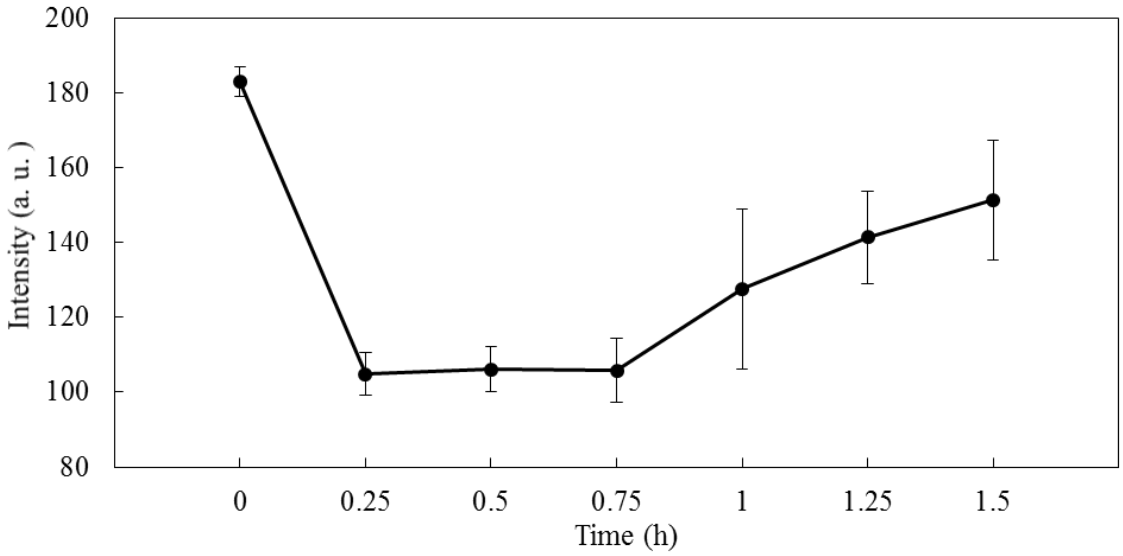


Fig. S2 Typical lensless images (scale bar = 50 μm) and the intensity variations of HeLa cells (n = 10) during the cell division events.

Table S1 Loading factors of PC1 and PC2 of the PCA using 6 discriminative parameters (S, I_{min}, I_{max}, I_{sd}, I_{mode}, and I_d) extracted from HeLa cells, JM cells and erythrocytes.

	PC1	PC2
S	0.671075	-0.66505
I_{sd}	-0.93653	-0.33978
I_d	-0.96043	-0.27289
I_{min}	0.913686	-0.35021
I_{max}	-0.77655	-0.6184
I_{mode}	0.900115	-0.32689

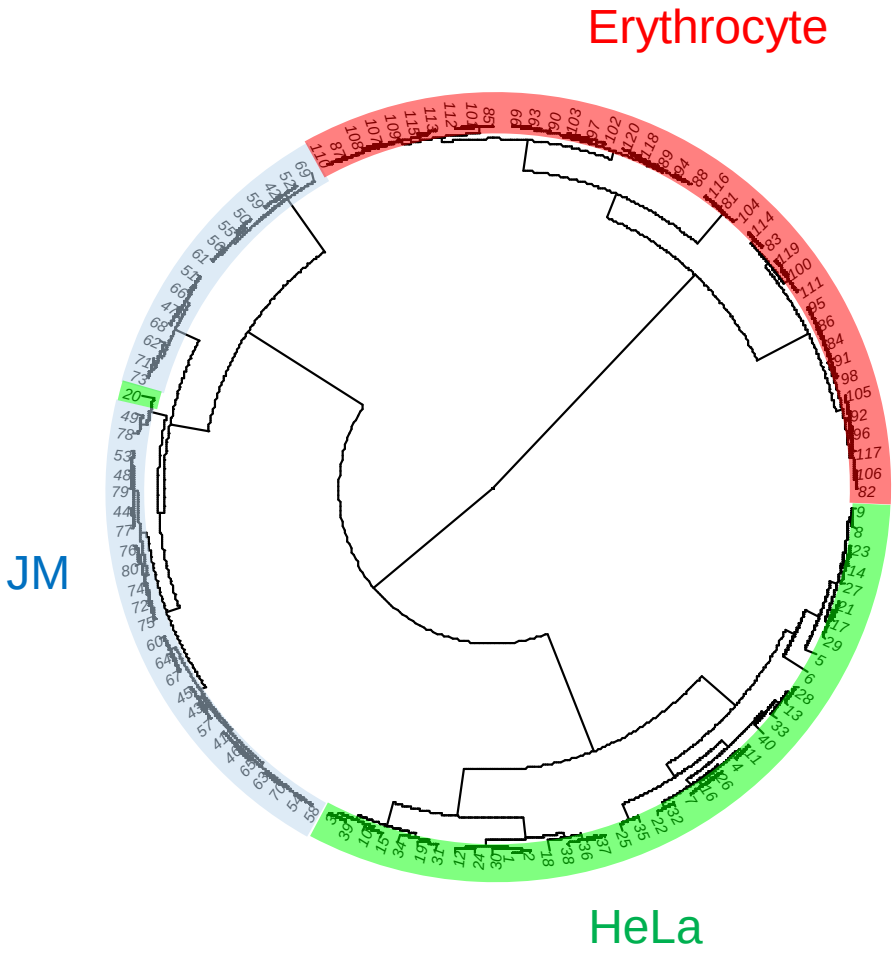
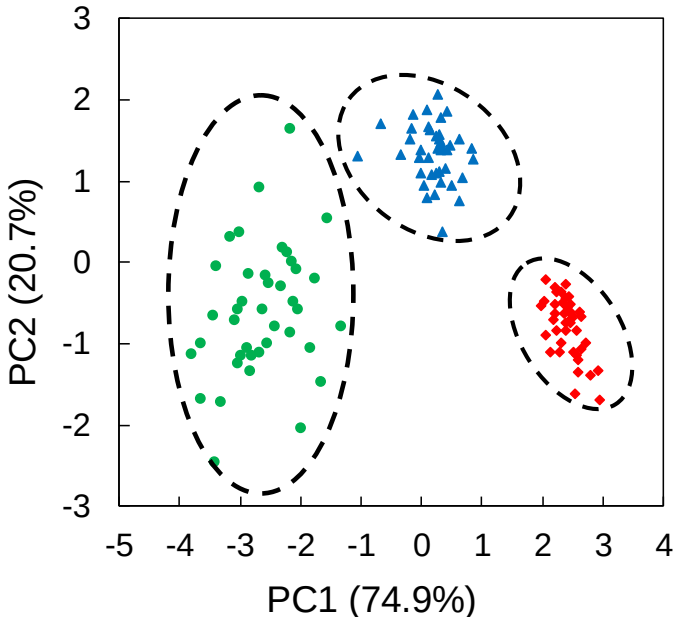
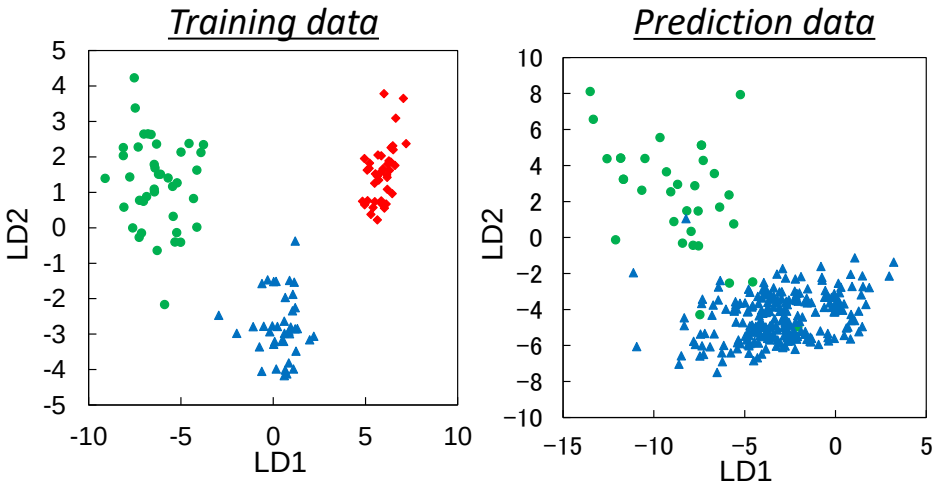


Fig. S3 Hierarchical clustering dendrogram of 6 discriminative parameters (S, I_{min}, I_{max}, I_{sd}, I_{mode}, and I_d) extracted from HeLa cells (green, ID:1~40), JM cells (blue, ID:41~80) and erythrocytes (red, ID:81~120).

(A) 6 parameters (S, I_{min}, I_{max}, I_{sd}, I_{mode}, and I_d)



(B) 6 parameters (S, I_{min}, I_{max}, I_{sd}, I_{mode}, and I_d)



(C) 3 parameters (S, I_{sd}, and I_d)

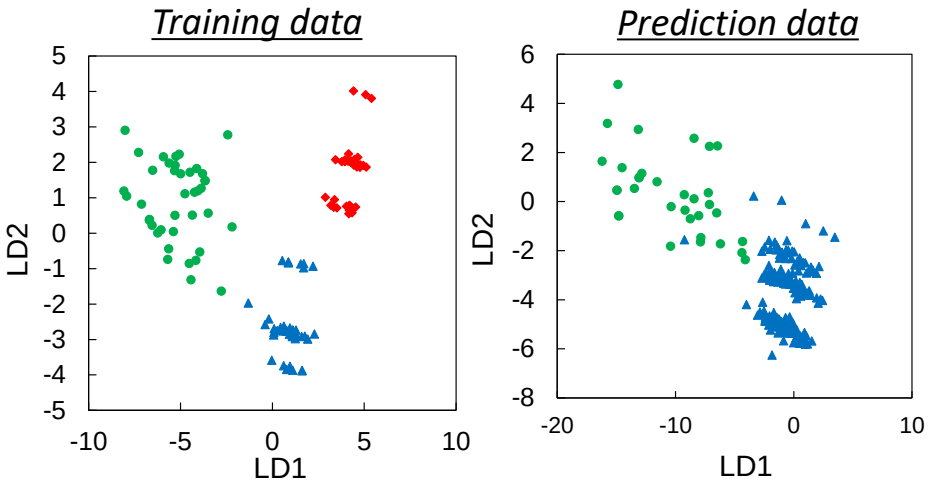


Fig. S4 Analyses of the discriminative parameters extracted from the lensless images of HeLa cells (model tumour cells, green marks), JM cells (model lymphocytes, blue marks) and erythrocytes (red marks). (A) Principal component analysis (PCA) and non-hierarchical *k*-means cluster analysis of 6 parameters. Proportions of the variance (%), which indicate the fraction of variance of the original data explained by each principal component, of PC1 and PC2 are shown, respectively. (B and C) Linear discriminant analysis (LDA) of 6 and 3 (S, I_{sd}, and I_d) parameters (B and C, respectively). Scattered plots for training data represent the distribution of the values of liner discriminant functions derived from 40 cells of HeLa cells, JM cellsand erythrocytes, which were separately cultured in different culture dishes. Scattered plots for prediction data represents the distribution of the values of liner discriminant functions derived from 34 HeLa cells which were identified under the fluorescence microscopy, and 241 JM cells. For prediction data, HeLa cells expressing GFP and JM cells were cultured in identical culture dishes. Training data of (C) is identical to Figure 4 (B) in the main text.

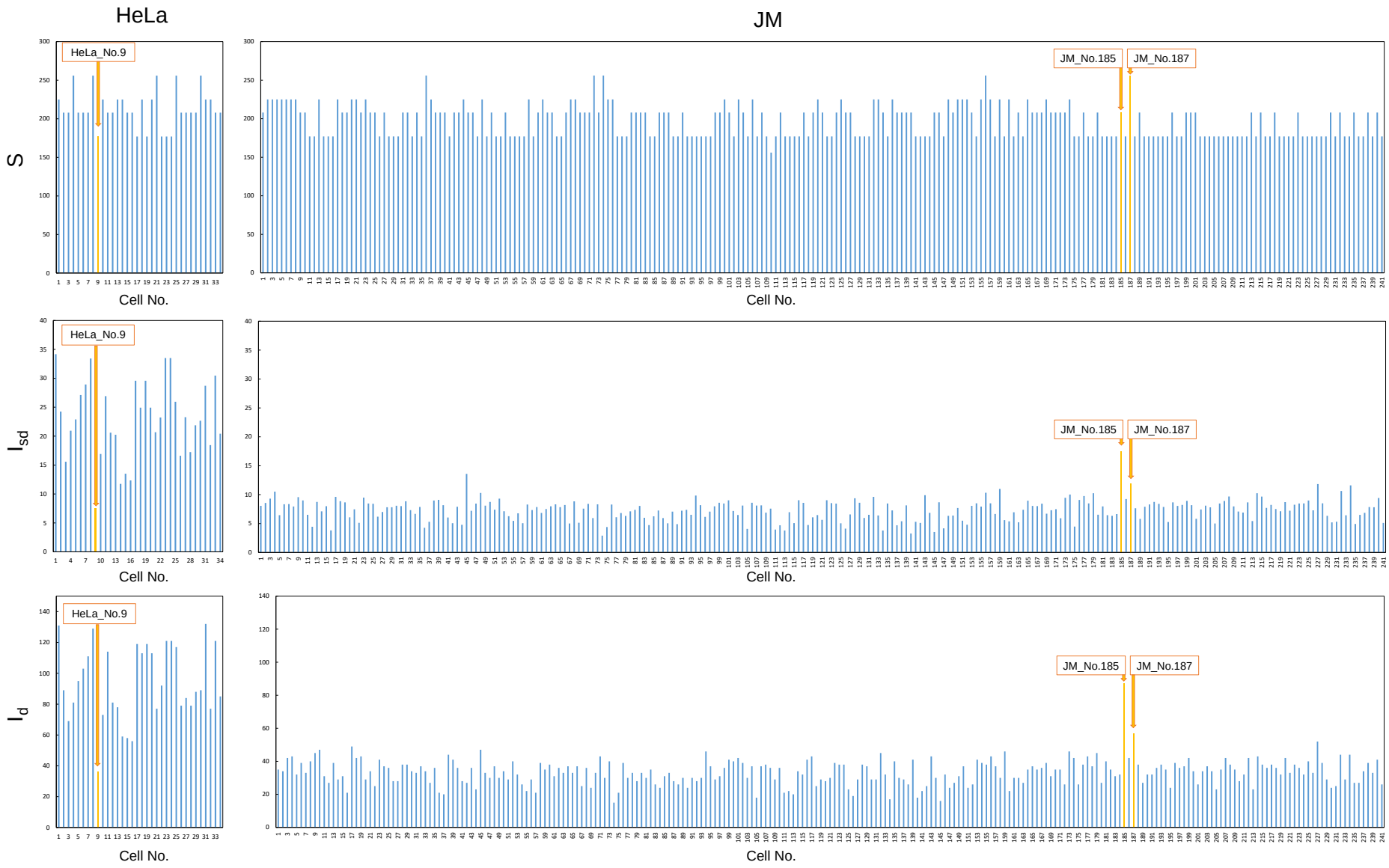


Fig. S5 Three discriminative parameters extracted from the lensless images of GFP-expressing HeLa cells (34 cells) and JM cells (241 cells). The cells shown in orange bars (HeLa_No.9, JM_No.185, and JM_No.187) were incorrectly classified by LDA.