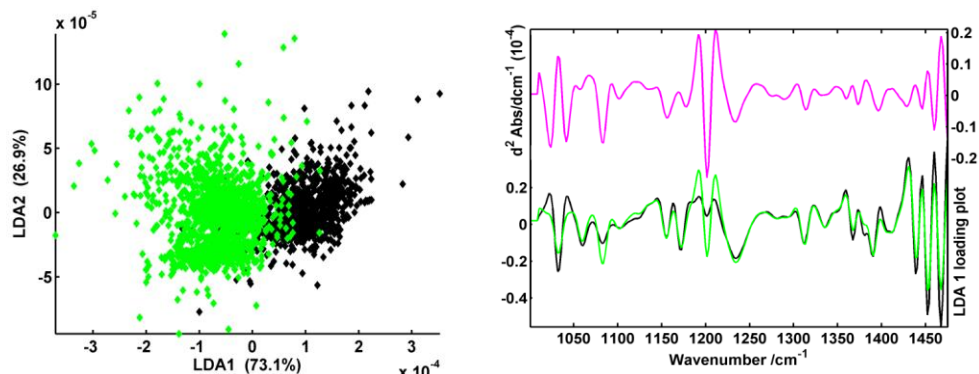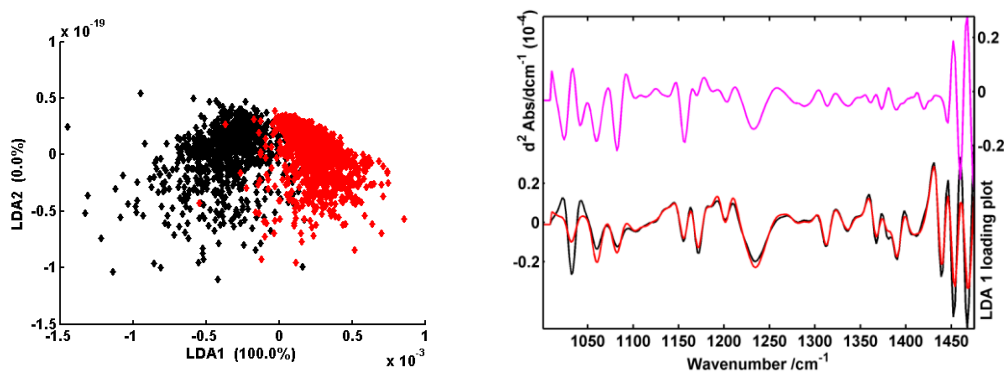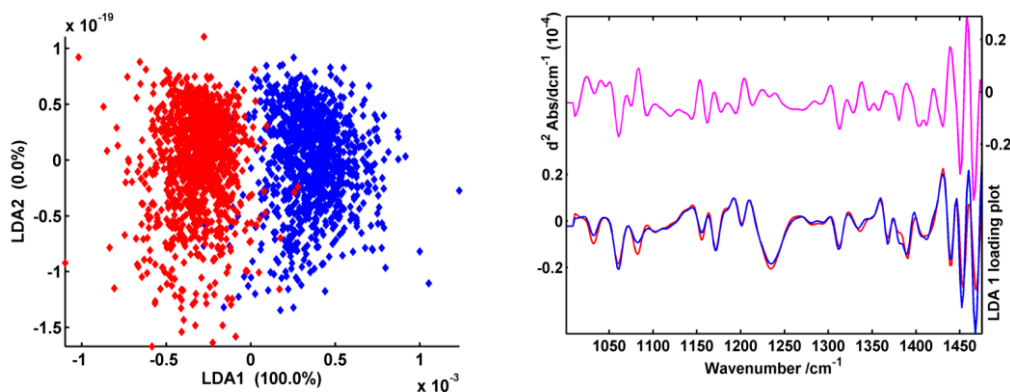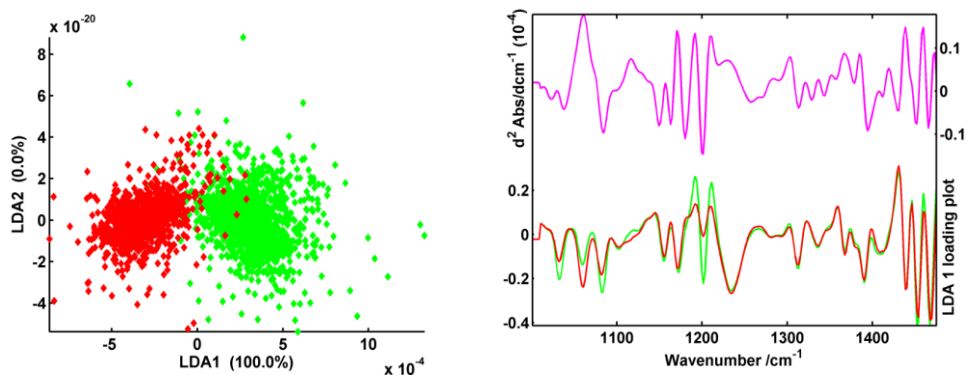## Supplementary Material

PC-LDA of ATRA **(green)** and DMSO **(black)** treated TERA2.cl.SP12 cells at day 7 (6 PCs used) and (Lower curves) mean spectra of the control and ATRA treated cells with LDA1 loading plot (upper curves).
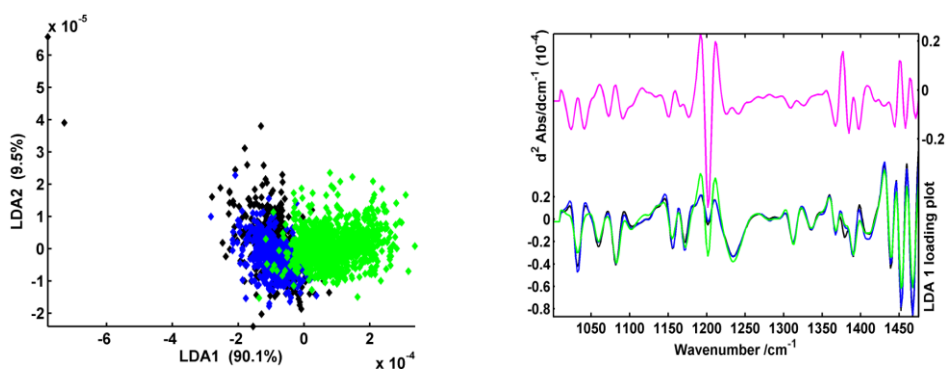

PC-LDA of EC19 **(red)** and DMSO **(black)** treated TERA2.cl.SP12 cells at day 7 (7 PCs used) and (Lower curves) mean spectra of the control and EC19 treated cells with LDA1 loading plot (upper curves).
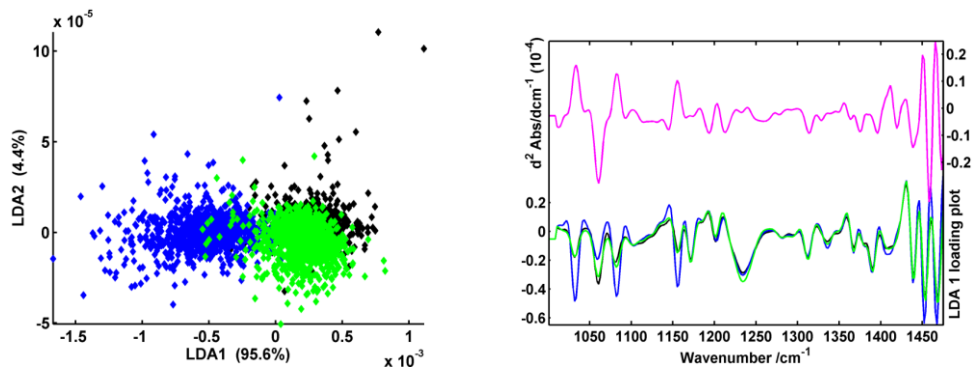

PC-LDA of EC19 **(red)** and EC23 **(blue)** treated TERA2.cl.SP12 cells at day 7 (8 PCs used) and (Lower curves) mean spectra of the EC19 and EC23 treated cells with LDA1 loading plot (upper curves).
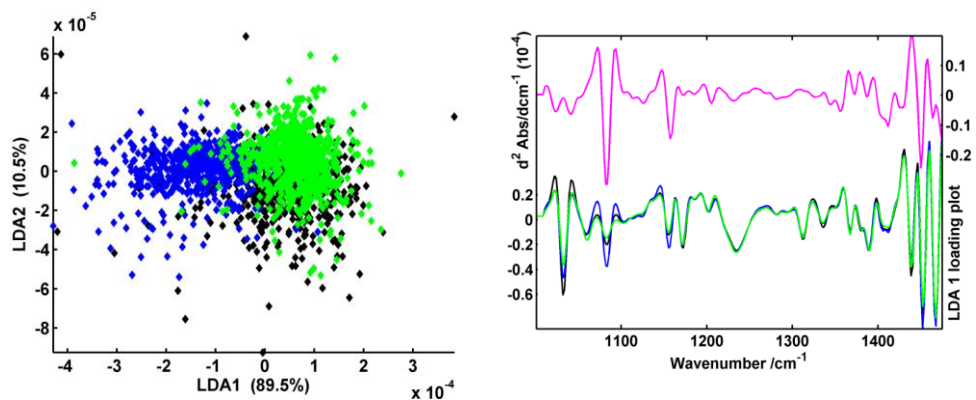
PC-LDA of EC19 **(red)** and ATRA **(green)** treated TERA2.cl.SP12 cells at day 7 (8 PCs used) and (Lower curves) mean spectra of the EC19 and ATRA treated cells with LDA1 loading plot (upper curves).

PC-LDA of ATRA treated TERA2.cl.SP12 cells at days 3 **(black)**, 5 **(blue)** and **7 (green)** (10 PCs used) and (Lower curves) mean spectra of the ATRA treated cells at days 3, 5 and 7 with LDA1 loading plot (upper curves).

PC-LDA of EC19 treated TERA2.cl.SP12 cells at days 3 **(black)**, 5 **(blue)** and **7 (green)** (8 PCs used) and (Lower curves) mean spectra of the EC19 treated cells at days 3, 5 and 7 with LDA1 loading plot (upper curves).

PC-LDA of DMSO (control) treated TERA2.cl.SP12 cells at days 3 **(black)**, 5 **(blue)** and **7 (green)** (6 PCs used) and (Lower curves) mean spectra of the DMSO treated cells at days 3, 5 and 7 with LDA1 loading plot (upper curves).

PC-LDA of ATRA **(green)** and DMSO **(black)** treated TERA2.cl.SP12 cells at day 5 (6 PCs used) and (Lower curves) mean spectra of the control and ATRA treated cells with LDA1 loading plot (upper curves).
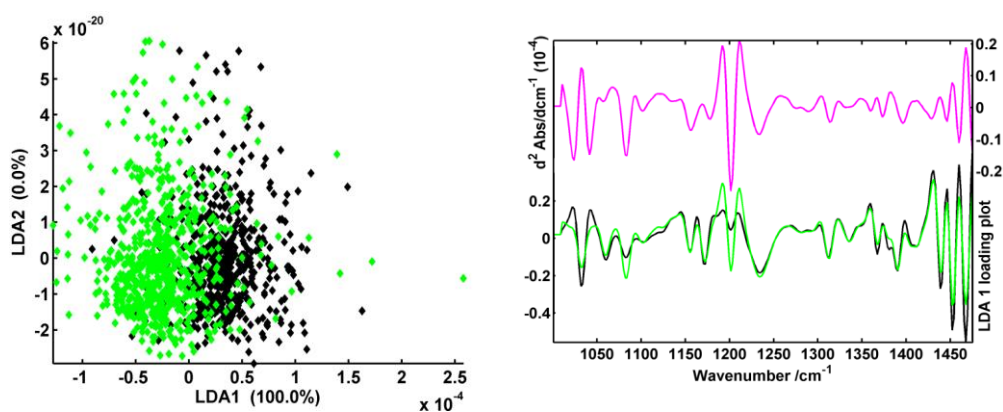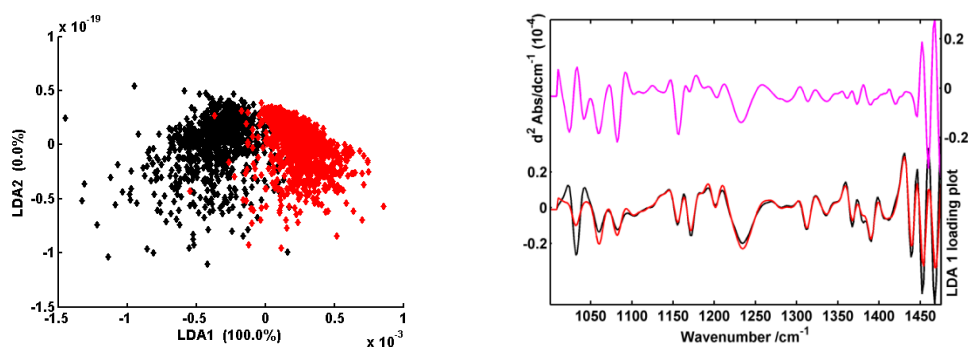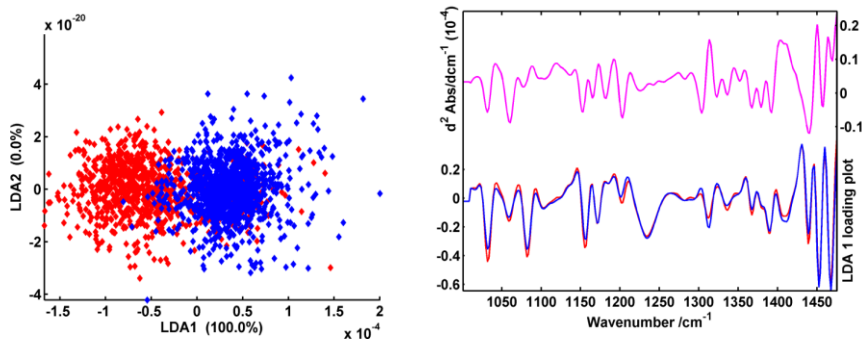

PC-LDA of EC19 **(red)** and DMSO **(black)** treated TERA2.cl.SP12 cells at day 5 (6 PCs used) and (Lower curves) mean spectra of the control and EC19 treated cells with LDA1 loading plot (upper curves).

PC-LDA of EC19 **(red)** and EC23 **(blue)** treated TERA2.cl.SP12 cells at day 5 (8 PCs used) and (Lower curves) mean spectra of the EC19 and EC23 treated cells with LDA1 loading plot (upper curves).

PC-LDA of EC19 **(red)** and ATRA **(green)** treated TERA2.cl.SP12 cells at day 5 (12 PCs used) and (Lower curves) mean spectra of the EC19 and ATRA treated cells with LDA1 loading plot (upper curves).

PC-LDA of EC19 **(red)**, ATRA **(green)** and the EC23 **(blue)** treated TERA2.cl.SP12 cells at day 5 (15 PCs used) and (Lower curves) mean spectra of the ATRA, EC19 and EC23 treated TERA2.cl.SP12 cells, (upper curve) LDA 1 loading plot from the EC19, ATRA and EC23 PC-LDA analysis at 5 days and LDA 2 loading plot.
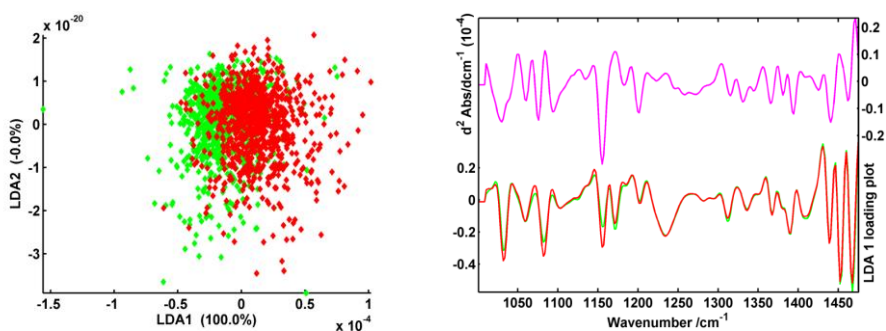
PC-LDA of ATRA **(green)** and DMSO **(black)** treated TERA2.cl.SP12 cells at day 3 (4 PCs used) and (Lower curves) mean spectra of the control and ATRA treated cells with LDA1 loading plot (upper curves).
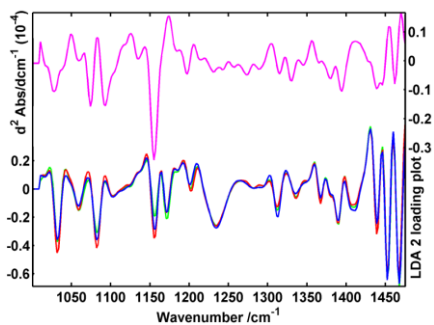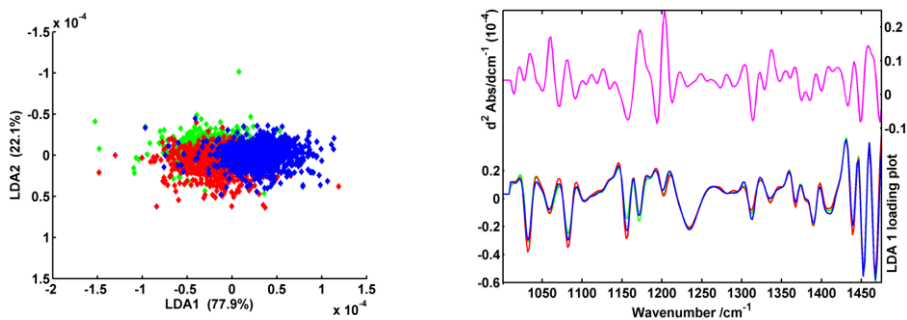

PC-LDA of EC19 **(red)** and DMSO **(black)** treated TERA2.cl.SP12 cells at day 5 (8 PCs used) and (Lower curves) mean spectra of the control and EC19 treated cells with LDA1 loading plot (upper curves).
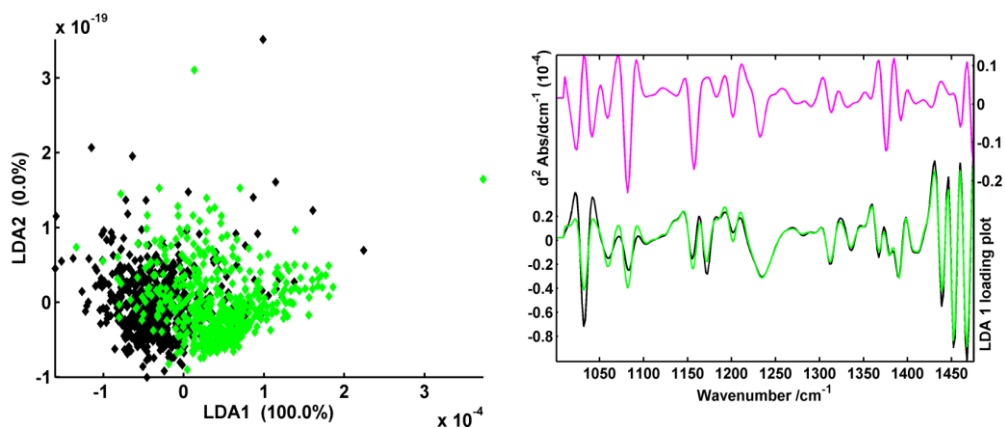

PC-LDA of EC19 **(red)** and EC23 **(blue)** treated TERA2.cl.SP12 cells at day 3 (8 PCs used) and (Lower curves) mean spectra of the EC19 and EC23 treated cells with LDA1 loading plot (upper curves).
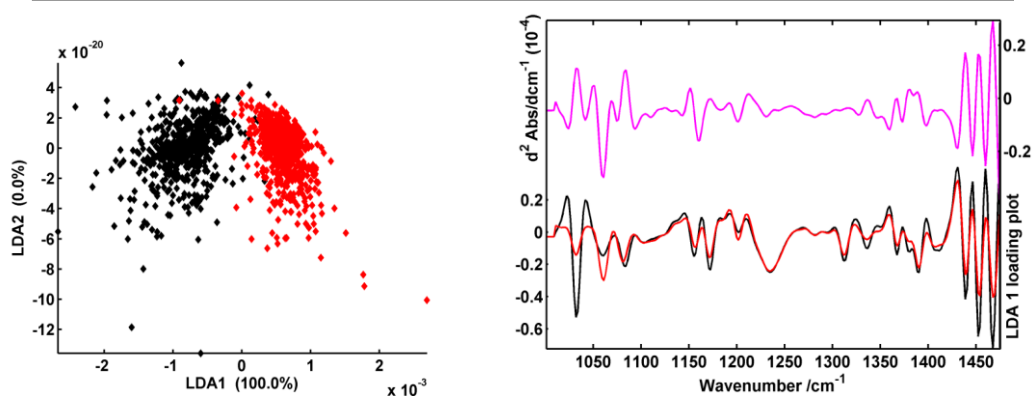
PC-LDA of EC19 **(red)** and ATRA **(green)** treated TERA2.cl.SP12 cells at day 3 (8 PCs used) and (Lower curves) mean spectra of the EC19 and ATRA treated cells with LDA1 loading plot (upper curves).
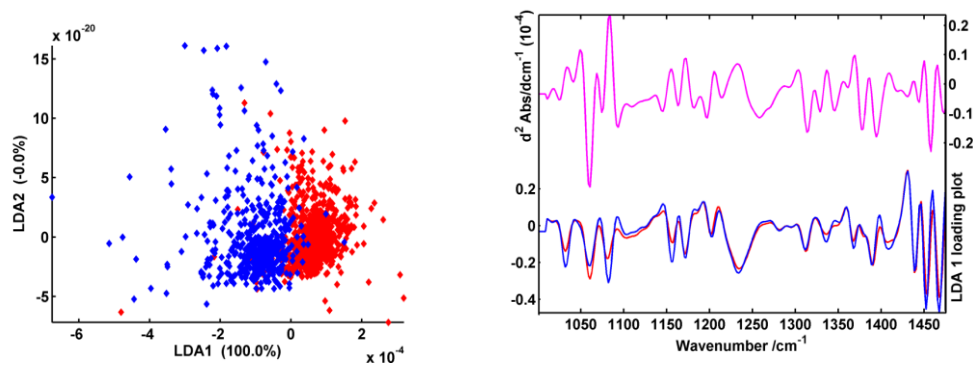
Spectral loadings and mean spectra from the ATRA and EC23 treated TERA2.cl.SP12 cells at 5(a) and 3 (b) days
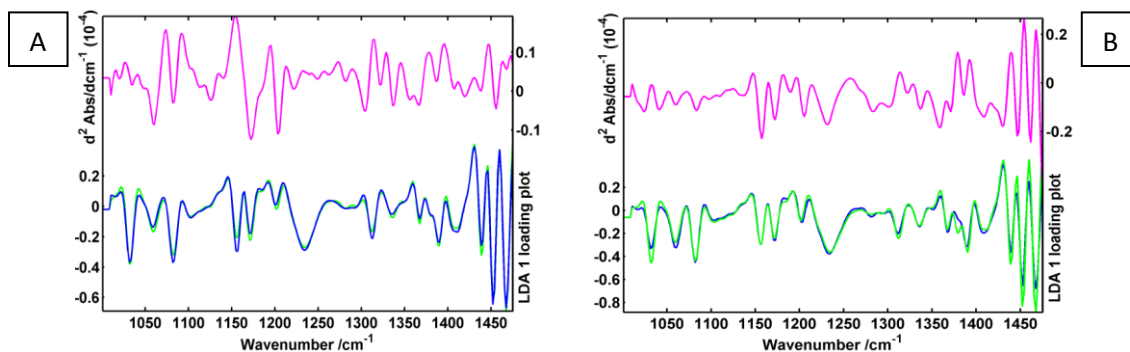
(Lower curves) mean spectra of EC23 **(blue)** and ATRA **(green)** treated TERA2.cl.SP12 cells, (upper curve) LDA 1 loading plots from the ATRA vs. EC23 PC-LDA analysis at 3 and 5 days.

Spectral loadings and mean spectra from the neuronal (ATRA and EC23 treated) and the epithelial differentiating (EC19 treated) TERA2.cl.SP12 cells at 5(a) and 3 (b) days
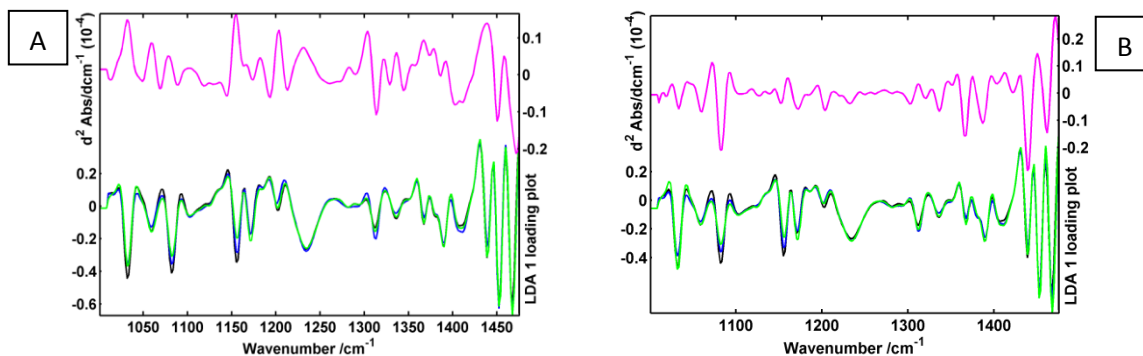
(Lower curves) mean spectra of epithelial **(black)** and neuronal **(blue)** (EC23) and green (ATRA)) differentiating TERA2.cl.SP12 cells, (upper curve) LDA 1 loading plots from the epithelial vs. neuronal differentiating PC-LDA analysis at 3 and 5 days.
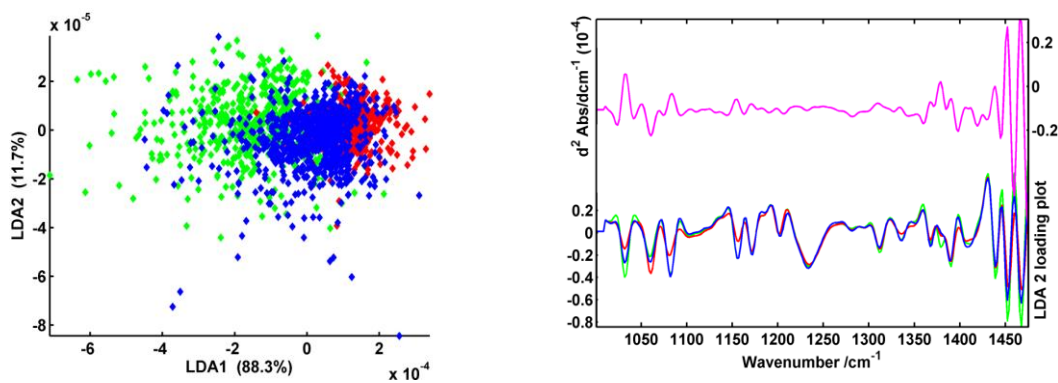
PC-LDA of EC19 **(red)**, ATRA **(green)** and the EC23 **(blue)** treated TERA2.cl.SP12 cells at day 3 (4 PCs used) and (Lower curves) mean spectra of the ATRA, EC19 and EC23treated TERA2.cl.SP12 cells, (upper curve) LDA 1 loading plot from the EC19, ATRA and EC23 PC-LDA analysis at 3 days.
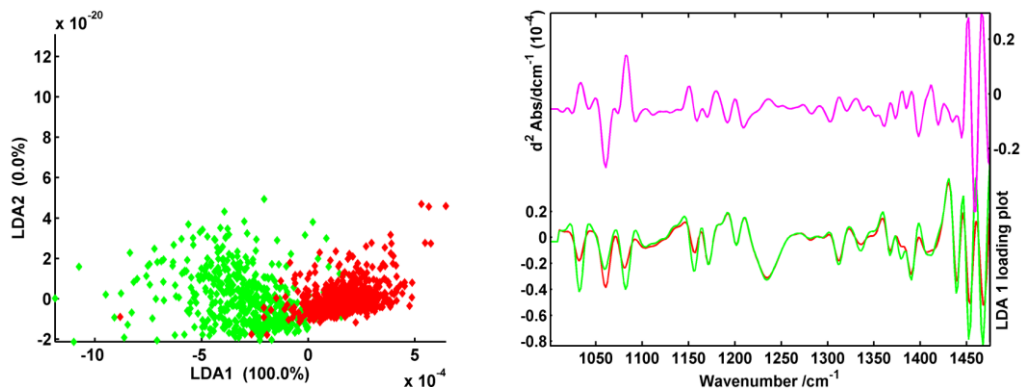
Mean spectrum plot of EC23 vs. DMSO (proteins region) at 5 days
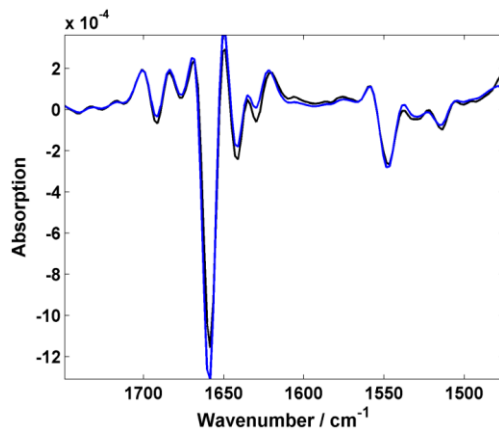
Reproducibility test of the control (DMSO) cells
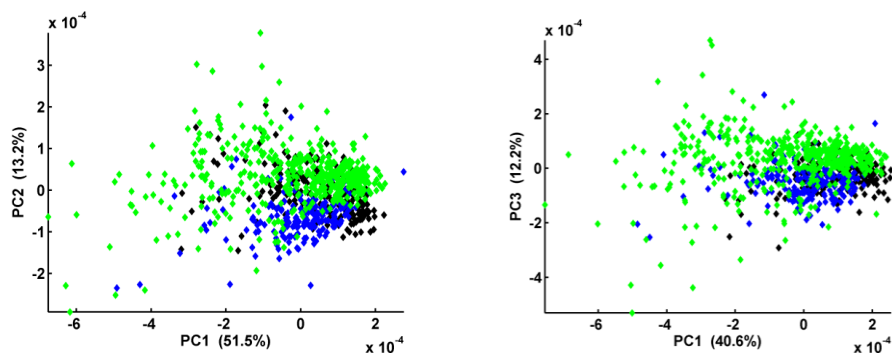
Reproducibility tests of the DMSO control cells. PCA scores plots of DMSO replicates 1 **(black)**, 2 **(blue)** and 3 **(green)** at 7 days
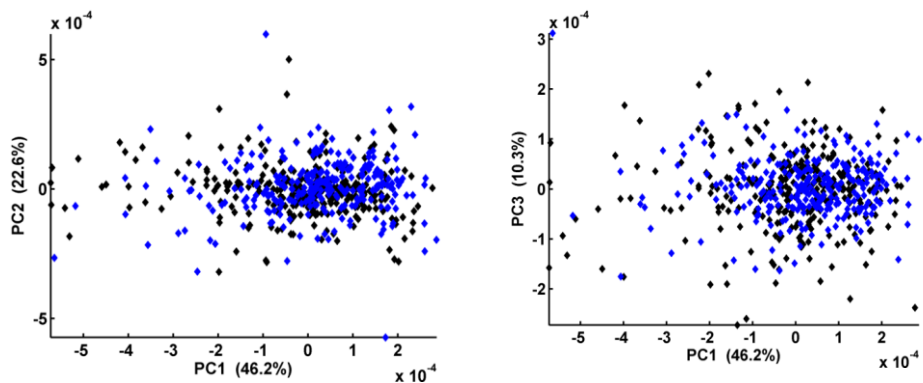
Reproducibility tests of the DMSO control cells. PCA scores plots of DMSO replicates 1 **(black)** and 2 **(blue)** at 5 days.
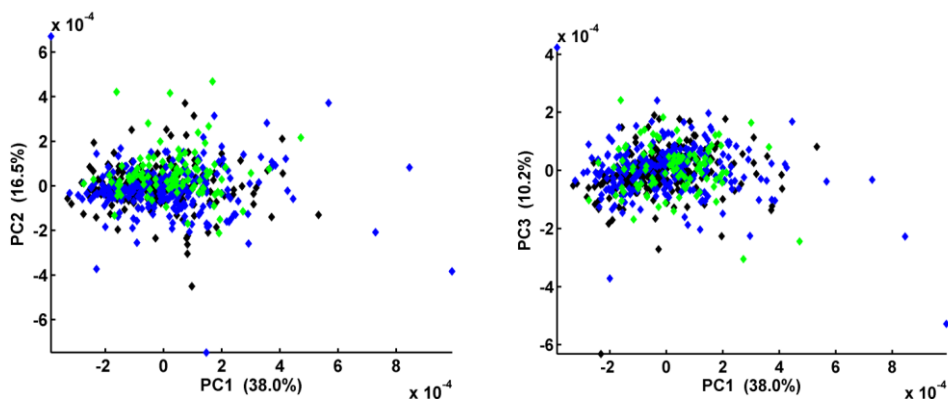
Reproducibility tests of the DMSO control cells. PCA scores plots of DMSO replicates 1 **(black)**, 2 **(blue)** and 3 **(green)** at 3 days.

Cumulative Percent Variance Explained Scree Plots
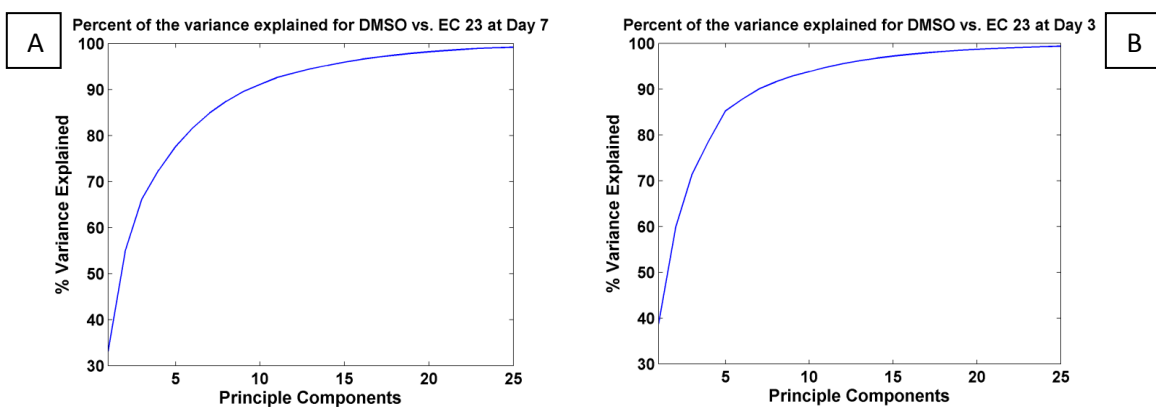
Percent variance explained for the PCA analysis of DMSO and EC23 at days 7 **(a)** and 5 **(b)**.
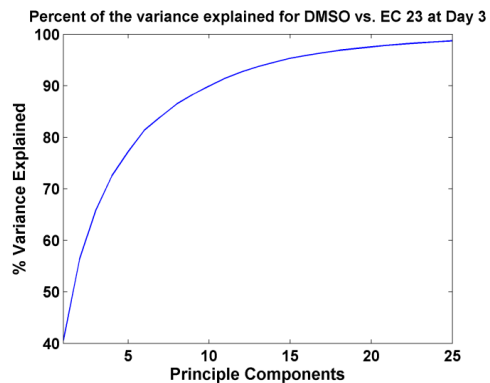
Percent variance explained for the PCA analysis of DMSO and EC23 at day 3.
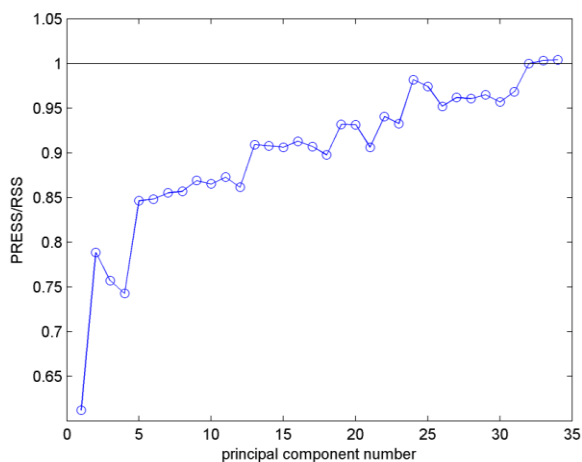
Example of the PRESS test result

10 fold cross validation of the PC-LDA analysis

	Numbers of PCs used	Specificity	Sensitivity	Correctly classified
DMSO vs. EC23 at day 7	6	0.767	0.867	0.823
DMSO vs. ATRA at day 7	6	0.901	0.906	0.907
DMSO vs. EC19 at day 7	8	0.929	0.881	0.906
DMSO vs. Control at day 7	6	0.807	0.814	0.811
ATRA vs. E 23 at day 7	6	0.876	0.884	0.880
ATRA vs. EC19 at day 7	9	0.884	0.886	0.884
EC23 vs. EC19 at day 7	8	0.929	0.881	0.907

	Number of PCs used	Specificity	Sensitivity	Correctly classified
DMSO vs. EC23 at day 5	8	0.854	0.866	0.858
DMSO vs. ATRA at day 5	10	0.791	0.778	0.785
DMSO vs. EC19 at day 5	10	0.819	0.828	0.823
DMSO vs. Control at day 5	10	0.883	0.772	0.816
ATRA vs. EC23 at day 5	12	0.725	0.733	0.728
ATRA vs. EC19 at day 5	10	0.728	0.797	0.754
EC23 vs. EC19 at day 5	8	0.642	0.743	0.690

	Number of PCs used	Specificity	Sensitivity	Correctly classified
DMSO vs. EC23 at day 3	6	0.869	0.862	0.866
DMSO vs. ATRA at day 3	4	0.854	0.747	0.805
DMSO vs. EC19 at day 3	8	0.933	0.892	0.915
DMSO vs. Control at day 3	6	0.878	0.763	0.827
ATRA vs. EC23 at day 3	6	0.765	0.77	0.768
ATRA vs. EC19 at day 3	8	0.930	0.831	0.893
EC23 vs. EC19 at day 3	8	0.783	0.862	0.833

Press Results

	PC number where PRESS/RSS is > 1
DMSO vs. EC23 at day 7	32
DMSO vs. EC19 at day 7	31
DMSO vs. ATRA at day 7	33
DMSO vs. Control at day 7	26
ATRA vs. EC23 at day 7	36
ATRA vs. EC19 at day 7	37
EC 23 vs. EC19 at day 7	36
ATRA vs. EC19 vs. EC23 at day 7	50

EC23 days3, 5 and 7	31
EC19 days 3, 5 and 7	37
ATRA days 3, 5 and 7	40
DMSO days 3, 5 and 7	21
Epithelial vs. Neuronal day 7	53
Epithelial vs. Neuronal day 5	48
Epithelial vs. Neuronal day 3	33
ATRA vs. EC23 at days 3, 5 and 7	55
ATRA vs. EC23 at days 3 and 5	34
DMSO vs. EC23 day 5	29
DMSO vs. EC19 day 5	26
DMSO vs. ATRA day 5	22
DMSO vs. Control day 5	19
ATRA vs. EC23 at day 5	32
ATRA vs. EC19 at day 5	26
EC23 vs. EC19 at day 5	33
ATRA vs. EC19 vs. EC23 at day 5	50
DMSO vs. EC23 day 3	13
DMSO vs. EC19 day 3	13
DMSO vs. ATRA day 3	10
DMSO vs. Control day 3	10
ATRA vs. EC23 at day 3	18
ATRA vs. EC19 at day 3	16
EC23 vs. EC19 at day 3	21
ATRA vs. EC19 vs. EC23 at day 3	31