

**Supplementary Table S1A.** Gold standard expression data sets from KEGGdzPathwaysGEO

GEO ID	Pubmed ID	Disease/Target pathway	KEGG ID	Tissue
GSE9476	17910043	Acute myeloid leukemia	hsa05221	Blood, Bone marrow
GSE1297	14769913	Alzheimer's Disease	hsa05010	Hippocampal CA1
GSE5281	17077275	Alzheimer's Disease	hsa05010	Brain, Entorhinal Cortex
GSE5281	17077275	Alzheimer's Disease	hsa05010	Brain, hippocampus
GSE5281	17077275	Alzheimer's Disease	hsa05010	Brain, Primary visual cortex
GSE4107	17317818	Colorectal Cancer	hsa05210	Mucosa
GSE8671	18171984	Colorectal Cancer	hsa05210	Colon
GSE9348	20143136	Colorectal Cancer	hsa05210	Colon
GSE3585	17045896	Dilated cardiomyopathy	hsa05414	Heart
GSE19728	-	Glioma	hsa05214	Brain
GSE21354	-	Glioma	hsa05214	Brain, Spine
GSE8762	17724341	Huntington's Disease	hsa05016	Lymphocytes (blood)
GSE18842	20878980	Non-Small Cell Lung Cancer	hsa05223	Lung
GSE19188	20421987	Non-Small Cell Lung Cancer	hsa05223	Lung
GSE15471	19260470	Pancreatic Cancer	hsa05212	Pancreas
GSE16515	19732725	Pancreatic Cancer	hsa05212	Pancreas
GSE20153	20926834	Parkinson's Disease	hsa05012	Lymphoblasts
GSE20291	15965975	Parkinson's Disease	hsa05012	Postmortem brain putamen
GSE6956	18245496	Prostate Cancer	hsa05215	Prostate, African-American
GSE6956	18245496	Prostate Cancer	hsa05215	Prostate, Caucasian
GSE14762	19252501	Renal Cancer	hsa05211	Kidney
GSE781	14641932	Renal Cancer	hsa05211	Kidney
GSE3467	16365291	Thyroid Cancer	hsa05216	Thyroid
GSE3678	-	Thyroid Cancer	hsa05216	Thyroid

**Supplementary Table S1B.** Gold standard expression data sets from Expression Atlas and DisGeNet

<b>Expression Atlas ID</b>	<b>Pubmed ID</b>	<b>Disease/Target pathway</b>	<b>Disease ID</b>
E-GEOD-53239	24393808	Bipolar disorder	C0005586
E-GEOD-60052	27093186	Small cell lung cancer	C0149925
E-GEOD-66573	-	Multiple sclerosis	C0026769
E-GEOD-72509	26382853	Lupus erythematosus	C0024141
E-GEOD-93624	28805827	Crohn's disease	C0010346

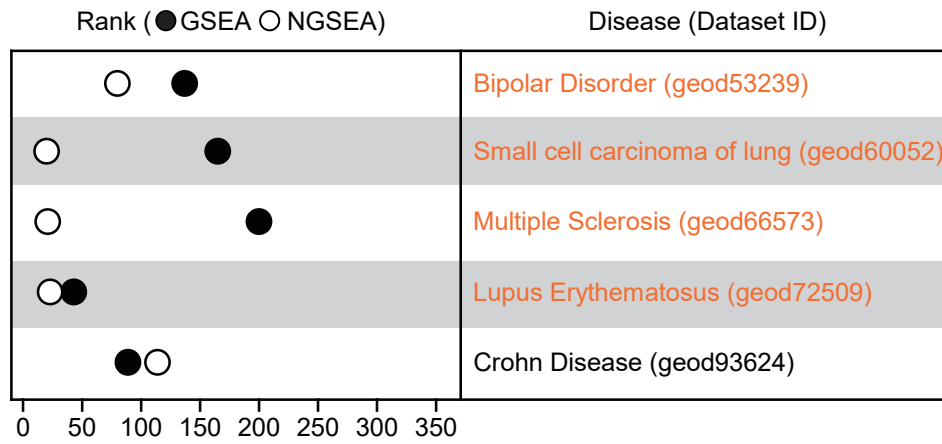
**Supplementary Table S2. Cell viability after treatment of budesonide**

<b>HCT116</b>	control	50	100	150	200	250
24hrs	100	103.4414	92.07371	78.19716	49.24512	34.8579
48hrs	100	100.2643	68.14329	51.83666	39.62264	33.95315
72hrs	100	101.7935	62.23228	51.43073	25.23072	25.09142

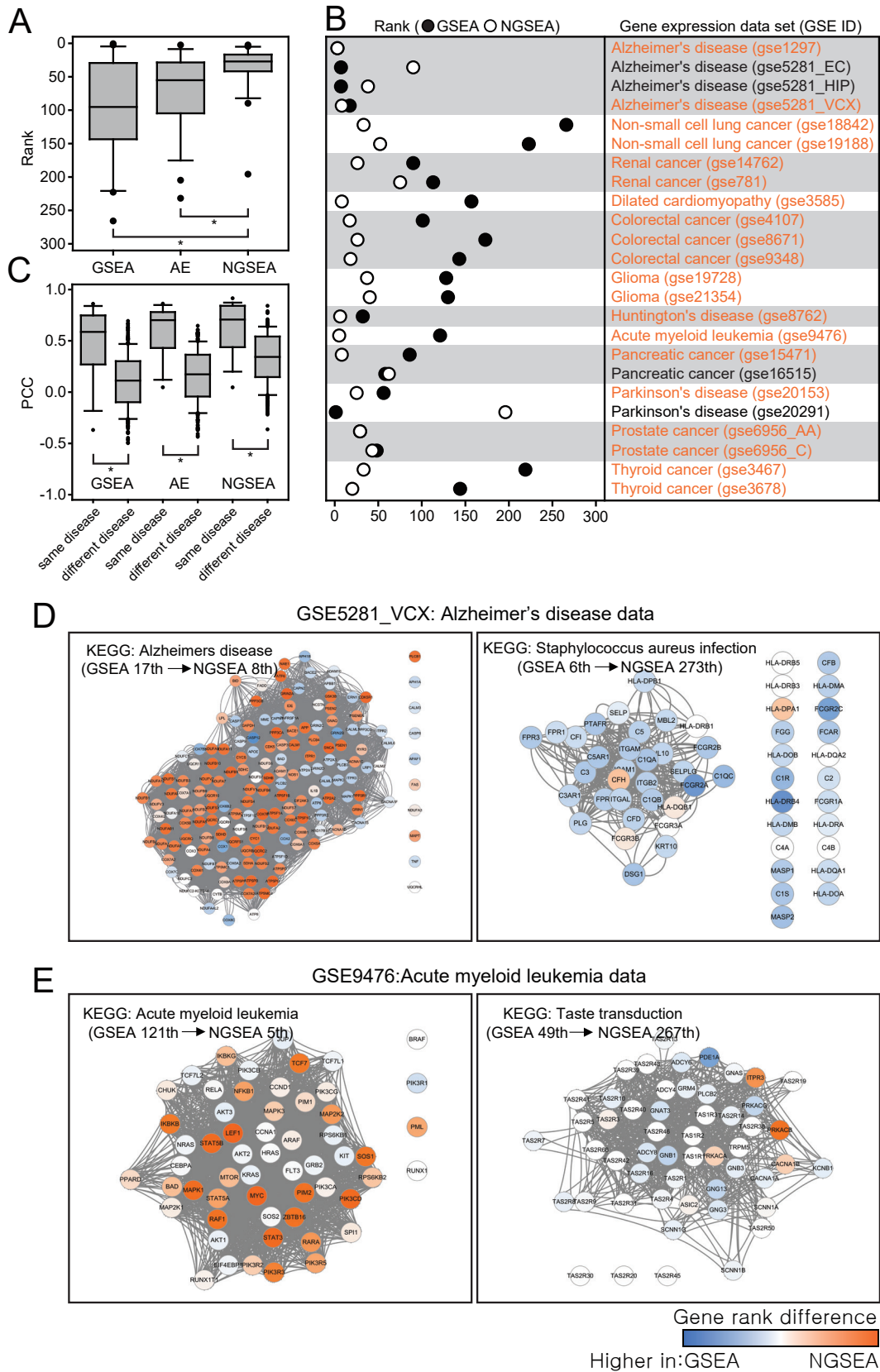
<b>HT-29</b>	control	50	100	150	200	250
24hrs	100	102.1072	86.37321	82.69726	49.98829	48.81761
48hrs	100	100.1124	75.16505	49.69799	45.55415	46.48125
72hrs	100	96.85039	76.34372	35.73434	37.43923	37.19274

\* Antiproliferative effect of budesonide on HCT116 and HT-29 cell line  
(viability of drug treated cell lines at 24, 48 & 72 hrs by MTS assay)

\* Each value is the percentage of normalized viability compared to DMSO treated cells.



**Supplementary Fig. S1.** Rank comparison of the matched DisGeNet disease gene sets between GSEA and NGSEA for each of the 5 gold-standard expression data sets compiled from Expression Atlas.



**Supplementary Fig. S2.** Recovery of KEGG pathways for matched disease expression datasets by GSEA, AE, and NGSEA with STRING network.