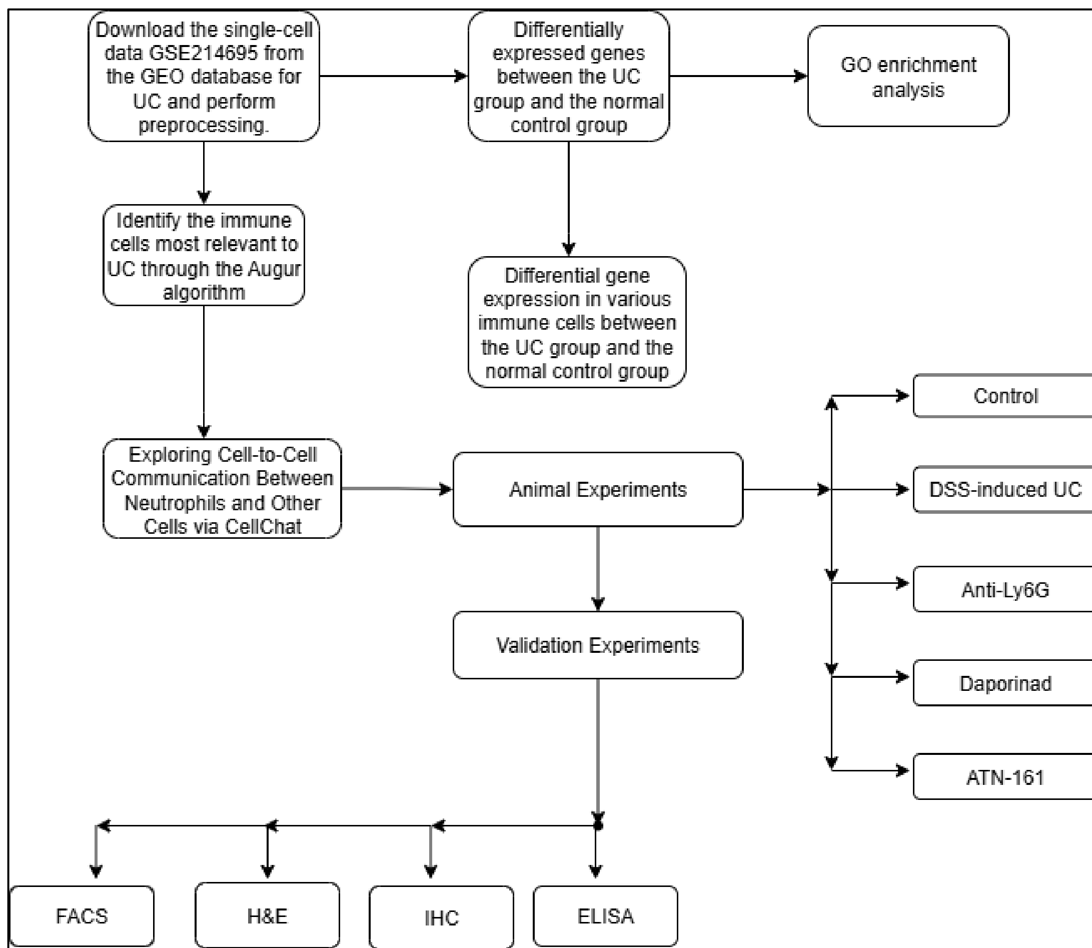


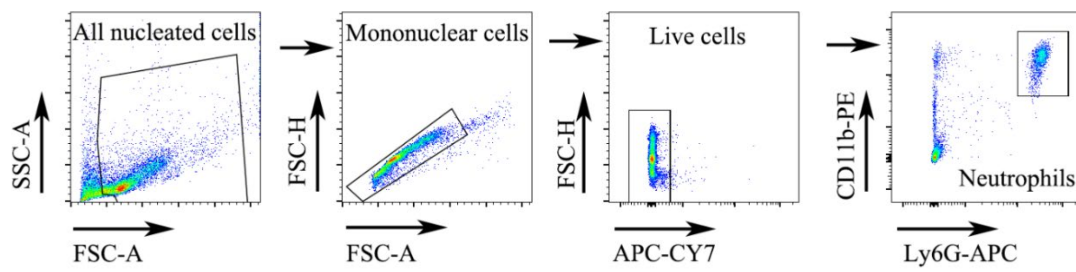
Supplementary Figure 1. Workflow of the study.

A schematic overview of the study design integrating single-cell RNA sequencing analysis, computational algorithms (Augur and CellChat), and in vivo validation experiments. The workflow includes data preprocessing and differential gene expression analysis, identification of disease-relevant immune cell populations, exploration of intercellular communication networks, and validation in DSS-induced colitis mouse models using FACS, H&E, IHC, and ELISA.

VEGFC – VEGFR3
VEGFC – VEGFR2R3
VEGFC – VEGFR2
VEGFB – VEGFR1
VEGFA – VEGFR2
VEGFA – VEGFR1R2
VEGFA – VEGFR1
VCAM1 – (ITGA4+ITGB7)
VCAM1 – (ITGA4+ITGB1)
TNFSF14 – TNFRSF14
TNFSF14 – LTBR
TNFSF13B – TNFRSF17
TNFSF13B – TNFRSF13C
TNFSF13B – TNFRSF13B
TNFSF10 – TNFRSF10B
THY1 – (ITGAX+ITGB2)
THY1 – (ITGAM+ITGB2)
THBS1 – SDC1
THBS1 – CD47
THBS1 – CD36
TGFB3 – (TGFBR1+TGFBR2)
TGFB3 – (ACVR1B+TGFBR2)
TGFB3 – (ACVR1+TGFBR1)
TGFB2 – (TGFBR1+TGFBR2)
TGFB2 – (ACVR1B+TGFBR2)
TGFB2 – (ACVR1+TGFBR1)
TGFB1 – (TGFBR1+TGFBR2)
TGFB1 – (ACVR1B+TGFBR2)
TGFB1 – (ACVR1+TGFBR1)
TGFA – EGFR
TGFA – (EGFR+ERBB2)
SEMA7A – PLXNC1
SEMA7A – (ITGB1+ITGA1)
SEMA4D – PLXNB2
SEMA4D – PLXNB1
SELL – PODXL
SELL – CD34
PTPRC – MRC1
PTPRC – CD22
PSAP – GPR37
PRSS3 – PARD3
PRSS3 – F2RL3
PRSS3 – F2R
PGF – VEGFR1
PECAM1 – PECAM1
PDGFC – PDGFRA
PDGFB – PDGFRB
PDGFB – PDGFRA
PDGFA – PDGFRB
PDGFA – PDGFRA
OSM – (OSMR+IL6ST)
OSM – (LIFR+IL6ST)
OCLN – OCLN
NTF3 – NTRK3
NTF3 – NTRK2
NTF3 – NTRK1
NRG1 – ERBB3
NRG1 – (ERBB2+ERBB3)
NPPC – NPR2
NECTIN2 – TIGIT
NAMPT – INSR
NAMPT – (ITGA5+ITGB1)
MPZL1 – MPZL1
LTA – TNFRSF1B
LTA – TNFRSF1A
LTA – TNFRSF14
LTA – (LTB+LTBR)
LIF – (LIFR+IL6ST)
LGALS9 – HAVCR2
LGALS9 – CD45
LGALS9 – CD44
KLK3 – NTRK1
KITL – KIT
JAG1 – NOTCH4
JAG1 – NOTCH3
JAG1 – NOTCH2
JAG1 – NOTCH1
ITGB2 – ICAM2
ITGB2 – ICAM1
INHBA – (ACVR1B+ACVR2B)
INHBA – (ACVR1B+ACVR2A)
IL7 – (IL7R+IL2RG)
IL6 – (IL6R+IL6ST)
IL4 – IL4R
IL4 – (IL4R+IL2RG)
IL4 – (IL4R+IL13RA2)
IL4 – (IL4R+IL13RA1)
IL34 – CSF1R
IL2 – (IL2RB+IL2RG)
IL1B – IL1R2
IL1B – (IL1R1+IL1RAP)
IL1A – IL1R2
IL1A – (IL1R1+IL1RAP)
IL15 – (IL15RA+IL2RB)
IL13 – IL13RA2
IL13 – IL13RA1
IL13 – (IL4R+IL13RA2)
IL13 – (IL4R+IL13RA1)
IGF1 – IGF1R
IGF1 – (ITGA6+ITGB4)
IFNG – (IFNGR1+IFNGR2)
ICAM1 – SPN
ICAM1 – ITGAL
ICAM1 – (ITGAX+ITGB2)
ICAM1 – (ITGAM+ITGB2)
ICAM1 – (ITGAL+ITGB2)
HLA–F – LILRB1
HLA–F – CD8A
HLA–E – KLRC1
HLA–E – CD94:NKG2A
HLA–E – CD8A
HLA–DRB5 – CD4
HLA–DRB1 – CD4
HLA–DRA – CD4
HLA–DQB1 – CD4
HLA–DQA1 – CD4
HLA–DPB1 – CD4
HLA–DPA1 – CD4
HLA–DMB – CD4
HLA–DMA – CD4
HLA–C – KIR2DL3
HLA–C – CD8A
HLA–B – CD8A
HLA–A – CD8A
HGF – MET
HC – C5AR1
HBEGF – EGFR
HBEGF – (EGFR+ERBB2)
GRN – SORT1
GP1BA – (ITGAM+ITGB2)
GH1 – GHR
GH – PRLR
GH – GHR
GDNF – GFRA1
GAS6 – AXL
FN1 – SDC1
FN1 – CD44
FN1 – (ITGAV+ITGB1)
FN1 – (ITGA8+ITGB1)
FN1 – (ITGA5+ITGB1)
FN1 – (ITGA4+ITGB7)
FN1 – (ITGA4+ITGB1)
FLT3L – FLT3
FGF9 – FGFR4
FGF9 – FGFR3
FGF9 – FGFR2
FGF9 – FGFR1
FGF7 – FGFR2
FGF7 – FGFR1
FGF2 – FGFR4
FGF2 – FGFR3
FGF2 – FGFR2
FGF2 – FGFR1
FGF10 – FGFR2
FGF10 – FGFR1
FCER2A – CR2
FCER2A – (ITGAX+ITGB2)
FCER2A – (ITGAM+ITGB2)
FASL – FAS
EREG – EGFR
EREG – (EGFR+ERBB2)
EGF – EGFR
EGF – (EGFR+ERBB2)
EFNB3 – EPHB4
EFNB3 – EPHB2
EFNB2 – EPHA4
EFNB2 – EPHB4
EFNB2 – EPHB2
EFNB2 – EPHA4
EFNA5 – EPHB2
EFNA5 – EPHA7
EFNA5 – EPHA4
EFNA5 – EPHA3
EFNA5 – EPHA2
EFNA5 – EPHA1
EFNA4 – EPHA7
EFNA4 – EPHA4
EFNA4 – EPHA3
EFNA4 – EPHA2
EFNA4 – EPHA1
EFNA1 – EPHA7
EFNA1 – EPHA4
EFNA1 – EPHA3
EFNA1 – EPHA2
EFNA1 – EPHA1
CXCL8 – CXCR2
CXCL8 – ACKR1
CXCL3 – CXCR2
CXCL3 – ACKR1
CXCL2 – CXCR2
CXCL2 – ACKR1
CXCL16 – CXCR6
CXCL12 – CXCR4
CSF3 – CSF3R
CSF2 – (CSF2RA+CSF2RB)
CSF1 – CSF1R
COL1A1 – SDC1
COL1A1 – CD44
COL1A1 – (ITGA2+ITGB1)
COL1A1 – (ITGA1+ITGB1)
CNTN2 – CNTN2
CLEC2B – KLRB1
CDH5 – CDH5
CDH1 – KLRG1
CDH1 – CDH1
CDH1 – (ITGAE+ITGB7)
CDH1 – (ITGA1+ITGB1)
CD99 – PILRA
CD99 – CD99
CD8A – CEACAM5
CD86 – CTLA4
CD86 – CD28
CD80 – CTLA4
CD80 – CD28
CD48 – CD244A
CD46 – JAG1
CD40LG – CD40
CD40LG – (ITGAM+ITGB2)
CD40LG – (ITGA5+ITGB1)
CD22 – PTPRC
CD1D – CEACAM5
CCL5 – CCR5
CCL5 – CCR3
CCL5 – CCR1
CCL5 – ACKR1
CCL4 – CCR5
CCL3L1 – CCR1
CCL3 – CCR5
CCL3 – CCR1
CCL11 – CCR3
CCL11 – ACKR1
C3 – CR2
C3 – C3AR1
C3 – (ITGAX+ITGB2)
C3 – (ITGAM+ITGB2)
BTLA – TNFRSF14
BDNF – NTRK2
AREG – EGFR
AREG – (EGFR+ERBB2)
APP – CD74
ANXA1 – FPR2
ANXA1 – FPR1
ANXA1 – (FPR2+LXA4)
ADGRE5 – CD55
Neutrophils -> B cells
Neutrophils -> CD4..T cells
Neutrophils -> Endothelial cells
Neutrophils -> Epithelial cells
Neutrophils -> Fibroblasts
Neutrophils -> M1 macrophages
Neutrophils -> Mast cells
Neutrophils -> Neutrophils
Neutrophils -> NK cells
p-value
0.01 < p < 0.05
p < 0.01
Commun. Prob.
max
min

Supplementary Figure 2. Communication Network between Neutrophils and Other Cell Types.

Dot heatmap based on the ligand-receptor probability matrix, dot color indicates the probability of communication (commun.prob), and dot size indicates the average expression level of the corresponding gene combinations in the paired cells. The red box indicates the pathway analyzed in this study.



Supplementary Figure 3. Flow Cytometry Gating Strategy.

To analyze peripheral blood neutrophils, the following gating strategy was employed. First, a gate was set on all nucleated cells based on FSC-A and SSC-A to exclude cell debris and aggregates. Subsequently, live cells were selected from the nucleated population using a viability dye (Zombie NIR™, APC-CY7). Finally, neutrophils were identified as the population that was double-positive for Ly6G (APC) and CD11b (PE) within the live cells.