

**Supplementary Table 1.** Summary of datasets and clinical characteristics

Dataset ID	Disease/Condition	Sample types	Sample size (healthy/disease)	Clinical characteristics	Metadata availability
GSE171110	COVID-19	Whole blood (RNA)	10/44	Supplementary Table 2	Partially available
GSE189990	COVID-19	Whole blood (RNA)	4/20	–	Limited
GSE178246	COVID-19 (miRNA dataset)	Whole blood (miRNA)	70/95	–	Limited
GSE48000	Venous thrombosis	Whole blood (RNA)	25/107	Supplementary Table 3	Comprehensive
GSE19151	Venous thrombosis	Whole blood (RNA)	63/70	–	Limited

**Supplementary Table 2.** Clinical characteristics of patients in the GSE171110 dataset

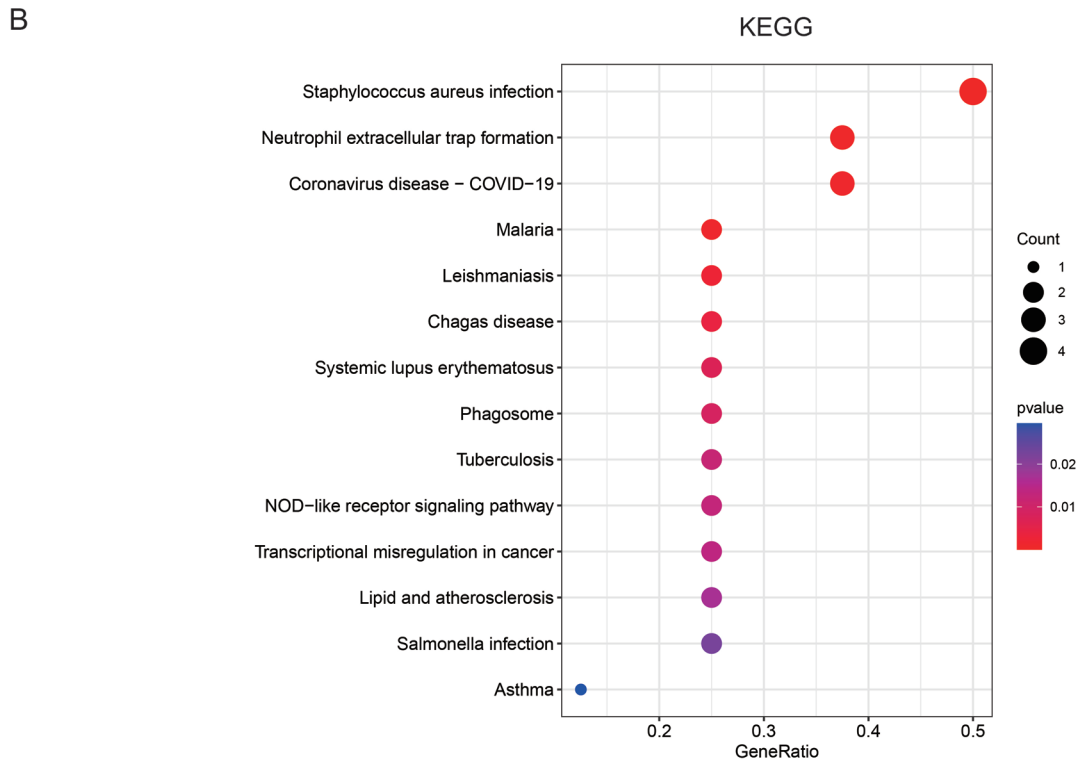
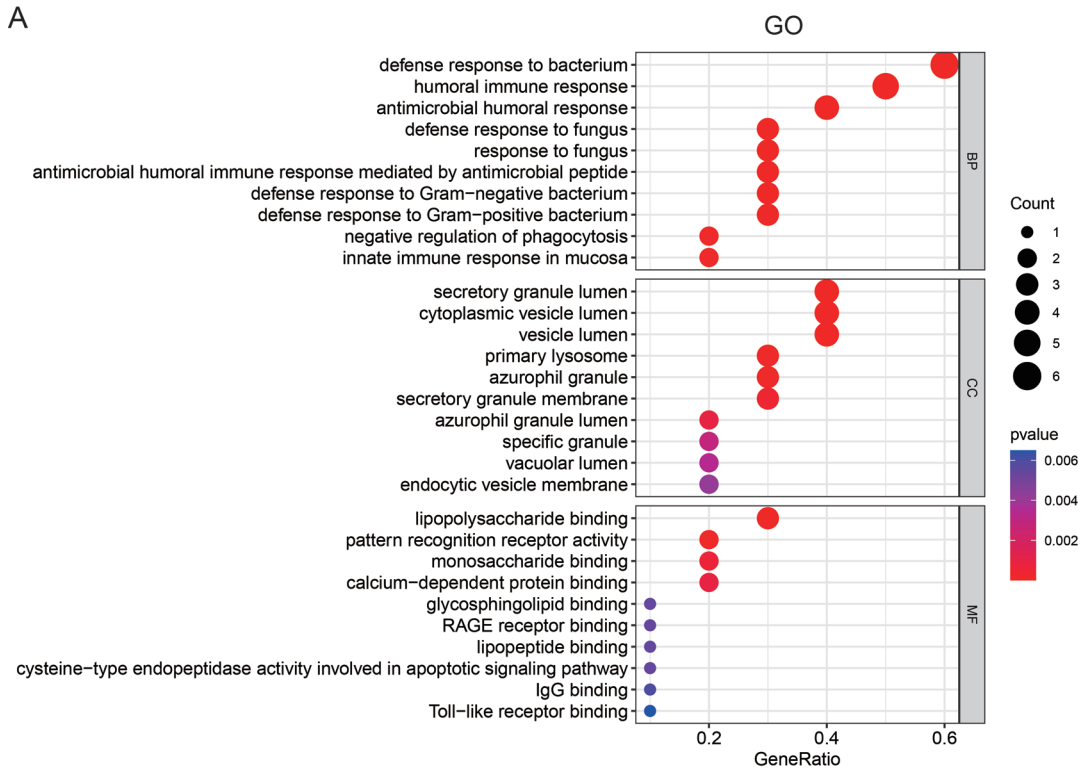
Parameter	<i>n</i>	Value
<b>Healthy</b>	10	
Age (years), median (IQR)		33 (29-38)
Male sex, <i>n</i> /total, <i>n</i> (%)		10/10 (100)
<b>COVID-19 patients</b>	44	
Demographic characteristics		
Age (years), IQR	44	(48-74)
Male sex, <i>n</i> /total, <i>n</i> (%)	44	37/44 (84.1)
ICU or transfer to ICU or death, <i>n</i> /total, <i>n</i> (%)	44	36/44 (81.8)
Outcome, <i>n</i> /total, <i>n</i> (%)	44	
Death		13/44 (29.5)
Discharge alive		31/44 (70.5)
Comorbidities, <i>n</i> /total, <i>n</i> (%)		
Any	44	13/44 (29.55)
Chronic cardiac disease	44	7/44 (15.91)
Hypertension	44	13/44 (29.55)
Chronic pulmonary disease	44	3/44 (6.82)
Asthma	44	2/44 (4.55)
Chronic kidney disease	44	3/44 (6.82)
Chronic neurological disorder	44	1/44 (2.27)
Obesity	44	13/44 (29.55)
Diabetes	44	9/44 (20.45)
Smoking history, <i>n</i> /total, <i>n</i> (%)		
Smoking	44	4/44 (9)
Laboratory findings on admission (IQR)		
Hemoglobin (g/dl)	44	12-15
WBC count ( $\times 10^9/l$ )	44	5-13
Platelet count ( $\times 10^9/l$ )	44	115-359
C-reactive protein (CRP) (mg/l)	44	20-244
Blood urea nitrogen (urea) (mmol/l)	44	3-12

**Supplementary Table 2.** Cont.

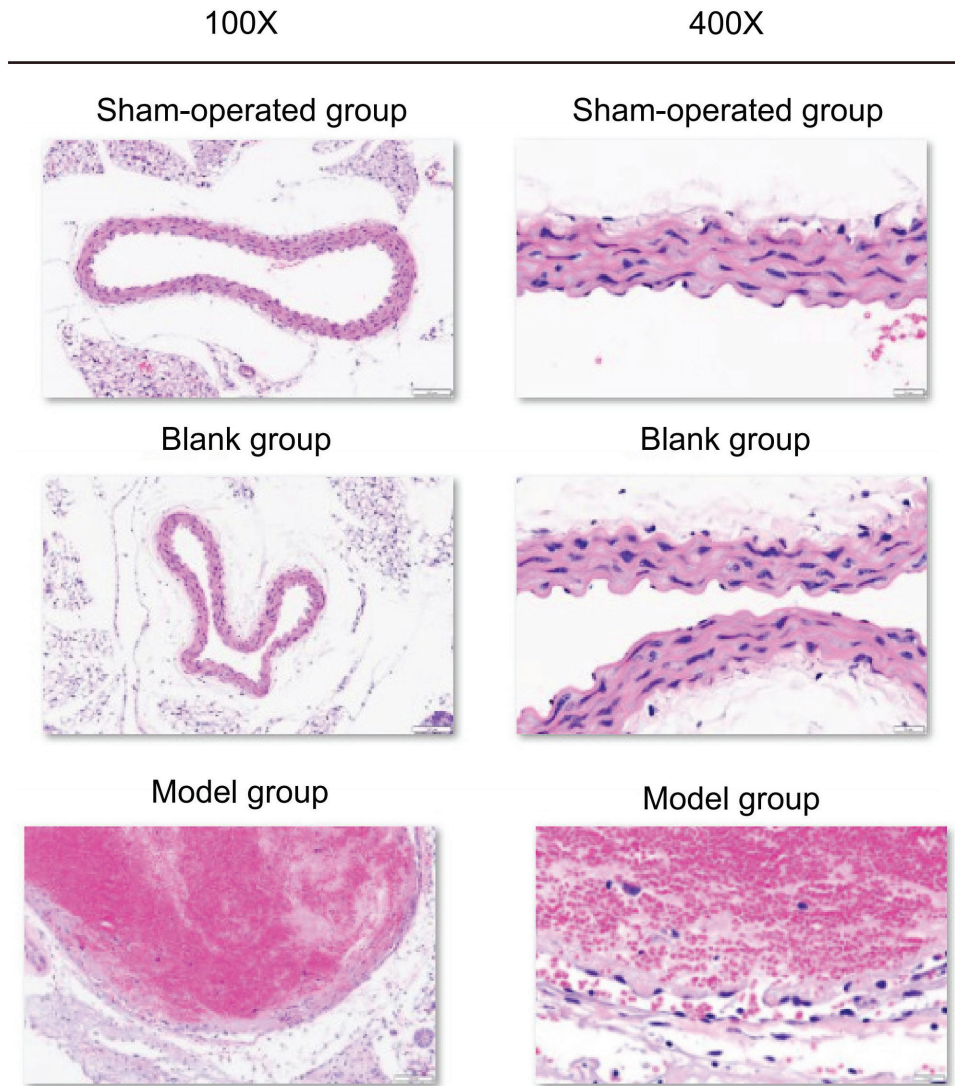
<b>Parameter</b>	<b>n</b>	<b>Value</b>
Symptoms on admission, n/total, n (%)		
Fever	44	30/44 (68.18)
Cough	42	30/42 (71.43)
Sore throat	41	3/41 (7.32)
Wheezing	39	3/39 (7.69)
Myalgia	41	15/41 (36.59)
Arthralgia	40	7/40 (17.5)
Fatigue	42	18/42 (42.86)
Dyspnea	42	35/42 (83.33)
Headache	42	10/42 (23.81)
Altered consciousness	41	2/41 (4.88)
Abdominal pain	38	4/38 (10.53)
Vomiting/nausea	41	8/41 (19.51)
Diarrhea	41	10/41 (24.39)
Clinical characteristics on admission (IQR)		
SOFA score	23	1-7
SAPS2	24	22-61
Heart rate (beats per minute)	44	72-105
Respiratory rate (breaths per minute)	40	18-33
Systolic blood pressure (mmHg)	43	108-158
Diastolic blood pressure (mmHg)	43	65-89
Oxygen saturation (%)	44	87-98
Oxygen saturation on, n/total, n (%)		
Room air		14/44 (31.82)
Oxygen therapy		30/44 (68.18)
Treatment, n/total, n (%)		
Antiviral	43	29/43 (67.44)
Antibiotic	43	29/43 (67.44)
Corticosteroids	43	19/43 (44.19)
Antifungal	43	5/43 (11.63)
Hydroxychloroquine	43	6/43 (13.95)

**Supplementary Table 3.** Clinical characteristics of patients in the GSE48000 dataset

Variable	High risk (n = 40)	Moderate risk (n = 33)	Low risk (n = 34)	Healthy controls (n = 25)
Age (years), mean (range)	56 (27-81)	54 (21-84)	48 (24-89)	46 (29-70)
Female, n (%)	13 (32)	18 (54)	20 (59)	16 (64)
BMI, mean (range)	33.0 (19.1-47.0)	31.3 (17.1-48.6)	31.9 (19.2-54.0)	28.8 (19.9-43.8)
Race White, n (%)	33 (82)	27 (82)	30 (88)	21 (84)
Race Black, n (%)	7 (17)	6 (18)	3 (9)	3 (12)
Race Other, n (%)	–	–	1 (3)	1 (4)
VTE events per subject – One, n (%)	0	21 (64)	29 (85)	N/A
VTE events per subject – Two, n (%)	25 (63)	10 (30)	5 (15)	N/A
VTE events per subject – Three, n (%)	9 (22)	2 (6)	0	N/A
VTE events per subject ≥ Four, n (%)	6 (15)	0	0	N/A
Pulmonary embolism, n (%)	20 (50)	27 (82)	11 (32)	N/A
Age at first event (years), mean (range)	44 (9-74)	50 (17-84)	44 (19-88)	N/A
Time since last VTE (years), mean (range)	4.76 (0.24-20.98)	2.17 (0.23-7.30)	2.61 (0.22-13.62)	N/A
Anticoagulant therapy – Warfarin, n (%)	35 (88)	29 (88)	21 (62)	–
Anticoagulant therapy – Other, n (%)	5 (12)	2 (6)	1 (3)	–
Anticoagulant therapy – None, n (%)	–	2 (6)	12 (35)	25 (100)



**Supplementary Fig. 1.** Functional enrichment analysis of COVID-19 and venous thrombosis patients. **A)** GO enrichment analysis, including BP, CC, and MF. Bubble size represents the number of genes, and color indicates the *p*-value. **B)** KEGG pathway enrichment analysis. Bubble size represents the number of genes, and color indicates the *p*-value



**Supplementary Fig. 2.** H&E staining analysis of key genes in the venous thrombosis animal model. H&E staining shows significant thrombus formation within the venous walls of the model group mice, with a clear thrombus structure. No significant thrombus formation was observed in the blank and sham groups. The results are displayed at different magnifications (100 $\times$ , bar = 100  $\mu$ m; and 400 $\times$ , bar = 120  $\mu$ m)