

Associations between multiple immune-response-related proteins and neonatal infection: A proximity extension assay based proteomic study using cord plasma of twins

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Supplementary Method 1. Principal component analysis

In the principal component analysis (PCA), the first step was to calculate the covariance matrix of the levels of 92 immune-response-related proteins in all samples of the 149 twins. Second, the eigenvalues and the eigenvectors of the covariance matrix were calculated. Third, the eigenvalues and the responding eigenvectors were sorted in descending order, which determined the components in order of statistical significance. The principal components (PCs) were then defined by the eigenvectors associated with the largest eigenvalues, and the number of PCs was determined based on the eigenvalues and explained variance. Finally, the original data was transposed and multiplied by the transpose of the eigenvectors. The original values of the data (per protein and per twin), and the eigenvalues and eigenvectors of the covariance matrix were introduced into the PCA. The data of 92 proteins from 149 twins were plotted into PC1 and PC2, which represented the maximum variance of the original data in these two directions.

Supplementary Method 2. Equations of multivariable unconditional logistic regression and multivariable conditional logistic regression

(A) Equation of multivariable unconditional logistic regression in the analysis of all twins;

A: $\text{logit}(P) = \theta_0 + \theta_1 X_1 + \theta_2 X_2 + \theta_3 X_3 + \theta_4 X_4 + \theta_5 X_5 + \theta_6 X_6 + \theta_7 X_7 + \theta_8 X_8 + \theta_9 X_9 + \theta_{10} X_{10} + \theta_{11} X_{11}$, X_1 = NPX of each immune-response-related protein, X_2 = maternal age at child's birth, X_3 = gravidity, X_4 = educational level, X_5 = gestational age, X_6 = vaginal bleeding in early pregnancy, X_7 = pre-pregnancy body mass index, X_8 = mode of conception, X_9 = complications, X_{10} = neonatal sex, X_{11} = neonatal birth weight.

(B) Equation of multivariable conditional logistic regression in the analysis of discordant twin pairs.

B: $\text{logit}(P) = \theta_0^i + \theta_1 X_1 + \theta_2 X_2 + \theta_3 X_3$, $i = 1, 2, \dots, 34$, X_1 = NPX of each immune-response-related protein, X_2 = neonatal sex, X_3 = neonatal birth weight.

Supplementary Table 1. Detailed information of 92 immune-response-related proteins

Protein name	Assay	Uniprot ID	LOD	LOD ratio (%) ^a	LOD ratio (%) ^b
Amphiregulin (AR)	AREG	P15514	-1.650975	0.00	0.00
Aryl hydrocarbon receptor nuclear translocator	ARNT	P27540	1.465695	26.85	22.06
Transcription regulator protein BACH1	BACH1	O14867	1.175015	2.68	0.00
Baculoviral IAP repeat-containing protein 2	BIRC2	Q13490	0.03507	46.98	54.41
Butyrophilin subfamily 3 member A2	BTN3A2	P78410	1.36314	0.67	1.47
Eotaxin	CCL11	P51671	2.259435	0.00	0.00
T-cell-specific surface glycoprotein CD28	CD28	P10747	1.37667	15.44	16.18
CD83 antigen	CD83	Q01151	0.231655	0.00	0.00
Corneodesmosin	CDSN	Q15517	2.095365	0.00	0.00
Cytoskeleton-associated protein 4	CKAP4	Q07065	2.384675	0.00	0.00
C-type lectin domain family 4 member A	CLEC4A	Q9UMR7	0.23449	0.00	0.00
C-type lectin domain family 4 member C	CLEC4C	Q8WTT0	2.12344	4.03	4.41
C-type lectin domain family 4 member D	CLEC4D	Q8WXI8	2.27157	16.11	10.29
C-type lectin domain family 4 member G	CLEC4G	Q6UXB4	1.93292	37.58	39.71
C-type lectin domain family 6 member A	CLEC6A	Q6EIG7	2.047489	47.65	48.53
C-type lectin domain family 7 member A	CLEC7A	Q9BXN2	1.907255	13.42	10.29
Contactin-associated protein-like 2	CNTNAP2	Q9UHC6	0.98033	0.00	0.00
Coxsackievirus and adenovirus receptor	CXADR	P78310	1.00574	0.00	0.00
Stromal cell-derived factor 1	CXCL12	P48061	-0.237985	16.11	13.24
Dual adapter for phosphotyrosine and 3-phosphotyrosine and 3-phosphoinositide	DAPP1	Q9UN19	1.83857	30.87	17.65
Discoidin, CUB and LCCL domain-containing protein 2	DCBLD2	Q96PD2	1.531445	0.00	0.00
Dynactin subunit 1	DCTN1	Q14203	0.40932	0.00	0.00
Probable ATP-dependent RNA helicase DDX58	DDX58	O95786	2.02256	36.91	38.24
DNA fragmentation factor subunit alpha	DFFA	O00273	0.56647	0.00	0.00
Diacylglycerol kinase zeta	DGKZ	Q13574	0.04668	44.30	55.88
Inactive dipeptidyl peptidase 10	DPP10	Q8N608	0.41812	8.05	4.41
Tumor necrosis factor receptor superfamily member EDAR	EDAR	Q9UNE0	0.93530	0.67	0.00
Egl nine homolog 1	EGLN1	Q9GZT9	0.63961	5.37	4.41
Eukaryotic translation initiation factor 4 gamma 1	EIF4G1	Q04637	0.943985	0.00	0.00
Eukaryotic translation initiation factor 5A-1	EIF5A	P63241	-0.33005	28.86	25.00
Protein FAM3B	FAM3B	P58499	0.629815	0.00	0.00
Fc receptor-like protein 3	FCRL3	Q96P31	-0.24336	31.54	27.94
Fc receptor-like protein 6	FCRL6	Q6DN72	1.19226	3.36	0.00
Fibroblast growth factor 2	FGF2	P09038	0.330290	20.81	20.59
FXYD domain-containing ion transport regulator 5	FXYD5	Q96DB9	1.522525	18.79	17.65
Polypeptide N-acetylgalactosaminyltransferase 3	GALNT3	Q14435	3.622242	4.70	4.41
Beta-galactosidase	GLB1	P16278	-2.15087	0.00	0.00
Hematopoietic lineage cell-specific protein	HCLS1	P14317	2.65825	1.34	0.00
Protein HEXIM1	HEXIM1	O94992	-0.68858	0.00	0.00
Histamine N-methyltransferase	HNMT	P50135	0.10492	0.00	0.00
Corticosteroid 11-beta-dehydrogenase isozyme 1	HSD11B1	P28845	-0.892605	48.32	45.59
Islet cell autoantigen 1	ICA1	Q05084	1.379475	32.89	38.24
Interferon lambda receptor 1	IFNLR1	Q8IU57	1.56003	10.74	13.24
Interleukin-10	IL10	P22301	2.91599	22.82	29.41
Interleukin-12 receptor subunit beta-1	IL12RB1	P42701	0.84911	11.41	16.18
Interleukin-5	IL5	P05113	-0.14698	15.44	19.12
Interleukin-6	IL6	P05231	1.037696	38.93	41.18
Interleukin-1 receptor-associated kinase 1	IRAK1	P51617	0.743625	31.54	30.88
Interleukin-1 receptor-associated kinase 4	IRAK4	Q9NWZ3	1.94708	30.87	38.24
Interferon regulatory factor 9	IRF9	Q00978	-0.357855	3.36	0.00
Integrin alpha-11	ITGA11	Q9UKX5	0.03608	8.72	7.35
Integrin alpha-6	ITGA6	P23229	1.408730	2.01	1.47
Integrin beta-6	ITGB6	P18564	0.701195	0.00	0.00
Integral membrane protein 2A	ITM2A	O43736	0.043915	0.00	0.00
Transcription factor AP-1	JUN	P05412	1.20037	12.08	8.82
Natural killer cells antigen CD94	KLRD1	Q13241	0.296025	0.00	0.00
Importin subunit alpha-5	KPNA1	P52294	-0.843335	46.31	44.12
Keratin, type I cytoskeletal 19	KRT19	P08727	1.38913	0.00	0.00
Lymphocyte activation gene 3 protein	LAG3	P18627	0.400585	26.17	29.41
Lysosome-associated membrane glycoprotein 3	LAMP3	Q9UQV4	2.37378	0.00	0.00
Leukocyte immunoglobulin-like receptor subfamily B member 4	LILRB4	Q8NHJ6	1.19091	0.00	0.00
Lymphocyte antigen 75	LY75	O60449	0.093845	4.70	1.47
Mannan-binding lectin serine protease 1	MASP1	P48740	-0.19536	1.34	0.00
Methylated-DNA--protein-cysteine methyltransferase	MGMT	P16455	0.518905	0.00	0.00
Allergin-1	MILR1	Q7Z6M3	1.70467	2.01	1.47
Natural cytotoxicity triggering receptor 1	NCR1	O76036	1.920720	0.00	0.00

Supplementary Table 1 (Continued). Detailed information of 92 immune-response-related proteins

Protein name	Assay	Uniprot ID	LOD	LOD ratio (%) ^a	LOD ratio (%) ^b
Merlin	NF2	P35240	0.35978	47.65	45.59
Nuclear factor of activated T-cells, cytoplasmic 3	NFATC3	Q12968	-0.875010	32.21	33.82
Neurotrophin-4	NTF4	P34130	1.056870	0.00	0.00
Protein-arginine deiminase type-2	PADI2	Q9Y2J8	-0.078905	70.47	67.65
Phosphoinositide 3-kinase adapter protein 1	PIK3AP1	Q6ZUJ8	0.633655	0.00	0.00
Plexin-A4	PLXNA4	Q9HCM2	2.600250	6.04	2.94
Neurabin-2	PPP1R9B	Q96SB3	1.26639	34.23	32.35
Peroxiredoxin-1	PRDX1	Q06830	0.207420	0.00	0.00
Thioredoxin-dependent peroxide reductase, mitochondrial	PRDX3	P30048	0.182795	73.15	73.53
Peroxiredoxin-5, mitochondrial	PRDX5	P30044	1.612330	0.00	0.00
Protein kinase C theta type	PRKCQ	Q04759	0.73957	27.52	30.88
PC4 and SFRS1-interacting protein	PSIP1	O75475	0.93544	0.00	0.00
Parathyroid hormone/parathyroid hormone-related peptide receptor	PTH1R	Q03431	2.618465	0.00	0.00
SH2B adapter protein 3	SH2B3	Q9UQQ2	1.290335	36.91	38.24
SH2 domain-containing protein 1A	SH2D1A	O60880	0.030215	0.00	0.00
Signaling threshold-regulating transmembrane adapter 1	SIT1	Q9Y3P8	0.06152	0.00	0.00
Protein sprouty homolog 2	SPRY2	O43597	2.088613	14.09	20.59
SRSF protein kinase 2	SRPK2	P78362	0.58260	24.16	19.12
Stanniocalcin-1	STC1	P52823	0.11927	0.00	0.00
TRAF family member-associated NF-kappa-B activator	TANK	Q92844	1.44874	2.01	1.47
Tryptase alpha/beta-1	TPSAB1	Q15661	-0.066595	0.00	0.00
TNF receptor-associated factor 2	TRAF2	Q12933	0.62747	0.00	0.00
Triggering receptor expressed on myeloid cells 1	TREM1	Q9NP99	-0.87484	0.00	0.00
E3 ubiquitin-protein ligase TRIM21	TRIM21	P19474	2.30422	0.00	0.00
Tripartite motif-containing protein 5	TRIM5	Q9C035	1.76097	36.91	35.29
Zinc finger and BTB domain-containing protein 16	ZBTB16	Q05516	0.135645	18.79	14.71

Uniprot: Universal protein resource; LOD: limit of detection.

^a Proportion of normalized protein expression values below LOD in all twins.

^b Proportion of normalized protein expression values below LOD in discordant twins.

Supplementary Table 2. Normalized protein expression values of 92 immune-response-related proteins of the bridge samples

Proteins	Bridge		Bridge		Bridge		Bridge		Bridge		Bridge		Bridge		Bridge		Bridge		Bridge	
	Sample 1		Sample 2		Sample 3		Sample 4		Sample 5		Sample 6		Sample 7		Sample 8		Sample 9		Sample 10	
	Batc h 1	Batc h 2	Batc h 1	Batc h 2	Batc h 1	Batc h 2	Batc h 1	Batc h 2	Batc h 1	Batc h 2	Batc h 1	Batc h 2	Batc h 1	Batc h 2	Batc h 1	Batc h 2	Batc h 1	Batc h 2	Batc h 1	Batc h 2
PPP1R9B	2.16	1.62	1.92	2.48	2.41	1.78	2.33	2.24	0.85	1.52	1.26	1.50	2.22	0.75	1.36	1.45	0.47	1.59	1.79	1.14
GLB1	0.39	-0.34	0.07	0.05	-0.28	-0.26	0.34	-0.13	-0.16	0.19	-0.59	-0.01	0.55	-0.04	0.12	0.03	-0.52	-0.31	-0.14	0.02
PSIP1	2.40	2.45	4.96	3.68	2.66	3.83	3.10	3.80	1.87	2.13	3.11	2.55	3.26	2.49	2.53	2.47	2.14	3.12	3.38	3.11
ZBTB16	0.50	0.23	1.51	1.83	0.63	1.31	1.17	0.89	-0.66	0.12	0.44	0.32	1.02	0.02	0.20	0.33	-0.01	1.14	0.88	0.53
IRAK4	2.78	1.44	2.46	2.72	2.77	2.51	2.82	1.67	0.92	1.37	1.43	2.33	2.73	1.46	1.26	2.08	1.67	2.62	2.49	1.77
TPSAB1	4.28	4.40	4.54	4.62	5.15	4.55	1.93	4.51	4.40	4.42	3.45	4.22	5.37	4.03	2.51	2.49	5.06	4.69	5.59	4.95
HCLS1	4.37	4.41	6.18	5.16	3.85	5.51	4.74	5.78	3.27	3.24	4.16	4.18	4.76	3.27	4.20	3.71	2.93	3.71	3.54	3.26
CNTNAP2	1.78	2.50	2.39	2.33	2.30	3.03	1.95	2.81	2.61	1.93	2.21	1.93	3.04	2.81	2.98	3.09	2.46	2.53	3.12	2.76
CLEC4G	3.18	2.96	2.02	3.34	2.10	2.43	1.85	2.24	1.66	1.74	1.55	1.48	2.48	1.79	2.61	2.26	2.27	1.99	2.17	2.24
IRF9	0.54	0.55	3.18	1.03	0.58	2.58	0.50	2.24	-0.36	0.20	0.31	0.30	1.17	0.44	0.68	0.33	0.25	0.77	0.74	0.40
EDAR	1.93	1.78	3.21	2.19	2.09	2.79	2.03	2.03	1.24	1.87	1.77	1.84	2.99	1.54	1.75	2.00	1.75	1.75	2.17	1.67
IL6	1.55	1.04	1.89	1.50	1.45	1.50	1.19	1.34	0.55	0.52	1.33	0.46	2.28	2.94	0.68	3.26	1.38	1.40	1.52	0.79
DGKZ	0.78	-0.08	0.45	0.52	0.84	0.76	0.41	-0.29	-0.91	-0.02	-0.64	-0.44	0.23	-0.57	-0.01	0.13	-0.55	0.52	0.37	0.22
CLEC4C	2.37	2.06	2.79	3.12	3.42	3.11	1.96	2.84	1.98	3.28	2.97	3.13	4.03	3.07	3.26	3.56	2.86	2.69	3.34	2.80
IRAK1	0.57	0.96	1.45	1.45	0.76	1.63	1.20	1.08	0.39	0.61	0.67	0.62	1.32	0.38	0.89	0.89	0.22	1.18	1.07	0.76
CLEC4A	1.98	2.30	1.95	2.66	2.30	2.24	2.03	2.33	2.01	2.47	2.31	2.35	2.47	1.87	2.61	2.25	2.20	2.16	2.31	2.04
PRDX1	3.51	3.77	4.64	5.82	3.66	3.57	4.63	3.75	3.80	3.17	4.32	4.42	5.06	4.35	3.84	4.73	4.34	4.57	4.60	3.92
PRDX3	0.33	0.17	-0.60	2.29	0.10	0.19	1.11	0.14	-0.72	-0.46	-0.41	-0.50	0.19	-0.81	-0.85	0.10	-0.85	0.06	0.00	-0.28
FGF2	0.53	0.34	2.92	1.69	1.32	2.12	1.61	2.27	0.96	-0.22	0.35	0.58	2.86	0.07	0.49	0.68	0.39	0.75	3.54	0.21
PRDX5	4.74	4.15	7.44	5.99	3.04	7.25	4.35	6.86	3.35	3.35	3.76	4.40	4.70	3.02	3.76	3.68	3.28	3.48	3.78	3.78
DPP10	0.31	0.28	0.66	0.69	0.77	1.06	1.39	0.77	0.56	-0.14	0.91	0.39	1.02	0.15	1.10	1.29	0.59	1.70	0.87	1.21
TRIM5	1.42	1.48	3.54	2.25	2.56	2.95	2.99	2.58	1.33	1.28	1.34	1.89	2.83	1.68	1.85	2.07	1.56	2.25	2.12	2.04
DCTN1	5.04	3.90	5.35	4.79	3.32	3.92	4.62	4.26	2.74	3.05	3.29	4.19	4.00	2.99	3.45	3.26	1.98	3.19	3.56	3.75
ITGA6	2.63	1.96	3.54	3.60	2.48	2.98	2.41	2.90	1.62	2.01	2.16	1.76	2.86	1.57	2.16	2.09	2.16	2.24	3.92	2.37
CDSN	5.27	5.43	5.62	5.47	5.03	5.70	5.03	5.18	4.93	4.78	5.08	4.85	6.22	4.76	5.62	5.21	4.61	5.99	5.52	6.17
GALNT3	5.37	4.24	4.85	4.79	5.05	5.11	4.90	4.65	2.63	4.17	3.63	3.70	4.22	3.51	2.90	4.67	3.80	4.89	4.89	4.80
FXYD5	1.53	1.64	1.53	2.26	2.48	1.99	2.00	1.71	1.10	1.59	1.91	1.59	1.67	1.97	2.55	1.61	1.68	1.99	1.89	1.78
TRAF2	2.58	2.60	4.23	3.27	3.17	3.40	4.18	3.40	2.44	2.62	3.26	3.54	4.11	2.61	3.22	3.28	3.04	3.02	3.44	3.23
TRIM21	3.83	3.00	5.92	3.74	3.29	3.99	4.05	4.08	2.79	2.94	2.95	3.04	3.54	2.55	3.46	3.27	2.56	3.11	3.53	3.51
LILRB4	3.22	2.92	3.20	3.35	3.08	3.03	2.98	3.04	2.72	2.77	2.91	2.56	3.45	2.76	2.97	3.03	3.08	2.90	2.83	3.34
NTF4	2.18	2.69	3.34	2.11	3.11	3.11	2.51	3.25	2.67	3.07	3.50	2.84	3.32	3.17	3.12	3.36	3.32	3.32	3.73	3.50
KRT19	3.97	3.94	4.02	4.28	4.39	3.68	3.71	3.74	3.95	4.60	3.72	4.47	4.52	3.81	4.19	4.36	4.12	3.95	4.43	4.03
ITM2A	0.72	2.66	2.02	3.23	3.01	3.14	2.74	2.37	2.28	2.28	3.08	2.24	3.11	3.05	2.52	2.90	2.83	2.39	2.64	2.64
HNMT	8.66	8.26	8.89	9.04	7.91	8.52	7.65	8.91	8.44	8.12	8.51	8.36	8.99	7.64	8.84	8.48	8.57	9.58	8.70	9.66
CCL11	4.71	5.34	4.56	6.20	5.11	5.23	5.13	5.94	5.16	4.61	5.55	4.70	5.92	4.92	4.95	4.83	5.64	5.30	5.68	5.83
MILR1	2.39	2.44	2.53	2.75	2.38	2.81	3.13	2.28	1.40	3.18	2.46	3.00	3.58	2.25	3.29	2.48	3.15	2.61	2.95	2.90
EGLN1	1.84	1.44	4.17	2.66	1.65	3.74	1.94	3.65	0.45	0.46	1.11	1.36	2.32	1.53	0.94	0.93	1.04	1.31	1.70	1.36
NFATC3	-0.53	-0.72	-0.62	1.25	-0.32	-0.59	-0.77	-0.75	-1.20	-1.16	-1.18	-0.99	-0.08	-1.11	-1.07	-0.75	-0.62	-0.64	-0.53	-0.70
LY75	0.52	0.58	-0.03	0.82	1.16	0.60	0.96	0.32	0.11	0.43	0.21	0.16	1.24	0.81	0.97	0.42	0.75	0.85	0.62	0.82
EIF5A	0.34	0.19	-0.85	0.26	0.41	0.20	0.10	-0.27	-0.27	0.03	-0.72	0.41	0.38	-0.05	-0.65	-0.19	0.32	0.47	0.59	0.26
EIF4G1	3.98	4.13	5.74	4.76	4.17	4.90	5.63	4.60	2.87	3.13	4.57	5.05	4.99	3.34	4.13	3.99	3.09	3.47	4.10	3.92
CD28	1.28	1.30	1.90	1.61	1.94	2.13	1.80	1.66	1.23	2.52	1.35	2.34	2.40	1.91	1.77	1.75	1.77	1.88	2.09	1.86
PTH1R	5.30	5.40	5.26	5.22	5.37	5.27	5.09	5.39	4.39	5.17	5.04	5.06	5.59	5.03	5.29	5.28	5.15	5.15	5.61	5.43
BIRC2	0.70	-0.05	0.12	0.14	0.45	0.78	0.27	0.10	-0.47	-0.49	-0.29	-0.21	0.70	-0.45	-0.14	-0.11	-0.12	0.05	-0.08	-0.40
HSD11B1	-0.59	-1.43	-0.41	-0.40	-0.40	-0.41	-0.56	-0.60	-1.56	-0.96	-1.21	-1.02	-1.04	-1.26	-1.72	-1.18	-1.43	-0.86	-0.70	-1.34
NF2	1.51	0.65	0.70	0.92	1.18	0.62	0.86	0.34	-1.15	-0.07	-0.76	0.47	1.08	0.24	-1.40	0.27	-0.02	0.37	0.30	0.09
PLXNA4	3.18	3.76	5.30	4.51	4.34	3.75	4.25	5.09	1.98	3.05	2.91	3.12	6.18	2.65	2.83	3.01	2.93	2.75	4.37	3.00
SH2B3	1.69	0.86	1.95	2.17	2.10	2.11	2.37	1.26	0.19	0.17	0.06	1.83	1.95	1.34	0.28	1.63	-0.71	1.98	1.64	1.37
FCRL3	-0.16	-0.19	0.21	0.28	0.11	0.13	-0.44	-0.19	-0.16	-0.39	-0.01	-0.60	0.09	-0.34	-0.76	0.19	-0.73	-0.22	0.01	-0.16
CKAP4	7.30	7.59	8.57	7.59	7.86	8.29	7.67	8.14	7.41	8.12	7.50	8.19	8.58	8.00	8.23	7.74	7.99	7.70	8.34	8.02
JUN	2.64	2.01	2.28	2.32	2.29	2.44	2.79	2.22	1.85	1.81	0.72	1.74	2.89	1.44	0.50	1.05	1.58	2.14	2.82	1.92
HEXIM1	3.88	4.06	4.19	4.52	3.71	3.65	4.80	4.23	3.16	3.22	3.80	4.05	5.00	3.67	3.57	3.67	3.92	3.20	4.25	3.40
CLEC4D	2.62	3.00	2.54	4.03	2.18	2.60	3.22	2.66	2.99	3.20	2.24	3.46	3.07	2.12	2.61	2.40	2.13	1.86	2.99	2.37
PRKCQ	1.23	0.71	1.00	1.04	1.11	1.34	0.96	0.92	-0.67	0.59	0.37	0.55	1.69	1.52	1.23	0.83	0.81	1.42	1.32	0.92
MGMT	4.44	4.55	6.25	5.63	4.53	5.51	5.56	5.64	3.48	3.40	4.44	4.30	5.49	3.31	4.10	3.85	3.60	4.21	4.22	4.43
TREM1	1.74	2.11	2.29	2.19	2.56	2.23	2.41	2.40	2.06	2.28	2.06	2.51	2.24	1.96	1.98	2.00	1.97	2.08	2.46	2.18
CXADR	3.52	3.69	3.91	3.76	4.24	4.31	3.80	3.95	3.70	3.82	3.89	3.83	4.55	4.08	4.68	4.47	3.33	4.05	4.29	4.14
IL10	3.50	2.81	3.47	3.43	2.95	3.08	2.65	3.24	3.27	2.68	4.29	2.36	3.75	2.51	3.12	3.17	3.29	3.36	3.33	3.49
SRPK2	0.97	0.91	1.94	1.72	1.29	1.35	1.52	1.78	0.04	0.35	0.16	0.77	1.74	0.51	0.84	0.66	0.39	0.87	1.24	0.47
KLRD1	3.52	3.41	4.61	3.85	4.57	4.55	4.41	4.45	4.52	4.54	4.08	4.78	4.77	4.63	4.68	5.07	4.53	4.09	3.91	4.06

Supplementary Table 2 (Continued). Normalized protein expression values of 92 immune-response-related proteins of the bridge samples

Proteins	Bridge		Bridge		Bridge		Bridge		Bridge		Bridge		Bridge		Bridge		Bridge		Bridge	
	Sample 1		Sample 2		Sample 3		Sample 4		Sample 5		Sample 6		Sample 7		Sample 8		Sample 9		Sample 10	
	Batc h 1	Batc h 2	Batc h 1	Batc h 2	Batc h 1	Batc h 2	Batc h 1	Batc h 2	Batc h 1	Batc h 2	Batc h 1	Batc h 2	Batc h 1	Batc h 2	Batc h 1	Batc h 2	Batc h 1	Batc h 2	Batc h 1	Batc h 2
ARNT	1.65	1.67	3.08	1.79	2.16	2.42	1.72	1.54	1.13	1.34	1.90	0.63	2.38	0.92	0.75	2.07	0.01	2.24	2.25	2.23
FAM3B	5.47	5.69	5.75	6.09	5.82	5.90	6.00	5.66	5.36	5.70	5.90	5.74	6.39	6.01	5.98	5.60	6.05	6.19	6.15	6.07
SH2D1A	3.10	2.94	3.34	3.50	1.82	2.61	2.36	3.60	2.08	1.99	1.87	2.25	3.09	2.31	2.41	2.00	1.97	2.05	1.81	1.72
ICA1	1.86	1.41	2.41	2.02	1.64	2.47	2.22	2.11	0.76	1.14	1.24	1.46	2.03	0.43	1.24	1.35	0.45	1.72	2.15	1.26
DFFA	4.87	4.97	5.78	5.83	4.99	5.12	5.57	5.52	4.29	4.47	5.21	5.16	6.48	4.84	5.51	4.74	4.89	5.04	5.55	5.13
DCBLD2	7.06	7.47	7.21	7.42	7.51	7.22	7.40	7.38	7.00	7.42	6.99	7.53	7.88	7.41	7.57	7.21	7.21	7.22	7.61	7.40
FCRL6	1.76	1.92	1.45	2.02	2.09	2.42	2.19	2.05	1.79	1.75	1.73	1.60	1.95	1.72	1.90	2.06	1.75	1.79	2.00	1.92
NCR1	3.26	2.84	3.16	3.23	3.24	3.18	3.07	2.96	2.93	3.37	2.92	3.21	3.89	2.91	3.73	2.82	2.60	3.22	2.79	3.28
CXCL12	0.75	-0.14	0.39	0.75	0.62	0.71	0.53	0.20	-0.61	0.00	-0.22	-0.32	0.42	-0.23	-0.75	-0.10	-1.08	1.26	0.27	0.12
AREG	3.81	3.98	4.10	4.22	3.37	4.14	4.52	4.62	3.63	3.54	3.75	3.88	5.80	3.76	3.76	3.41	4.50	3.91	5.50	4.46
IFNLR1	2.13	1.98	1.56	2.34	2.16	1.96	1.79	1.94	1.40	2.14	1.85	1.57	2.75	1.45	1.90	1.75	1.38	2.07	1.91	2.30
DAPP1	2.60	2.05	2.85	2.77	2.90	2.85	3.51	3.02	-0.58	1.47	1.19	2.20	3.39	1.86	0.38	2.25	1.12	2.19	2.18	2.22
PADI2	-0.03	-0.04	-0.50	0.34	-0.01	0.41	0.02	-0.14	-0.54	-0.53	-0.48	-0.75	0.01	-0.60	-0.36	-0.24	-0.96	0.35	0.12	-0.17
SIT1	6.06	6.17	6.53	5.77	3.25	3.89	4.00	6.06	4.66	4.39	3.57	4.26	5.16	3.97	5.76	4.58	2.71	3.44	3.28	3.17
MASP1	0.56	0.64	0.37	0.73	0.51	0.43	-0.14	0.36	0.32	0.47	0.05	0.50	0.99	0.63	1.10	0.44	0.53	0.26	0.57	0.44
LAMP3	3.21	3.09	3.79	3.63	3.82	4.17	3.68	4.01	3.23	3.69	3.48	3.59	4.60	3.19	4.06	3.47	4.50	3.77	3.76	3.96
CLEC7A	1.79	2.09	2.45	2.14	2.60	2.62	2.17	2.70	2.11	3.05	2.30	2.89	2.39	2.09	2.98	2.26	2.07	2.05	2.67	2.19
CLEC6A	2.02	2.01	2.75	2.69	2.31	2.50	2.07	2.04	1.28	1.95	1.87	2.14	1.86	1.87	2.00	1.98	0.81	2.14	1.77	1.57
DDX58	2.14	1.89	5.02	2.52	2.86	4.19	1.96	4.11	1.76	1.57	1.82	1.77	1.99	1.89	1.86	1.91	1.88	2.63	2.13	2.21
IL12RB1	1.76	0.83	1.61	1.14	1.35	1.52	1.22	1.08	1.01	1.16	0.31	0.89	1.62	1.34	0.70	1.36	0.74	1.41	1.55	1.00
TANK	2.79	2.31	2.87	2.93	2.93	3.33	3.66	2.44	2.63	2.19	1.66	2.80	3.09	1.92	0.42	2.68	0.71	2.46	2.82	2.77
ITGA11	1.22	0.03	0.48	1.44	1.18	1.92	1.02	1.41	-0.19	1.01	1.13	0.74	1.81	1.30	1.29	0.66	-0.09	1.60	1.12	0.63
KPNA1	-0.96	-1.06	2.83	-0.28	1.18	0.08	-1.00	-0.38	-0.81	-1.36	-1.20	-1.09	-0.79	-1.74	-1.63	-1.22	-1.56	0.12	-1.06	-0.80
LAG3	0.92	0.06	0.52	0.59	1.03	1.00	0.37	0.39	-0.05	0.46	0.44	0.21	1.24	0.22	0.38	0.87	0.57	0.63	0.72	0.69
IL5	1.08	0.27	0.27	0.70	0.78	1.36	0.70	0.06	-0.95	-0.59	0.06	-0.51	0.48	-0.12	-1.08	0.37	0.08	0.80	0.65	0.29
CD83	1.52	1.78	2.25	2.20	2.59	2.45	2.18	2.22	2.10	2.43	1.70	2.41	2.85	2.09	2.44	2.13	2.24	2.02	2.23	2.39
ITGB6	2.89	2.64	2.79	3.15	3.24	3.23	2.76	3.52	3.31	3.65	3.53	3.78	4.48	3.44	3.69	3.36	3.09	3.10	3.79	3.35
BTN3A2	2.74	2.96	3.14	3.18	2.74	2.95	2.71	2.90	2.49	2.77	2.85	2.67	3.93	3.12	3.24	3.15	2.60	2.56	3.13	3.02

Supplementary Table 3. Maternal and neonatal characteristics comparing between all twins and discordant twins

Characteristics	All twins (n=149)	Discordant twins (n=68)	P ^a
Mothers			
Age at delivery (years), mean±SD	32.04±4.07	31.70±4.26	0.575 ^b
<25, n (%)	4 (2.68)	2 (2.94)	0.491
25-29, n (%)	45 (30.20)	26 (38.24)	
30-34, n (%)	69 (46.31)	24 (35.29)	
≥35, n (%)	31 (20.81)	16 (23.53)	
Educational level, n (%)			0.876
Junior high school and below	21 (14.09)	10 (14.71)	
Senior high/Vocational school	50 (33.56)	18 (26.47)	
University and above	78 (52.35)	40 (58.82)	
Pre-pregnancy BMI, mean±SD	21.66±3.14	21.55±2.86	0.790 ^b
<18.5, n (%)	19 (12.75)	6 (8.82)	0.706
18.5-23.9, n (%)	98 (65.77)	50 (73.53)	
24-27.9, n (%)	26 (17.45)	10 (14.71)	
≥28, n (%)	6 (4.03)	2 (2.94)	
Mode of conception, n (%)			0.291
Naturally conceived	70 (46.98)	26 (38.24)	
IVF-ET	79 (53.02)	42 (61.76)	
Gravidity, n (%)			0.747
1	60 (40.27)	26 (38.24)	
2	45 (30.20)	24 (35.29)	
≥3	44 (29.53)	18 (26.47)	
Vaginal bleeding during early pregnancy, n (%)			0.993
No	120 (80.54)	54 (79.41)	
Yes	29 (19.46)	14 (20.59)	
Diabetes, n (%)			0.584
No	89 (59.73)	44 (64.71)	
Pregestational diabetes	0 (0.00)	0 (0.00)	
Gestational diabetes	60 (40.27)	24 (35.29)	
Hypertension, n (%)			0.513
No	106 (71.14)	52 (76.47)	
Pregestational hypertension	0 (0.00)	0 (0.00)	
Gestational hypertension	43 (28.86)	16 (23.53)	
Autoimmune diseases, n (%)			0.798
No	143 (95.97)	64 (94.12)	
Yes	6 (4.03)	4 (5.88)	
Gestational age (weeks), mean±SD	36.37±1.16	36.54±1.07	0.292 ^b
<34 ⁺⁰ , n (%)	5 (3.36)	2 (2.94)	0.207
34 ⁺⁰ -36 ⁺⁶ , n (%)	80 (53.69)	28 (41.18)	
37 ⁺⁰ -38 ⁺⁶ , n (%)	64 (42.95)	38 (55.88)	
≥39 ⁺⁰ , n (%)	0 (0.00)	0 (0.00)	
Neonatal characteristics			
Sex, n (%)			>0.999
Male	76 (51.01)	35 (51.47)	
Female	73 (48.99)	33 (48.53)	
Birth weight (grams), mean±SD	2,404.50±411.44	2,466.03±346.75	0.292 ^b
<2000, n (%)	28 (18.79)	8 (11.76)	0.567
2000-2499, n (%)	98 (65.77)	50 (73.53)	
2500-2999, n (%)	67 (44.97)	32 (47.06)	
≥3000, n (%)	9 (6.04)	6 (8.82)	

SD, standard deviation; IVF-ET: In vitro fertilization and embryo transfer.

^a Pearson's Chi-squared test or Fisher's exact test unless stated otherwise.

^b Independent sample t-test.

Supplementary Table 4. Normalized protein expression values of immune-response-related proteins between neonates without and with infection										
Proteins	All twins (n=149)					Discordant twins (n=68)				
	Without neonatal infection (n=89)	With neonatal infection (n=60)	P^a	$P_{adjusted}$	Fold Change	Without neonatal infection (n=34)	With neonatal infection (n=34)	P^b	$P_{adjusted}$	Fold Change
PPP1R9B	1.58 (1.24-1.97)	1.45 (1.12-1.92)	0.199	0.843	0.920	1.53 (1.26-2.03)	1.54 (1.17-1.94)	0.748	0.971	0.965
GLB1	0.00 (-0.21-0.40)	0.04 (-0.21-0.30)	0.485	0.843	0.135	0.05 (-0.20-0.39)	0.01 (-0.40-0.26)	0.301	0.936	-0.143
PSIP1	2.63 (2.23-3.38)	2.55 (2.15-3.05)	0.527	0.851	0.960	2.53 (2.25-3.11)	2.66 (2.46-3.33)	0.326	0.936	1.067
ZBTB16	0.67 (0.30-1.09)	0.43 (0.14-0.86)	0.125	0.821	0.803	0.75 (0.49-1.08)	0.40 (0.17-0.71)	0.087	0.667	0.789
IRAK4	2.31 (1.91-2.78)	2.17 (1.72-2.74)	0.266	0.843	0.940	2.46 (1.81-2.81)	2.02 (1.67-2.63)	0.081	0.667	0.952
TPSAB1	4.67 (4.07-4.90)	4.66 (4.07-4.98)	0.946	0.967	0.991	4.28 (3.89-4.76)	4.57 (4.09-4.81)	0.510	0.971	1.045
HCLS1	3.96 (3.58-4.50)	3.77 (3.45-4.17)	0.077	0.764	0.952	4.04 (3.65-4.36)	3.82 (3.56-4.49)	0.748	0.971	1.015
CNTNAP2	2.58 (2.16-2.89)	2.63 (2.41-2.99)	0.058	0.764	1.073	2.67 (2.34-3.08)	2.58 (2.38-2.83)	0.761	0.971	0.986
CLEC4G	2.01 (1.81-2.23)	2.02 (1.77-2.21)	0.848	0.967	1.010	2.08 (1.84-2.24)	1.98 (1.75-2.16)	0.543	0.971	0.956
IRF9	0.50 (0.26-0.96)	0.58 (0.23-0.95)	0.998	0.998	0.955	0.52 (0.39-0.97)	0.57 (0.31-0.94)	0.636	0.971	1.041
EDAR	1.87 (1.55-2.20)	1.61 (1.42-1.98)	0.023	0.705	0.919	1.73 (1.52-1.97)	1.61 (1.48-2.09)	0.919	0.975	1.025
IL6	1.23 (0.86-1.56)	1.04 (0.67-1.56)	0.179	0.843	0.911	1.17 (0.76-1.39)	1.14 (0.66-1.43)	0.698	0.971	1.039
DGKZ	0.17 (-0.25-0.46)	0.00 (-0.38-0.26)	0.096	0.764	0.163	0.04 (-0.34-0.47)	-0.04 (-0.53-0.17)	0.407	0.936	-0.741
CLEC4C	2.92 (2.62-3.18)	2.88 (2.59-3.19)	0.827	0.967	1.000	2.75 (2.52-3.09)	2.88 (2.58-3.19)	0.648	0.971	1.033
IRAK1	0.99 (0.65-1.32)	0.91 (0.63-1.32)	0.767	0.967	0.981	1.02 (0.68-1.26)	0.94 (0.62-1.34)	0.532	0.971	1.035
CLEC4A	2.31 (2.08-2.55)	2.37 (2.14-2.57)	0.385	0.843	1.021	2.31 (2.03-2.50)	2.29 (2.15-2.58)	0.235	0.936	1.045
PRDX1	4.43 (3.76-5.40)	4.23 (3.63-5.04)	0.393	0.843	0.963	4.48 (3.91-5.19)	4.30 (3.83-5.00)	0.800	0.971	1.035
PRDX3	-0.13 (-0.41-0.24)	-0.10 (-0.35-0.18)	0.958	0.969	8.253	0.02 (-0.28-0.41)	-0.17 (-0.44-0.06)	0.004	0.368	-0.488
FGF2	0.86 (0.38-1.48)	0.63 (0.37-1.04)	0.193	0.843	0.834	0.71 (0.38-1.37)	0.63 (0.41-1.26)	0.577	0.971	1.051
PRDX5	3.90 (3.29-4.74)	3.85 (3.37-4.58)	0.931	0.967	0.982	4.30 (3.71-4.78)	4.03 (3.48-4.62)	0.787	0.971	1.007
DPP10	0.89 (0.63-1.25)	1.00 (0.67-1.26)	0.424	0.843	1.085	0.94 (0.71-1.39)	0.78 (0.59-1.27)	0.235	0.936	0.914
TRIM5	2.06 (1.64-2.46)	1.90 (1.64-2.36)	0.325	0.843	0.951	2.08 (1.66-2.36)	1.83 (1.61-2.32)	0.163	0.859	0.973
DCTN1	3.56 (3.18-4.38)	3.47 (2.77-4.09)	0.093	0.764	0.937	3.55 (3.30-4.29)	3.74 (2.99-4.18)	0.787	0.971	1.004
ITGA6	2.13 (1.89-2.55)	2.14 (1.93-2.38)	0.504	0.843	0.961	2.10 (1.92-2.51)	2.08 (1.92-2.37)	0.467	0.971	0.961
CDSN	5.22 (4.96-5.47)	5.18 (4.81-5.50)	0.776	0.967	0.988	5.17 (4.98-5.37)	5.12 (4.67-5.38)	0.360	0.936	0.974
GALNT3	4.58 (4.20-4.81)	4.40 (4.19-4.76)	0.362	0.843	0.988	4.65 (4.32-4.91)	4.39 (4.22-4.62)	0.031	0.667	0.960
FXYS5	1.83 (1.61-2.11)	1.85 (1.58-2.07)	0.689	0.960	1.025	1.89 (1.66-2.08)	1.81 (1.54-2.00)	0.577	0.971	0.992
TRAF2	2.98 (2.78-3.57)	3.04 (2.71-3.43)	0.545	0.864	0.978	2.96 (2.82-3.32)	3.05 (2.76-3.47)	0.774	0.971	1.046
TRIM21	3.29 (2.97-3.71)	3.22 (2.93-3.55)	0.603	0.909	0.995	3.29 (3.13-3.53)	3.28 (3.14-3.71)	0.879	0.974	1.033
LILRB4	2.91 (2.71-3.13)	2.95 (2.69-3.08)	0.857	0.967	1.019	2.85 (2.66-3.04)	2.89 (2.70-3.02)	0.648	0.971	1.020
NTF4	2.99 (2.75-3.20)	3.06 (2.85-3.27)	0.358	0.843	1.013	2.97 (2.76-3.20)	3.02 (2.79-3.28)	0.698	0.971	1.000
KRT19	3.99 (3.69-4.32)	3.95 (3.63-4.34)	0.931	0.967	0.989	3.88 (3.69-4.18)	3.96 (3.70-4.30)	0.278	0.936	1.032
ITM2A	2.52 (2.33-2.73)	2.61 (2.41-2.85)	0.085	0.764	1.055	2.58 (2.42-2.84)	2.55 (2.37-2.94)	0.761	0.971	1.023
HNMT	8.36 (7.91-8.95)	8.31 (7.72-8.84)	0.466	0.843	0.982	8.41 (7.83-8.93)	8.43 (7.71-8.86)	0.467	0.971	0.994
CCL11	5.36 (4.92-5.68)	5.14 (4.86-5.63)	0.310	0.843	0.988	5.36 (5.15-5.71)	5.15 (4.89-5.64)	0.221	0.936	0.988
MILR1	2.60 (2.34-2.95)	2.58 (2.22-2.92)	0.700	0.960	0.985	2.55 (2.31-2.98)	2.51 (2.14-2.86)	0.153	0.859	0.950
EGLN1	1.49 (1.11-1.94)	1.48 (1.03-2.00)	0.424	0.843	0.914	1.51 (1.12-1.88)	1.54 (1.04-1.94)	0.736	0.971	1.017
NFATC3	-0.77 (-0.88--0.52)	-0.78 (-0.99--0.50)	0.495	0.843	1.067	-0.77 (-0.86--0.53)	-0.79 (-0.99--0.50)	1.000	1.000	0.960
LY75	0.62 (0.47-0.84)	0.72 (0.43-0.91)	0.229	0.843	1.118	0.80 (0.57-0.91)	0.65 (0.35-0.87)	0.078	0.667	0.841
EIF5A	-0.09 (-0.43-0.24)	-0.04 (-0.32-0.29)	0.692	0.960	0.522	0.11 (-0.36-0.32)	-0.04 (-0.30-0.27)	0.879	0.974	-9.416
EIF4G1	4.38 (3.66-4.88)	4.16 (3.60-4.77)	0.350	0.843	0.975	4.38 (3.71-4.62)	4.25 (3.68-4.74)	0.826	0.974	1.017
CD28	1.74 (1.46-1.95)	1.74 (1.60-1.98)	0.372	0.843	1.027	1.74 (1.51-1.99)	1.71 (1.58-1.90)	0.602	0.971	0.975
PTH1R	5.15 (5.03-5.34)	5.19 (4.95-5.33)	0.597	0.909	0.990	5.23 (5.05-5.34)	5.12 (4.87-5.26)	0.043	0.667	0.974
BIRC2	0.06 (-0.18-0.28)	0.07 (-0.16-0.23)	0.830	0.967	0.913	-0.02 (-0.28-0.27)	-0.02 (-0.17-0.18)	0.589	0.971	0.433
HSD11B1	-0.87 (-1.17--0.59)	-0.86 (-1.16--0.55)	0.872	0.967	0.989	-0.79 (-1.08--0.53)	-0.88 (-1.15--0.57)	0.317	0.936	1.115
NF2	0.41 (0.11-0.89)	0.29 (0.08-0.85)	0.374	0.843	0.784	0.42 (0.22-0.78)	0.34 (0.08-0.88)	0.906	0.975	0.952
PLXNA4	3.35 (3.00-4.37)	3.20 (2.89-3.58)	0.182	0.843	0.954	3.30 (3.00-4.18)	3.29 (2.90-4.16)	0.774	0.971	1.015
SH2B3	1.60 (1.17-2.00)	1.54 (1.06-1.95)	0.334	0.843	0.924	1.63 (1.20-1.94)	1.48 (1.08-1.75)	0.478	0.971	0.927
FCRL3	-0.13 (-0.29-0.05)	-0.16 (-0.29-0.09)	0.761	0.967	0.875	-0.04 (-0.19-0.09)	-0.16 (-0.30-0.03)	0.256	0.936	3.466
CKAP4	7.82 (7.59-8.04)	7.84 (7.56-7.96)	0.619	0.919	0.997	7.79 (7.59-8.03)	7.80 (7.46-7.92)	0.343	0.936	0.989
JUN	1.85 (1.52-2.17)	1.81 (1.56-2.13)	0.940	0.967	1.006	1.94 (1.60-2.28)	1.83 (1.59-2.12)	0.168	0.859	0.941
HEXIM1	3.91 (3.52-4.43)	3.83 (3.56-4.22)	0.466	0.843	0.981	3.90 (3.62-4.41)	3.92 (3.58-4.21)	0.800	0.971	1.022
CLEC4D	2.84 (2.41-3.31)	2.91 (2.60-3.41)	0.442	0.843	1.034	3.00 (2.63-3.34)	2.97 (2.75-3.47)	0.987	0.998	1.008
PRKCQ	0.97 (0.70-1.43)	1.02 (0.66-1.30)	0.909	0.967	0.995	0.89 (0.66-1.25)	1.02 (0.67-1.26)	0.636	0.971	1.005
MGMT	4.24 (3.64-4.97)	4.05 (3.62-4.61)	0.358	0.843	0.965	4.32 (3.84-4.74)	4.32 (3.75-4.61)	0.933	0.975	1.031
TREM1	2.12 (1.81-2.45)	2.09 (1.94-2.37)	0.712	0.960	1.015	2.08 (1.88-2.34)	2.20 (1.98-2.37)	0.235	0.936	1.050
CXADR	3.97 (3.77-4.22)	4.01 (3.80-4.27)	0.424	0.843	1.019	4.11 (3.80-4.32)	3.98 (3.74-4.26)	0.407	0.936	0.984
IL10	3.27 (2.97-3.57)	3.19 (2.91-3.61)	0.449	0.843	0.991	3.16 (2.98-3.50)	3.03 (2.73-3.43)	0.109	0.716	1.001
SRPK2	0.92 (0.58-1.24)	0.83 (0.59-1.17)	0.269	0.843	0.864	0.91 (0.72-1.16)	0.83 (0.64-1.22)	0.946	0.978	1.057
KLRD1	4.44 (4.08-4.74)	4.40 (4.09-4.69)	0.720	0.960	1.000	4.40 (3.98-4.59)	4.43 (3.94-4.68)	0.309	0.936	1.023
BACH1	1.79 (1.59-2.12)	1.83 (1.60-2.07)	0.900	0.967	0.955	1.77 (1.61-2.03)	1.82 (1.60-2.14)	0.879	0.974	1.072
PIK3AP1	2.97 (2.58-3.43)	2.84 (2.53-3.35)	0.519	0.851	0.968	2.98 (2.67-3.36)	2.99 (2.63-3.38)	0.987	0.998	1.022
SPRY2	2.98 (2.52-3.37)	2.87 (2.23-3.18)	0.104	0.764	0.937	2.77 (2.35-3.21)	2.85 (2.17-3.17)	0.813	0.971	1.022
STC1	5.61 (5.50-5.73)	5.59 (5.42-5.70)	0.499	0.843	0.997	5.60 (5.45-5.72)	5.58 (5.44-5.70)	0.787	0.971	0.996
ARNT	1.84 (1.43-2.13)	1.81 (1.47-2.21)	0.800	0.967	1.041	1.88 (1.54-2.22)	1.63 (1.46-2.01)	0.388	0.936	0.966

Supplementary Table 4 (Continued). Normalized protein expression values of immune-response-related proteins between neonates without and with infection

Proteins	All twins (n=149)					Discordant twins (n=68)				
	Without neonatal infection (n=89)	With neonatal infection (n=60)	<i>P</i> ^a	<i>P</i> _{adjusted}	Fold Change	Without neonatal infection (n=34)	With neonatal infection (n=34)	<i>P</i> ^b	<i>P</i> _{adjusted}	Fold Change
FAM3B	5.88 (5.64-6.05)	5.88 (5.67-6.11)	0.630	0.920	1.007	5.74 (5.56-5.99)	5.73 (5.62-5.90)	0.774	0.971	1.005
SH2D1A	2.16 (1.83-2.61)	1.97 (1.66-2.27)	0.018	0.705	0.879	2.08 (1.87-2.34)	1.97 (1.68-2.27)	0.748	0.971	0.994
ICA1	1.76 (1.28-2.09)	1.52 (1.20-2.00)	0.108	0.764	0.932	1.73 (1.25-2.06)	1.42 (1.10-1.65)	0.050	0.667	0.854
DFFA	5.25 (4.82-5.72)	5.11 (4.68-5.59)	0.184	0.843	0.972	5.21 (4.87-5.57)	5.11 (4.73-5.47)	0.813	0.971	1.013
DCBLD2	7.31 (7.13-7.43)	7.28 (7.17-7.42)	0.818	0.967	1.001	7.33 (7.13-7.43)	7.21 (7.16-7.39)	0.360	0.936	0.994
FCRL6	1.86 (1.62-2.12)	1.99 (1.80-2.12)	0.039	0.718	1.069	1.97 (1.76-2.14)	1.97 (1.75-2.15)	0.840	0.974	0.993
NCR1	3.12 (2.85-3.37)	2.99 (2.83-3.36)	0.402	0.843	0.993	3.08 (2.84-3.36)	2.93 (2.77-3.24)	0.084	0.667	0.966
CXCL12	0.20 (-0.11-0.53)	0.24 (-0.10-0.59)	0.885	0.967	0.966	0.28 (0.05-0.79)	0.14 (-0.19-0.42)	0.087	0.667	0.368
AREG	4.16 (3.75-4.55)	4.18 (3.62-4.85)	0.791	0.967	1.011	4.07 (3.69-4.52)	4.13 (3.63-4.61)	0.879	0.974	1.007
IFNLR1	1.99 (1.84-2.28)	1.92 (1.68-2.17)	0.141	0.843	0.961	1.94 (1.81-2.12)	1.82 (1.58-2.09)	0.121	0.742	0.938
DAPP1	2.17 (1.79-2.60)	2.07 (1.73-2.47)	0.290	0.843	0.916	2.20 (1.90-2.59)	2.18 (1.91-2.73)	0.685	0.971	0.962
PADI2	-0.24 (-0.43--0.03)	-0.36 (-0.50--0.00)	0.293	0.843	1.067	-0.16 (-0.39-0.12)	-0.41 (-0.50--0.23)	0.033	0.667	3.983
SIT1	3.91 (3.32-4.81)	4.02 (3.12-4.56)	0.396	0.843	0.946	3.82 (3.30-4.48)	4.08 (3.26-4.53)	0.532	0.971	1.015
MASP1	0.46 (0.24-0.60)	0.51 (0.36-0.69)	0.100	0.764	1.205	0.45 (0.19-0.58)	0.49 (0.35-0.59)	0.326	0.936	1.145
LAMP3	3.61 (3.41-3.82)	3.57 (3.40-3.85)	0.885	0.967	0.998	3.55 (3.36-3.81)	3.53 (3.36-3.81)	0.543	0.971	0.997
CLEC7A	2.30 (2.06-2.53)	2.35 (2.11-2.59)	0.398	0.843	1.013	2.39 (2.20-2.63)	2.35 (2.08-2.61)	0.309	0.936	0.972
CLEC6A	2.10 (1.77-2.42)	2.04 (1.73-2.42)	0.821	0.967	0.999	2.14 (1.97-2.41)	1.91 (1.57-2.36)	0.072	0.667	0.897
DDX58	2.41 (1.99-2.69)	2.03 (1.82-2.40)	0.010	0.705	0.924	2.28 (1.96-2.62)	2.17 (1.85-2.45)	0.326	0.936	1.004
IL12RB1	1.27 (1.03-1.51)	1.17 (1.04-1.44)	0.581	0.906	0.986	1.24 (0.89-1.51)	1.13 (1.02-1.34)	0.612	0.971	0.966
TANK	2.70 (2.32-3.04)	2.66 (2.25-2.98)	0.470	0.843	0.967	2.67 (2.33-3.00)	2.66 (2.26-2.91)	0.532	0.971	0.973
ITGA11	0.97 (0.53-1.22)	1.13 (0.83-1.44)	0.033	0.718	1.218	0.95 (0.41-1.22)	1.09 (0.82-1.37)	0.326	0.936	1.138
KPNA1	-0.87 (-1.24--0.38)	-0.66 (-1.21--0.37)	0.310	0.843	0.849	-0.84 (-1.18--0.30)	-0.66 (-1.24--0.33)	0.919	0.975	0.829
LAG3	0.66 (0.44-0.80)	0.57 (0.30-0.83)	0.211	0.843	0.900	0.67 (0.47-0.81)	0.45 (0.27-0.66)	0.031	0.667	0.743
IL5	0.40 (0.04-0.81)	0.31 (-0.01-0.74)	0.269	0.843	0.793	0.54 (-0.08-1.08)	0.21 (-0.04-0.52)	0.109	0.716	0.511
CD83	2.15 (1.93-2.31)	2.13 (1.93-2.38)	0.700	0.960	1.015	2.17 (1.92-2.25)	2.07 (1.92-2.27)	0.933	0.975	1.000
ITGB6	3.44 (3.21-3.66)	3.41 (3.25-3.70)	0.468	0.843	1.016	3.51 (3.26-3.61)	3.37 (3.16-3.69)	0.397	0.936	0.980
BTN3A2	2.86 (2.67-3.07)	2.84 (2.62-3.15)	0.918	0.967	0.998	2.87 (2.75-3.11)	2.78 (2.61-3.12)	0.388	0.936	0.958

Values presented are median (interquartile range); *P*_{adjusted}: *P* values are adjusted by Benjamini & Hochberg false discovery rate procedure.

^a Wilcoxon rank-sum test.

^b Wilcoxon signed-rank test.

Supplementary Table 5. Association between immune-response-related proteins levels and neonatal infection in twins

Proteins	All twins (n=149)		Discordant twins (n=68)	
	OR (95%CI)	OR (95%CI) ^a	OR (95%CI)	OR (95%CI) ^b
PPP1R9B	0.68 (0.38-1.21)	0.64 (0.32-1.29)	0.83 (0.36-1.94)	1.21 (0.41-3.61)
GLB1	0.73 (0.39-1.39)	0.66 (0.30-1.42)	0.63 (0.26-1.53)	0.65 (0.26-1.64)
PSIP1	0.84 (0.55-1.27)	0.80 (0.46-1.39)	1.60 (0.72-3.55)	3.49 (1.07-11.44)
ZBTB16	0.71 (0.42-1.20)	0.47 (0.23-0.95)	0.61 (0.26-1.46)	1.02 (0.31-3.41)
IRAK4	0.79 (0.52-1.21)	0.74 (0.44-1.25)	0.85 (0.48-1.51)	1.08 (0.55-2.12)
TPSAB1	0.93 (0.60-1.44)	1.03 (0.62-1.71)	1.64 (0.70-3.84)	1.74 (0.66-4.56)
HCLS1	0.75 (0.50-1.13)	0.70 (0.43-1.15)	1.16 (0.54-2.48)	1.71 (0.68-4.30)
CNTNAP2	2.10 (1.06-4.13)	2.34 (1.04-5.28)	0.68 (0.14-3.17)	0.84 (0.13-5.45)
CLEC4G	1.12 (0.52-2.39)	1.81 (0.65-5.03)	0.38 (0.08-1.92)	0.32 (0.05-2.08)
IRF9	0.93 (0.57-1.54)	0.95 (0.50-1.80)	1.12 (0.43-2.89)	2.09 (0.55-8.00)
EDAR	0.60 (0.32-1.12)	0.57 (0.27-1.19)	1.12 (0.52-2.41)	1.60 (0.63-4.06)
IL6	0.75 (0.44-1.28)	0.68 (0.35-1.32)	1.19 (0.46-3.05)	0.90 (0.25-3.18)
DGKZ	0.63 (0.31-1.27)	0.57 (0.24-1.36)	0.75 (0.30-1.91)	0.95 (0.25-3.56)
CLEC4C	1.00 (0.48-2.07)	1.24 (0.51-3.02)	1.61 (0.53-4.92)	1.36 (0.33-5.58)
IRAK1	0.94 (0.54-1.64)	0.96 (0.50-1.86)	1.10 (0.51-2.38)	1.45 (0.60-3.55)
CLEC4A	1.55 (0.57-4.17)	2.25 (0.68-7.47)	3.29 (0.57-19.11)	4.12 (0.47-36.34)
PRDX1	0.90 (0.70-1.17)	0.92 (0.68-1.24)	1.14 (0.73-1.78)	1.46 (0.84-2.52)
PRDX3	0.96 (0.55-1.65)	0.76 (0.37-1.54)	0.22 (0.05-0.95)	0.21 (0.03-1.44)
FGF2	0.81 (0.56-1.17)	0.85 (0.54-1.32)	1.07 (0.60-1.92)	2.25 (0.91-5.58)
PRDX5	0.95 (0.72-1.25)	0.93 (0.66-1.32)	1.04 (0.61-1.78)	1.28 (0.66-2.49)
DPP10	1.27 (0.73-2.23)	1.75 (0.89-3.45)	0.31 (0.05-1.78)	0.40 (0.03-4.83)
TRIM5	0.77 (0.46-1.30)	0.66 (0.35-1.25)	0.86 (0.39-1.89)	1.12 (0.42-2.95)
DCTN1	0.78 (0.56-1.10)	0.77 (0.51-1.16)	1.03 (0.56-1.88)	1.51 (0.71-3.19)
ITGA6	0.72 (0.38-1.36)	0.86 (0.40-1.89)	0.67 (0.24-1.89)	1.16 (0.34-3.99)
CDSN	0.80 (0.43-1.49)	0.64 (0.31-1.33)	0.34 (0.08-1.50)	0.22 (0.03-1.47)
GALNT3	0.82 (0.45-1.52)	1.04 (0.50-2.16)	0.41 (0.13-1.29)	0.46 (0.10-2.10)
FXYD5	1.20 (0.62-2.31)	1.01 (0.46-2.22)	0.93 (0.31-2.74)	1.66 (0.41-6.62)
TRAF2	0.89 (0.58-1.36)	0.86 (0.51-1.44)	1.46 (0.65-3.27)	2.51 (0.89-7.09)
TRIM21	0.97 (0.60-1.54)	1.22 (0.69-2.17)	1.38 (0.61-3.13)	1.93 (0.74-4.99)
LILRB4	1.50 (0.61-3.69)	1.42 (0.47-4.28)	2.83 (0.33-23.94)	2.12 (0.15-30.78)
NTF4	1.47 (0.52-4.14)	1.71 (0.47-6.22)	1.01 (0.23-4.36)	0.66 (0.11-3.74)
KRT19	0.90 (0.53-1.51)	0.80 (0.45-1.44)	2.21 (0.64-7.69)	2.91 (0.59-14.25)
ITM2A	2.32 (0.99-5.47)	2.00 (0.77-5.17)	1.57 (0.41-6.01)	0.96 (0.20-4.53)
HNMT	0.83 (0.57-1.20)	0.78 (0.49-1.22)	0.89 (0.44-1.83)	0.97 (0.37-2.53)
CCL11	0.84 (0.48-1.46)	1.21 (0.61-2.42)	0.65 (0.18-2.32)	1.01 (0.23-4.42)
MILR1	0.86 (0.45-1.64)	0.73 (0.32-1.67)	0.42 (0.12-1.51)	0.29 (0.06-1.54)
EGLN1	0.79 (0.51-1.21)	0.78 (0.46-1.31)	1.08 (0.48-2.41)	1.65 (0.63-4.36)
NFATC3	0.75 (0.33-1.74)	0.60 (0.22-1.65)	1.46 (0.26-8.25)	2.86 (0.36-23.06)
LY75	2.09 (0.72-6.04)	3.09 (0.84-11.36)	0.17 (0.02-1.28)	0.08 (0.01-1.25)
EIF5A	1.24 (0.61-2.52)	2.09 (0.82-5.30)	0.82 (0.26-2.53)	0.77 (0.21-2.86)
EIF4G1	0.89 (0.63-1.25)	0.84 (0.55-1.27)	1.14 (0.60-2.15)	1.47 (0.69-3.11)
CD28	1.52 (0.57-4.02)	1.33 (0.42-4.21)	0.67 (0.16-2.86)	1.01 (0.18-5.66)
PTH1R	0.50 (0.15-1.69)	0.48 (0.11-2.05)	0.14 (0.02-1.08)	0.12 (0.01-1.36)
BIRC2	0.96 (0.41-2.26)	1.05 (0.38-2.95)	0.78 (0.23-2.69)	1.19 (0.26-5.53)
HSD11B1	1.06 (0.48-2.34)	1.41 (0.53-3.74)	0.50 (0.13-1.93)	0.65 (0.11-3.79)
NF2	0.79 (0.47-1.31)	0.84 (0.47-1.51)	0.96 (0.48-1.93)	1.61 (0.63-4.09)
PLXNA4	0.84 (0.60-1.18)	0.72 (0.48-1.09)	1.05 (0.66-1.66)	1.20 (0.69-2.09)
SH2B3	0.80 (0.51-1.25)	0.77 (0.45-1.33)	0.82 (0.44-1.53)	1.08 (0.47-2.49)
FCRL3	1.17 (0.41-3.32)	1.00 (0.29-3.42)	0.40 (0.08-1.89)	0.34 (0.05-2.32)
CKAP4	0.85 (0.34-2.13)	0.56 (0.18-1.76)	0.45 (0.10-2.09)	0.45 (0.07-2.71)
JUN	1.04 (0.57-1.90)	1.20 (0.60-2.42)	0.65 (0.25-1.70)	0.95 (0.35-2.61)
HEXIM1	0.88 (0.59-1.34)	0.90 (0.55-1.47)	1.23 (0.58-2.61)	1.73 (0.72-4.17)
CLEC4D	1.26 (0.76-2.08)	1.50 (0.81-2.78)	1.09 (0.44-2.70)	1.27 (0.44-3.66)
PRKCQ	0.99 (0.60-1.62)	0.99 (0.56-1.73)	1.01 (0.53-1.94)	1.17 (0.55-2.46)
MGMT	0.85 (0.61-1.19)	0.78 (0.52-1.18)	1.21 (0.68-2.17)	1.77 (0.79-3.99)
TREM1	1.18 (0.56-2.48)	1.93 (0.77-4.82)	3.41 (0.58-20.17)	9.92 (0.87-113.44)
CXADR	1.79 (0.72-4.44)	1.99 (0.67-5.93)	0.32 (0.04-2.54)	0.21 (0.01-5.91)
IL10	0.96 (0.66-1.39)	0.82 (0.53-1.28)	1.00 (0.57-1.76)	1.01 (0.55-1.84)
SRPK2	0.66 (0.37-1.18)	0.58 (0.28-1.19)	1.36 (0.42-4.42)	5.01 (0.87-28.95)
KLRD1	1.00 (0.49-2.03)	1.05 (0.44-2.49)	2.11 (0.54-8.24)	1.53 (0.30-7.79)
BACH1	0.82 (0.51-1.35)	0.82 (0.47-1.44)	1.53 (0.61-3.86)	2.66 (0.75-9.50)
PIK3AP1	0.86 (0.57-1.30)	0.83 (0.50-1.39)	1.16 (0.57-2.33)	1.63 (0.71-3.71)
SPRY2	0.72 (0.47-1.12)	0.54 (0.31-0.94)	1.15 (0.55-2.38)	0.97 (0.41-2.32)
STC1	0.60 (0.11-3.32)	1.26 (0.14-11.13)	0.28 (0.01-9.80)	0.25 (0.00-13.12)
ARNT	1.23 (0.71-2.14)	1.17 (0.60-2.28)	0.88 (0.45-1.73)	1.06 (0.43-2.60)
FAM3B	1.54 (0.51-4.65)	1.69 (0.41-6.92)	1.51 (0.23-10.03)	1.50 (0.14-16.30)

Supplementary Table 5 (Continued). Association between immune-response-related proteins levels and neonatal infection in twins

Proteins	All twins (n=149)		Discordant twins (n=68)	
	OR (95%CI)	OR (95%CI) ^a	OR (95%CI)	OR (95%CI) ^b
SH2D1A	0.53 (0.31-0.91)	0.28 (0.12-0.63)	0.94 (0.32-2.73)	2.02 (0.51-8.01)
ICA1	0.68 (0.37-1.24)	0.63 (0.30-1.33)	0.47 (0.19-1.15)	0.59 (0.17-2.03)
DFFA	0.79 (0.52-1.20)	0.78 (0.48-1.28)	1.16 (0.56-2.41)	1.65 (0.69-3.94)
DCBLD2	1.13 (0.30-4.26)	1.99 (0.37-10.55)	0.26 (0.02-3.92)	0.77 (0.03-22.32)
FCRL6	3.83 (1.25-11.74)	5.72 (1.45-22.55)	0.72 (0.07-7.50)	0.94 (0.08-11.61)
NCR1	0.83 (0.33-2.13)	0.67 (0.21-2.15)	0.26 (0.04-1.60)	0.08 (0.01-1.03)
CXCL12	0.97 (0.52-1.83)	0.91 (0.42-2.00)	0.50 (0.21-1.19)	0.60 (0.17-2.11)
AREG	1.07 (0.73-1.57)	1.07 (0.66-1.74)	1.09 (0.47-2.56)	0.83 (0.25-2.72)
IFNLR1	0.49 (0.18-1.33)	0.45 (0.14-1.48)	0.35 (0.08-1.50)	0.35 (0.05-2.31)
DAPP1	0.74 (0.49-1.13)	0.74 (0.44-1.24)	0.83 (0.42-1.67)	0.97 (0.41-2.31)
PADI2	0.95 (0.48-1.86)	1.39 (0.62-3.10)	0.32 (0.08-1.28)	0.27 (0.04-2.05)
SIT1	0.83 (0.62-1.13)	0.77 (0.53-1.14)	1.16 (0.54-2.50)	1.69 (0.62-4.59)
MASP1	2.99 (0.91-9.89)	4.71 (1.11-19.94)	3.26 (0.36-29.63)	3.62 (0.34-38.51)
LAMP3	0.95 (0.34-2.66)	1.38 (0.39-4.93)	0.82 (0.12-5.75)	0.48 (0.04-6.27)
CLEC7A	1.26 (0.50-3.21)	1.53 (0.51-4.61)	0.34 (0.05-2.49)	0.35 (0.03-4.33)
CLEC6A	0.99 (0.55-1.80)	1.09 (0.54-2.20)	0.37 (0.12-1.11)	0.21 (0.04-1.00)
DDX58	0.62 (0.35-1.08)	0.61 (0.31-1.23)	1.03 (0.45-2.34)	1.32 (0.47-3.71)
IL12RB1	0.87 (0.34-2.21)	0.84 (0.28-2.53)	0.70 (0.17-2.88)	0.94 (0.14-6.29)
TANK	0.78 (0.45-1.35)	0.76 (0.39-1.49)	0.80 (0.35-1.85)	1.70 (0.42-6.94)
ITGA11	1.85 (1.00-3.40)	3.09 (1.38-6.96)	1.40 (0.63-3.07)	5.50 (1.20-25.23)
KPNA1	1.20 (0.80-1.80)	1.38 (0.81-2.36)	1.26 (0.65-2.44)	1.20 (0.57-2.55)
LAG3	0.51 (0.17-1.52)	0.46 (0.13-1.62)	0.23 (0.05-1.10)	0.15 (0.02-1.08)
IL5	0.76 (0.42-1.36)	0.77 (0.39-1.52)	0.53 (0.22-1.24)	0.41 (0.11-1.55)
CD83	1.48 (0.47-4.65)	1.34 (0.31-5.86)	1.01 (0.16-6.23)	0.76 (0.07-8.39)
ITGB6	1.50 (0.61-3.67)	1.44 (0.47-4.47)	0.33 (0.04-2.37)	0.43 (0.05-3.93)
BTN3A2	0.95 (0.38-2.39)	0.80 (0.27-2.38)	0.40 (0.09-1.72)	0.25 (0.04-1.51)

OR: Odds ratios; CI: confidence interval.

^aAdjusted for maternal age at delivery, educational level, pre-pregnancy BMI, mode of conception, gravidity, vaginal bleeding, gestational age, complications during pregnancy, as well as infant's sex and birth weight.

^bAdjusted for infant's sex and birth weight.

Supplementary Table 6. Association between immune-response-related proteins levels and neonatal infection diagnosed at 0-6 days and 7-27 days of age in all twins

Proteins	0-6 days of age, <i>OR</i> (95% <i>CI</i>) ^a	7-27 days of age, <i>OR</i> (95% <i>CI</i>) ^a
PPP1R9B	0.40 (0.16-0.98)	1.49 (0.54-4.15)
GLB1	0.73 (0.30-1.74)	0.53 (0.14-1.99)
PSIP1	0.73 (0.38-1.39)	0.91 (0.39-2.15)
ZBTB16	0.23 (0.08-0.62)	1.26 (0.50-3.17)
IRAK4	0.45 (0.22-0.90)	1.48 (0.72-3.02)
TPSAB1	1.40 (0.71-2.74)	0.74 (0.35-1.53)
HCLS1	0.61 (0.34-1.09)	0.94 (0.43-2.08)
CNTNAP2	3.13 (1.18-8.26)	1.39 (0.39-4.96)
CLEC4G	1.17 (0.30-4.52)	3.24 (0.74-14.26)
IRF9	0.67 (0.32-1.43)	1.77 (0.65-4.83)
EDAR	0.23 (0.08-0.70)	1.68 (0.68-4.20)
IL6	0.27 (0.10-0.75)	2.15 (0.77-5.96)
DGKZ	0.25 (0.08-0.78)	2.65 (0.64-10.94)
CLEC4C	0.89 (0.31-2.58)	2.59 (0.66-10.10)
IRAK1	0.70 (0.32-1.53)	1.48 (0.56-3.97)
CLEC4A	2.34 (0.58-9.49)	1.59 (0.28-8.94)
PRDX1	0.87 (0.61-1.23)	1.13 (0.70-1.83)
PRDX3	0.57 (0.23-1.40)	1.25 (0.46-3.45)
FGF2	0.59 (0.33-1.06)	1.55 (0.82-2.94)
PRDX5	0.88 (0.58-1.33)	1.07 (0.62-1.84)
DPP10	1.06 (0.41-2.75)	3.47 (1.08-11.16)
TRIM5	0.40 (0.17-0.91)	1.47 (0.61-3.53)
DCTN1	0.69 (0.43-1.09)	1.12 (0.58-2.15)
ITGA6	0.75 (0.30-1.86)	1.19 (0.32-4.45)
CDSN	0.54 (0.23-1.29)	0.68 (0.22-2.17)
GALNT3	0.84 (0.37-1.89)	1.48 (0.44-4.93)
FXYD5	0.38 (0.13-1.16)	3.25 (1.02-10.37)
TRAF2	0.63 (0.34-1.18)	1.64 (0.77-3.49)
TRIM21	1.18 (0.62-2.25)	1.24 (0.49-3.14)
LILRB4	0.59 (0.13-2.62)	6.07 (0.85-43.40)
NTF4	1.31 (0.30-5.74)	2.77 (0.35-21.84)
KRT19	0.71 (0.35-1.43)	1.20 (0.53-2.74)
ITM2A	1.23 (0.41-3.65)	4.61 (0.92-23.20)
HNMT	0.59 (0.32-1.09)	1.29 (0.65-2.56)
CCL11	1.07 (0.47-2.40)	1.63 (0.54-4.88)
MILR1	0.47 (0.16-1.40)	1.43 (0.48-4.22)
EGLN1	0.62 (0.33-1.16)	1.22 (0.55-2.72)
NFATC3	0.27 (0.07-1.04)	1.93 (0.51-7.37)
LY75	1.83 (0.40-8.28)	11.62 (1.35-100.22)
EIF5A	1.58 (0.55-4.50)	4.19 (0.94-18.62)
EIF4G1	0.76 (0.48-1.23)	1.07 (0.54-2.15)
CD28	0.97 (0.25-3.79)	2.52 (0.43-14.78)
PTH1R	0.20 (0.03-1.25)	1.83 (0.24-14.08)
BIRC2	0.41 (0.12-1.41)	8.45 (1.40-51.02)
HSD11B1	0.96 (0.31-2.98)	2.35 (0.55-10.01)
NF2	0.55 (0.28-1.11)	2.13 (0.75-6.06)
PLXNA4	0.60 (0.36-1.02)	1.04 (0.58-1.88)
SH2B3	0.55 (0.28-1.10)	1.23 (0.59-2.58)
FCRL3	0.76 (0.18-3.24)	1.24 (0.20-7.55)
CKAP4	0.57 (0.14-2.27)	0.78 (0.15-4.20)
JUN	1.26 (0.54-2.94)	1.19 (0.42-3.36)
HEXIM1	0.75 (0.42-1.34)	1.33 (0.65-2.73)
CLEC4D	2.05 (0.97-4.29)	0.78 (0.29-2.15)
PRKCQ	0.82 (0.42-1.60)	1.52 (0.64-3.60)
MGMT	0.61 (0.36-1.02)	1.20 (0.67-2.13)
TREM1	1.77 (0.62-5.04)	2.20 (0.52-9.30)
CXADR	1.74 (0.47-6.41)	4.28 (0.78-23.40)
IL10	0.38 (0.14-1.05)	1.13 (0.68-1.86)
SRPK2	0.33 (0.12-0.87)	1.20 (0.46-3.08)
KLRD1	0.83 (0.30-2.34)	1.73 (0.44-6.75)
BACH1	0.57 (0.27-1.20)	1.42 (0.67-2.98)
PIK3AP1	0.70 (0.38-1.29)	1.11 (0.52-2.33)
SPRY2	0.41 (0.20-0.83)	0.79 (0.36-1.76)
STC1	0.91 (0.07-12.13)	2.45 (0.09-69.04)
ARNT	0.80 (0.36-1.75)	2.15 (0.76-6.12)
FAM3B	1.56 (0.28-8.61)	2.69 (0.29-25.22)

Supplementary Table 6 (Continued). Association between immune-response-related proteins levels and neonatal infection diagnosed at 0-6 days and 7-27 days of age in all twins

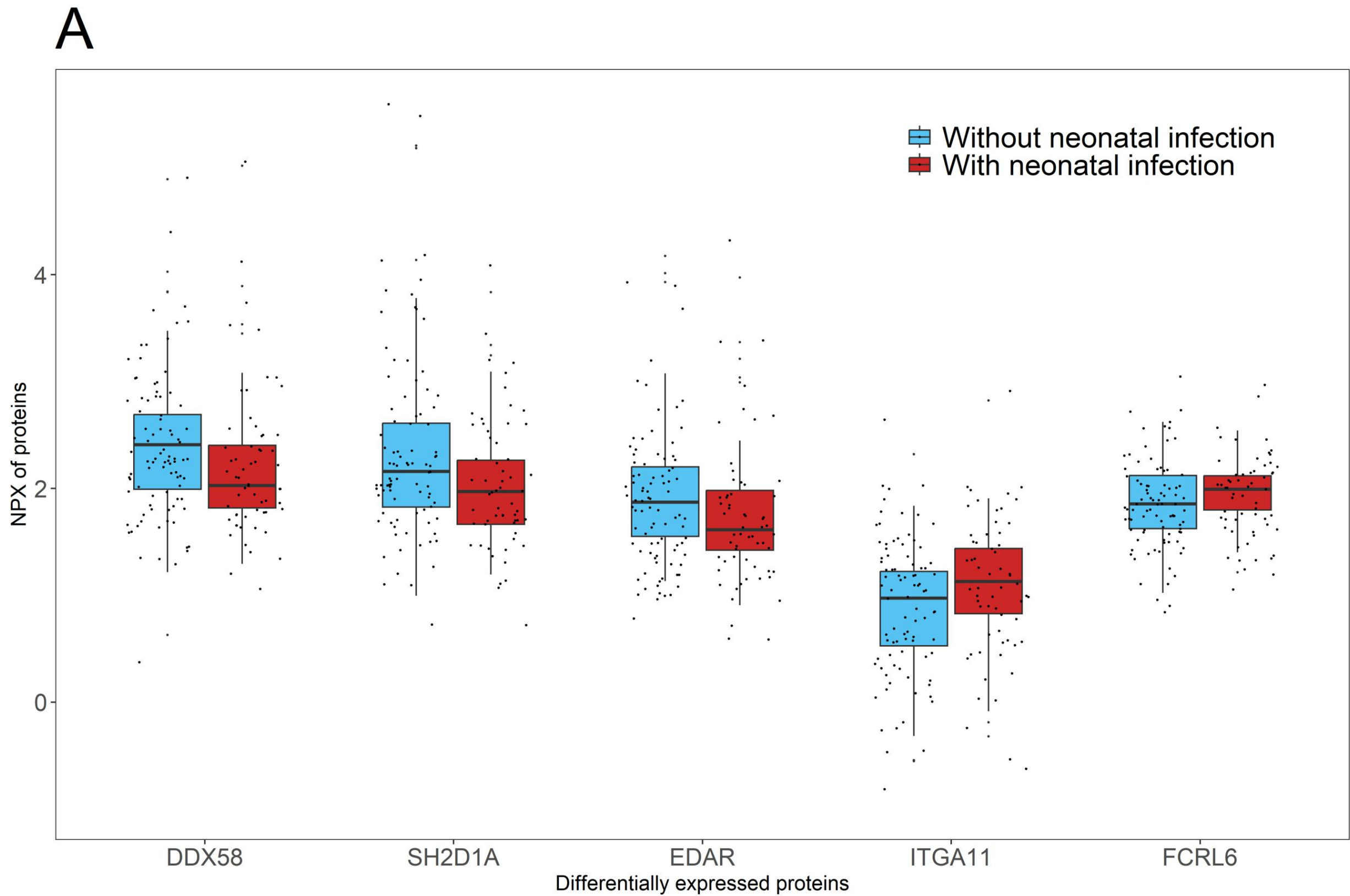
Proteins	0-6 days of age, <i>OR</i> (95% <i>CI</i>) ^a	7-27 days of age, <i>OR</i> (95% <i>CI</i>) ^a
SH2D1A	0.19 (0.07-0.54)	0.49 (0.16-1.53)
ICA1	0.23 (0.08-0.64)	2.86 (0.84-9.74)
DFFA	0.58 (0.31-1.06)	1.41 (0.69-2.89)
DCBLD2	1.35 (0.17-10.66)	6.62 (0.53-82.63)
FCRL6	9.71 (1.82-51.89)	2.83 (0.36-22.12)
NCR1	0.47 (0.12-1.89)	1.59 (0.26-9.71)
CXCL12	0.58 (0.23-1.46)	2.26 (0.67-7.67)
AREG	1.23 (0.72-2.10)	0.69 (0.31-1.57)
IFNLR1	0.14 (0.03-0.69)	2.04 (0.37-11.12)
DAPP1	0.68 (0.37-1.23)	0.87 (0.41-1.86)
PADI2	0.42 (0.11-1.65)	3.25 (1.17-9.02)
SIT1	0.63 (0.39-1.02)	1.04 (0.59-1.86)
MASP1	3.53 (0.68-18.29)	7.42 (0.76-72.43)
LAMP3	0.29 (0.05-1.62)	11.54 (1.59-83.73)
CLEC7A	1.30 (0.36-4.69)	1.93 (0.34-10.95)
CLEC6A	1.14 (0.49-2.63)	0.72 (0.24-2.18)
DDX58	0.39 (0.16-0.90)	1.42 (0.49-4.13)
IL12RB1	0.63 (0.17-2.35)	1.65 (0.30-9.15)
TANK	0.66 (0.31-1.38)	1.04 (0.36-3.02)
ITGA11	2.29 (0.94-5.59)	9.29 (2.37-36.38)
KPNA1	1.19 (0.62-2.28)	1.81 (0.77-4.24)
LAG3	0.20 (0.04-0.89)	2.11 (0.28-15.80)
IL5	0.53 (0.24-1.20)	1.67 (0.57-4.89)
CD83	0.87 (0.15-5.12)	5.02 (0.51-49.26)
ITGB6	1.63 (0.45-5.89)	0.91 (0.15-5.54)
BTN3A2	0.39 (0.11-1.41)	3.89 (0.60-25.01)

OR: Odds ratios; CI: confidence interval.

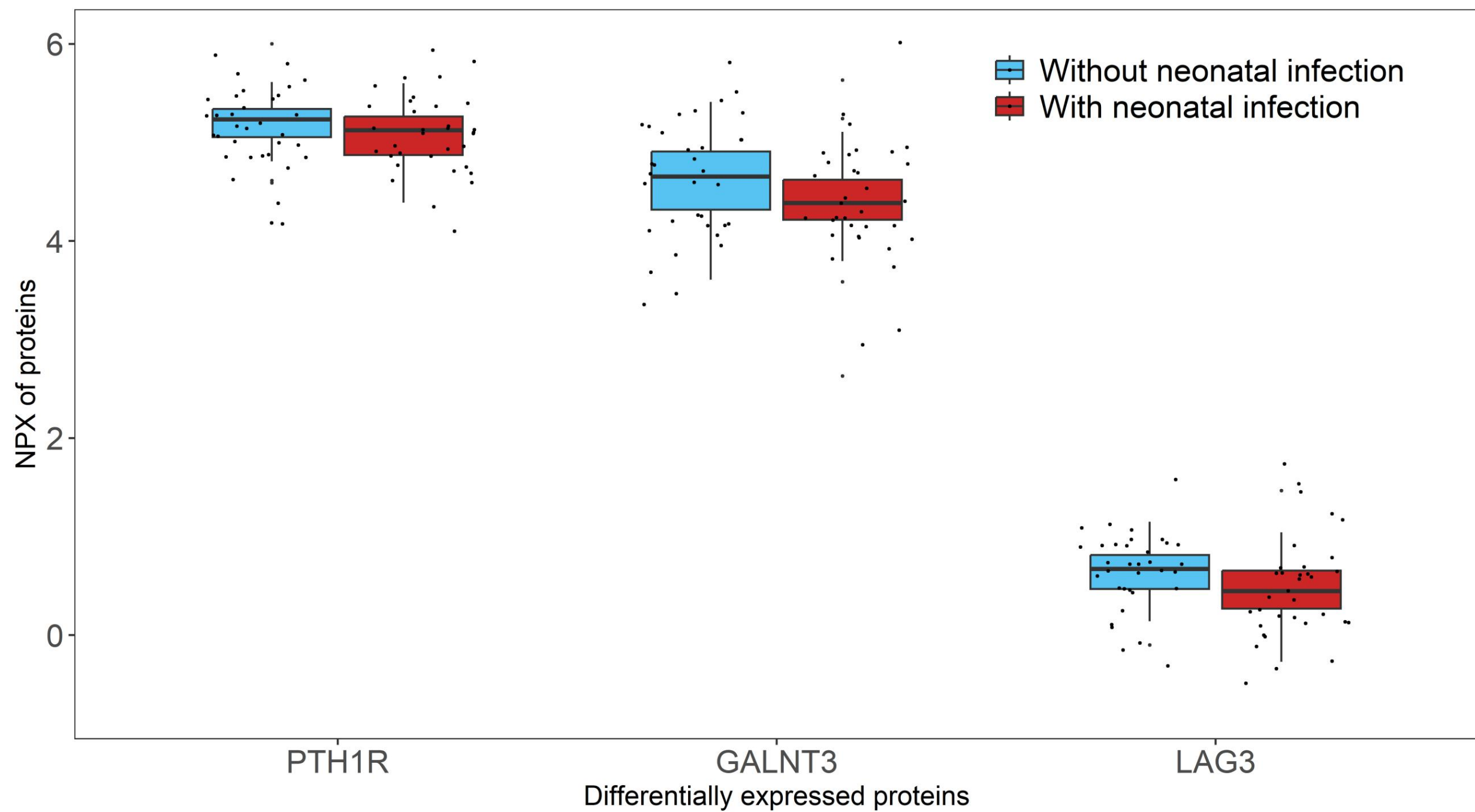
^aAdjusted for maternal age at delivery, educational level, pre-pregnancy BMI, mode of conception, gravidity, vaginal bleeding, gestational age, complications during pregnancy, as well as infant's sex and birth weight.

Supplementary Figure 1. Box plot for proteins levels between infant with or without neonatal infection

(A) In all twins (n=149); (B) In discordant twin pairs (n=68). NPX: Normalized protein expression, with a higher value corresponding to a higher protein expression. The dot of each protein represents the NPX value of each sample; the black line in the box represents the median NPX value of the protein; the upper and lower edge of the box represents the upper and the lower quartile, respectively; the line segment endpoints represent the edge values (i.e., median $\pm$ 1.5 interquartile range).

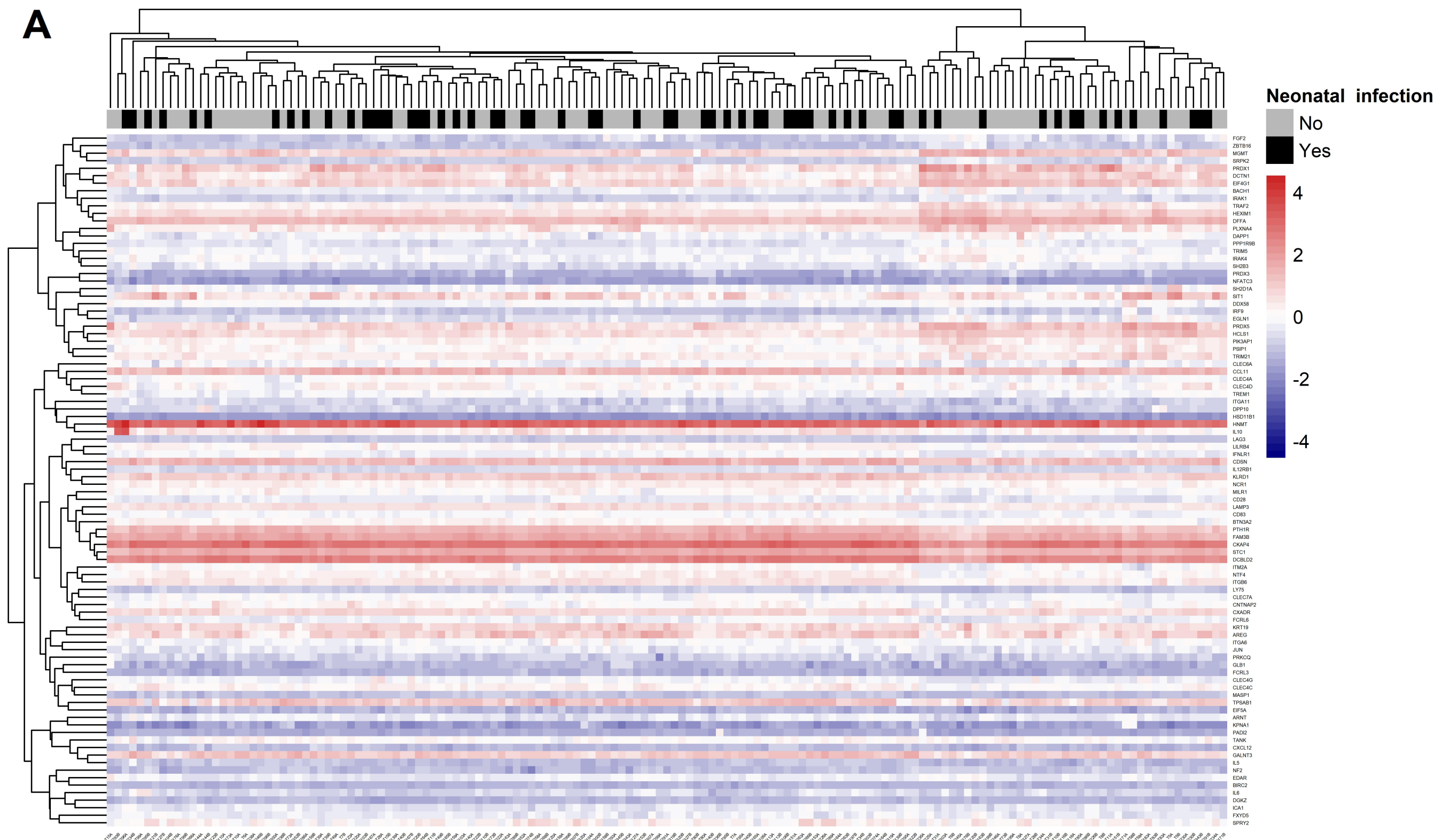


B

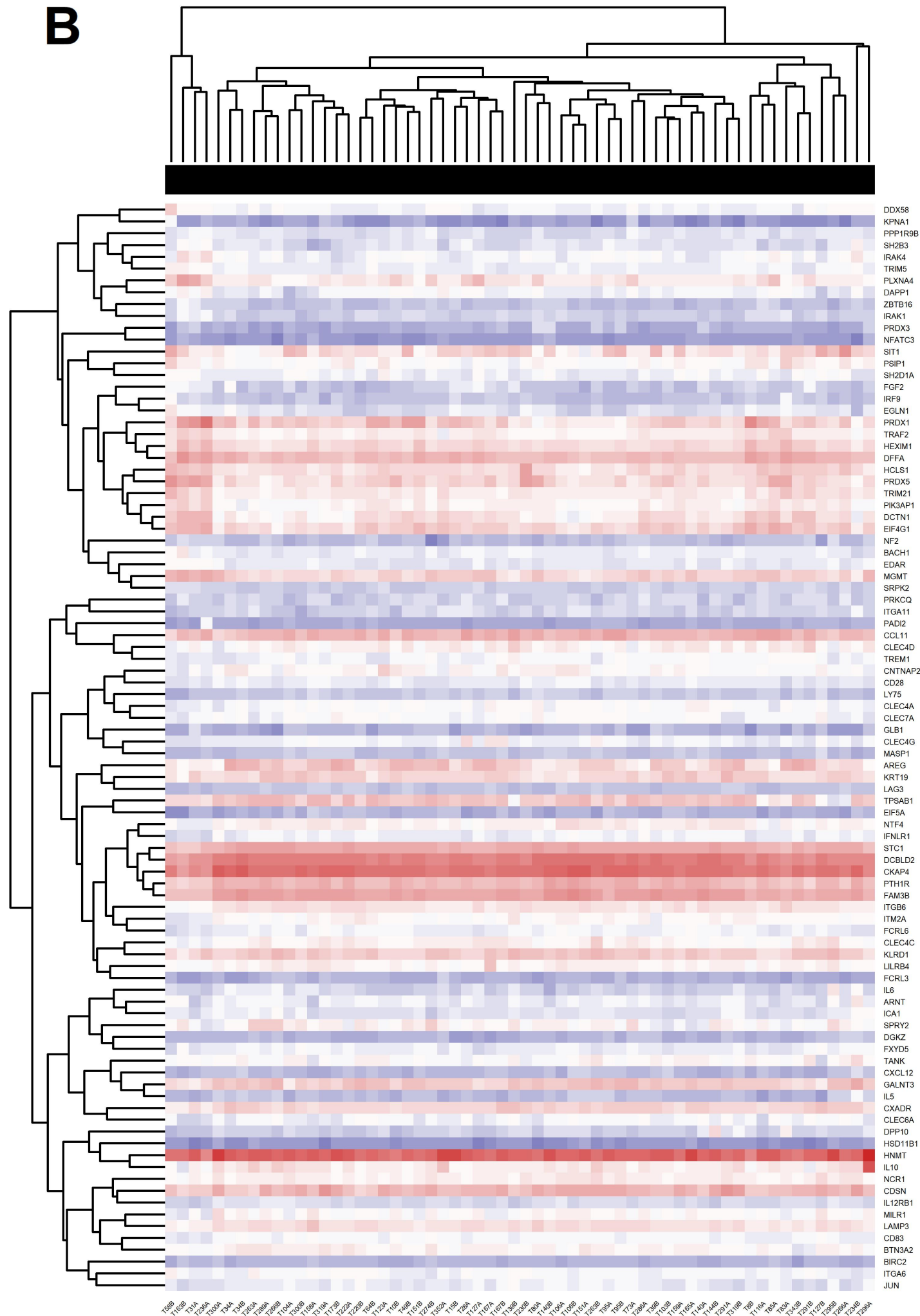


Supplementary Figure 2. Cluster heatmap for the levels of multiple immune response-related proteins

The 92 rows represent the levels of each protein in twins, and the columns represent the levels of 92 proteins in each neonate. The immune-response-related proteins were clustered by hierarchical clustering based on Pearson correlation coefficient. (A) In all twins, sorted by the states of neonatal infection (without neonatal infection - gray; with neonatal infection - black); (B) In twins with neonatal infection.

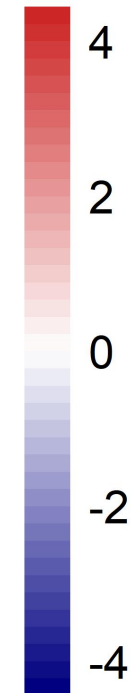


B



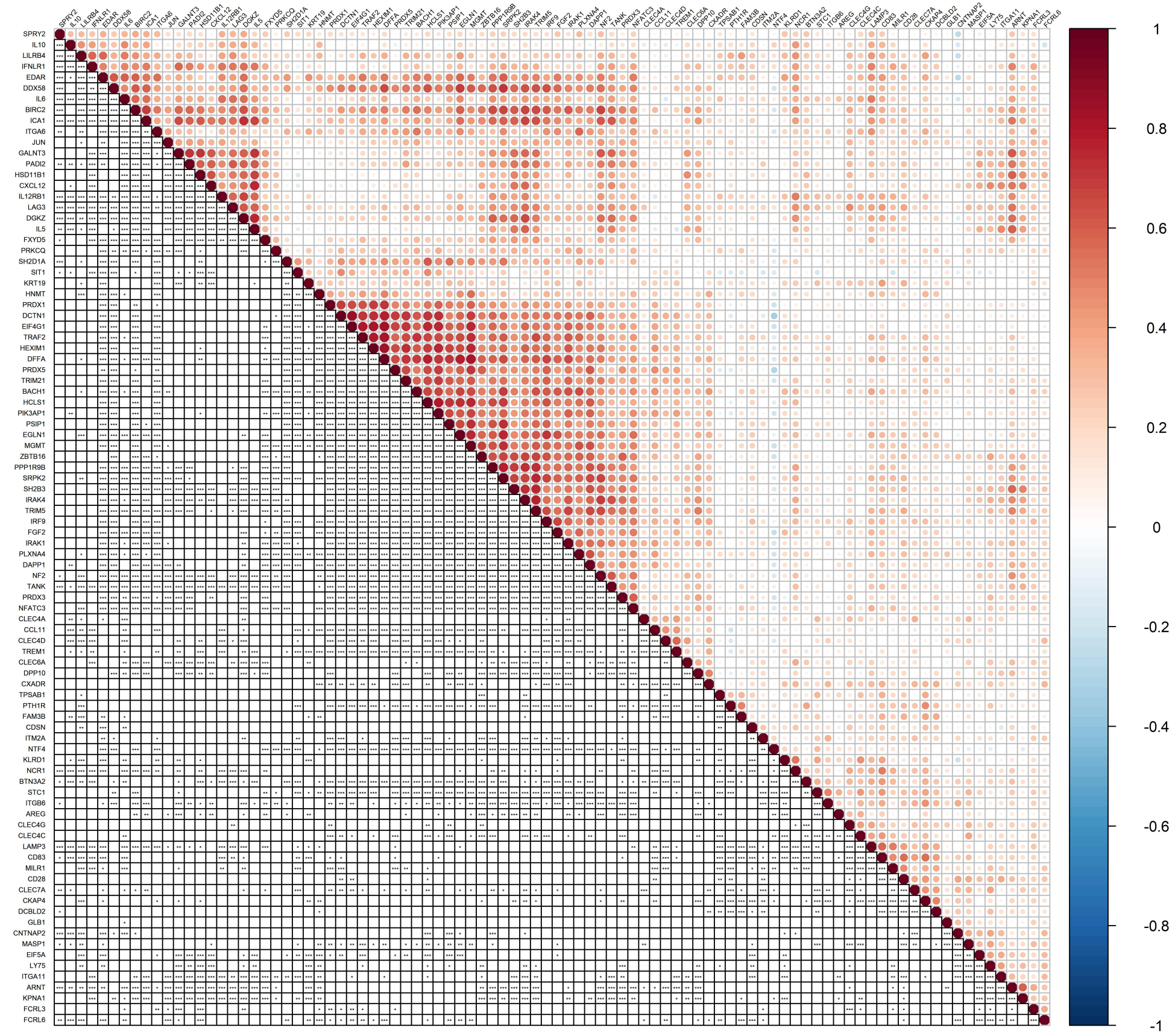
Neonatal infection

Yes



Supplementary Figure 3. Correlation heatmap for the levels of multiple immune response-related proteins

The correlation heatmap is plotted based on the Spearman correlation coefficient between 92 immune-response-related proteins. The upper right part of the heatmap shows the correlation coefficient. The lower left part shows the classification of the P value for correlation coefficient (*: $P < 0.05$; **: $P < 0.01$; ***: $P < 0.001$).



Supplementary Figure 4. Heatmap for group differences of differentially expressed proteins according to maternal and neonatal characteristics

The heatmap is plotted based on the *P* values from Kruskal-Wallis test.

