

**Table S1 Primer sequences used in qRT-PCR**

| Gene         | Forward (5'→3')           | Reverse (5'→3')          |
|--------------|---------------------------|--------------------------|
| <i>Tnf</i>   | GAGTGACAAGCCTGTAGCC       | CTCCTGGTATGAGATAGCAAA    |
| <i>Il6</i>   | GAAACCGCTATGAAGTTCCTCTCTG | TGTTGGGAGTGGTATCCTCTGTGA |
| <i>Hmgb1</i> | GGCGAGCATCCTGGCTTATC      | GGCTGCTTGTCACTGCTG       |
| <i>Il1b</i>  | CCTCGTGCTGTCGGACCCATA     | CAGGCTTGTGCTCTGCTTGTGA   |
| <i>Nos2</i>  | CACCAAGCTGAACTTGAGCG      | CGTGGCTTTGGGCTCCTC       |
| <i>Ccl2</i>  | CACAACCACCTCAAGCAC        | AAGGGAATACCATAACATCA     |
| <i>Cxcr2</i> | AAGTTTGTGTGCATAGCCAT      | GCAGTACGACCCTCAAACGG     |
| <i>Cxcr4</i> | TTCCGGGATGAAAACGTCCA      | GGTACTTGTCCGTCATGCTC     |
| <i>Il10</i>  | ACCTGGTAGAAGTGATGCCC      | GCTCCACTGCCTTGCTCTTAT    |
| <i>Tgfb1</i> | AACAATTCCTGGCGTTACCTT     | TCGAAAGCCCTGTATTCCGTCT   |
| <i>Gapdh</i> | TGACGTGCCGCTGGAGAAA       | AGTGTAGCCCAAGATGCCCTTCAG |

**Table S2 Erythroid cell state in different groups and erythroid subsets**

| Group/subset                                        | State 1 | State 1 (%) | State 2 | State 2 (%) | State 3 | State 3 (%) | Total |
|-----------------------------------------------------|---------|-------------|---------|-------------|---------|-------------|-------|
| Erythroid cell state in different groups            |         |             |         |             |         |             |       |
| IHG-F1-E18.5                                        | 791     | 28.81       | 26      | 0.95        | 1929    | 70.25       | 2746  |
| Ctrl-F1-E18.5                                       | 740     | 21.48       | 47      | 1.36        | 2658    | 77.16       | 3445  |
| Erythroid cell state in different erythroid subsets |         |             |         |             |         |             |       |
| Erythroid_cell_1                                    | 0       |             | 0       |             | 2254    |             |       |
| Erythroid_cell_2                                    | 464     |             | 1       |             | 1257    |             |       |
| Erythroid_cell_3                                    | 32      |             | 0       |             | 931     |             |       |
| Erythroid_cell_4                                    | 1035    |             | 72      |             | 145     |             |       |

**Table S3 CellChat of the Ctrl and IHG groups**

| Group                 | B_cells_1 | NKT_cells | T_cells | B_cells_0 | NK_cells_1 | Monocytes | NK_cells_0 | Mixed | Neutrophils | Hepatocytes | Hepatic_stromal_cells | Th_cells | Plasma_cells |
|-----------------------|-----------|-----------|---------|-----------|------------|-----------|------------|-------|-------------|-------------|-----------------------|----------|--------------|
| Ctrl                  |           |           |         |           |            |           |            |       |             |             |                       |          |              |
| B_cells_1             | 1         | 0         | 0       | 1         | 1          | 2         | 3          | 2     | 3           | 0           | 1                     | 0        | 2            |
| NKT_cells             | 1         | 4         | 0       | 2         | 5          | 5         | 11         | 6     | 10          | 4           | 5                     | 1        | 4            |
| T_cells               | 1         | 0         | 0       | 1         | 0          | 1         | 0          | 2     | 2           | 0           | 1                     | 0        | 1            |
| B_cells_0             | 1         | 0         | 0       | 1         | 1          | 1         | 3          | 0     | 2           | 0           | 2                     | 0        | 2            |
| NK_cells_1            | 1         | 4         | 0       | 2         | 5          | 5         | 10         | 4     | 7           | 2           | 5                     | 0        | 3            |
| Monocytes             | 2         | 5         | 1       | 3         | 5          | 10        | 12         | 5     | 14          | 5           | 7                     | 4        | 6            |
| NK_cells_0            | 1         | 4         | 0       | 2         | 5          | 6         | 10         | 6     | 8           | 4           | 2                     | 0        | 3            |
| Mixed                 | 1         | 4         | 0       | 2         | 5          | 6         | 11         | 6     | 10          | 2           | 4                     | 1        | 3            |
| Neutrophils           | 2         | 3         | 1       | 3         | 4          | 7         | 7          | 4     | 4           | 5           | 7                     | 2        | 2            |
| Hepatocytes           | 7         | 19        | 2       | 7         | 7          | 19        | 23         | 21    | 22          | 37          | 25                    | 11       | 16           |
| Hepatic_stromal_cells | 9         | 16        | 0       | 9         | 5          | 22        | 18         | 22    | 19          | 35          | 21                    | 12       | 21           |
| Th_cells              | 1         | 0         | 0       | 2         | 2          | 3         | 3          | 3     | 5           | 0           | 1                     | 0        | 2            |
| Plasma_cells          | 1         | 1         | 0       | 2         | 2          | 4         | 4          | 3     | 5           | 1           | 2                     | 0        | 1            |
| IHG                   |           |           |         |           |            |           |            |       |             |             |                       |          |              |
| B_cells_1             | 1         | 1         | 0       | 1         | 1          | 1         | 2          | 1     | 3           | 0           | 1                     | 0        | 2            |
| NKT_cells             | 1         | 4         | 0       | 2         | 5          | 5         | 9          | 4     | 10          | 4           | 3                     | 2        | 8            |
| T_cells               | 1         | 1         | 0       | 2         | 1          | 3         | 1          | 1     | 3           | 0           | 1                     | 0        | 1            |
| B_cells_0             | 0         | 1         | 0       | 0         | 1          | 1         | 2          | 0     | 2           | 0           | 2                     | 0        | 1            |
| NK_cells_1            | 1         | 4         | 0       | 2         | 5          | 5         | 9          | 2     | 7           | 3           | 3                     | 2        | 6            |
| Monocytes             | 2         | 8         | 1       | 3         | 6          | 13        | 12         | 5     | 13          | 10          | 5                     | 4        | 11           |
| NK_cells_0            | 1         | 4         | 0       | 2         | 5          | 5         | 10         | 2     | 9           | 4           | 3                     | 2        | 8            |
| Mixed                 | 0         | 3         | 0       | 1         | 4          | 4         | 8          | 1     | 8           | 1           | 2                     | 1        | 6            |
| Neutrophils           | 3         | 3         | 1       | 4         | 4          | 9         | 8          | 5     | 6           | 7           | 6                     | 3        | 5            |
| Hepatocytes           | 8         | 17        | 3       | 8         | 9          | 21        | 20         | 14    | 19          | 34          | 22                    | 10       | 22           |
| Hepatic_stromal_cells | 11        | 22        | 1       | 11        | 6          | 28        | 21         | 24    | 23          | 52          | 25                    | 15       | 39           |
| Th_cells              | 1         | 3         | 0       | 2         | 4          | 4         | 4          | 1     | 10          | 1           | 3                     | 0        | 6            |
| Plasma_cells          | 1         | 4         | 0       | 2         | 4          | 5         | 8          | 4     | 8           | 5           | 2                     | 3        | 4            |

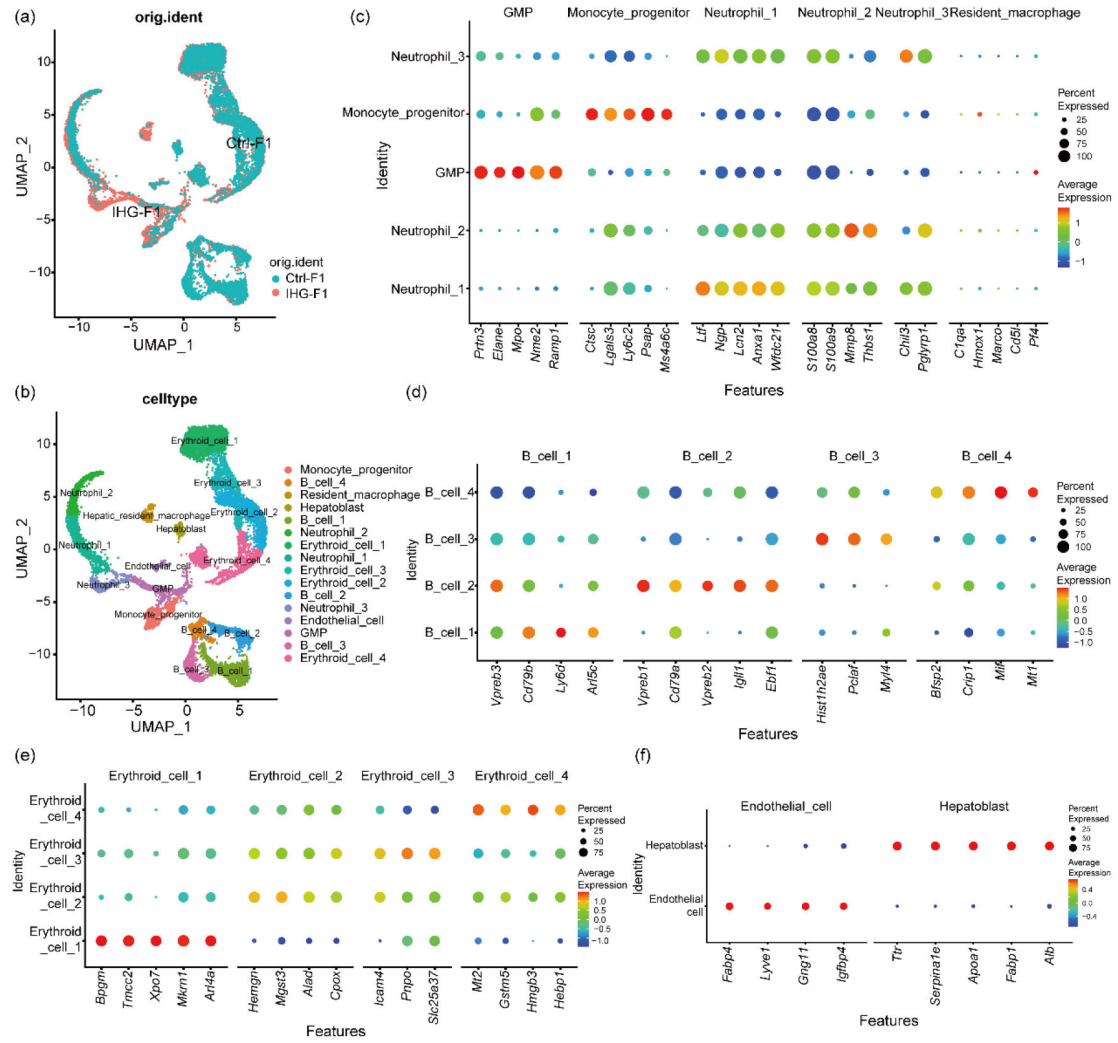


**Fig. S1 Cell clusters and markers of E18.5 fetal liver. Dimensionality reduction clustering of different samples (a) and cell typing (b). Cell markers of myeloid lineage (c), B cell (d), erythroid cell (e), and other clusters (f).**

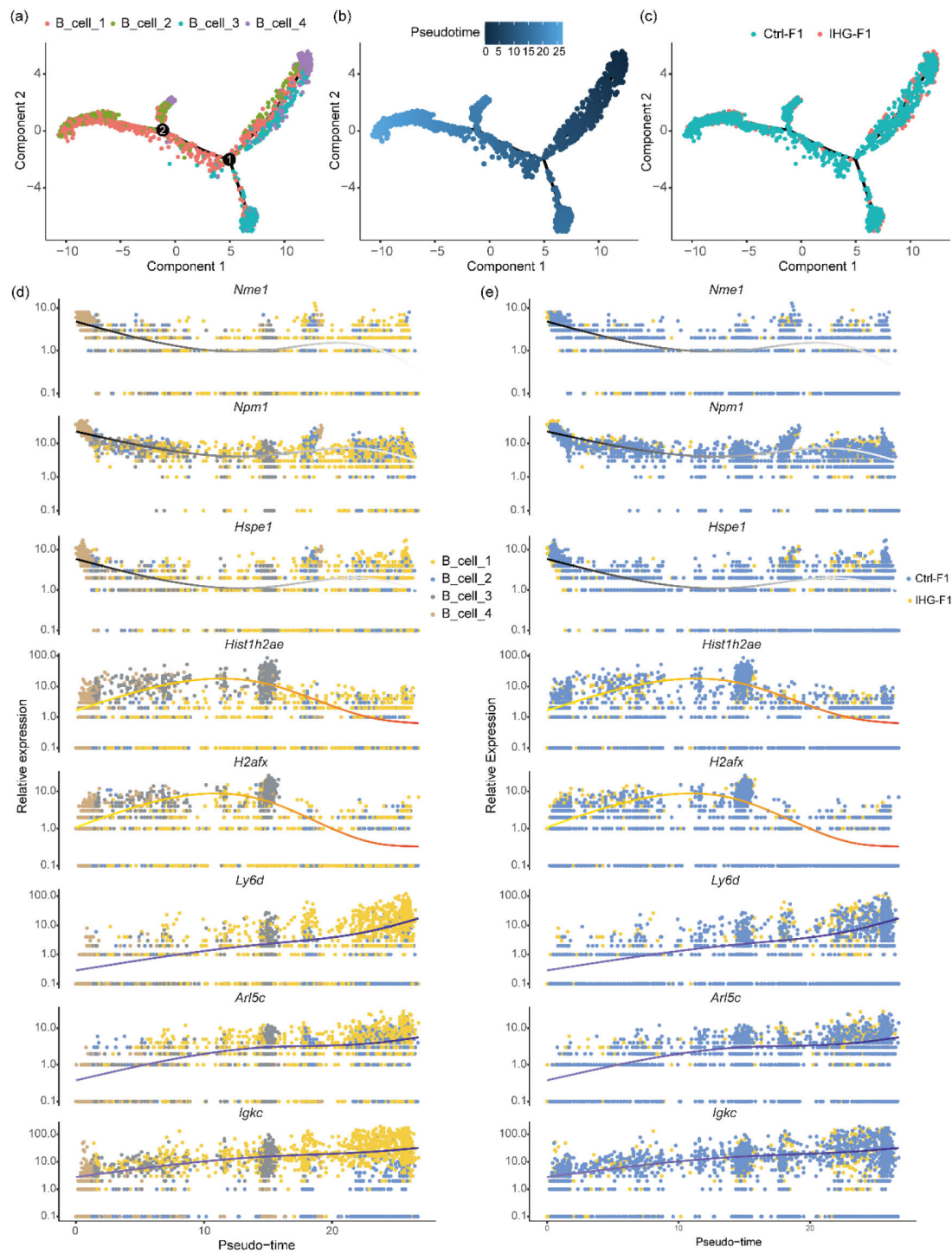


**Fig. S2** Intruterine hyperglycemia induces B cell development retardation in the fetal liver. Pseudotime analysis by cell types (a), pseudotime (b), and samples (c). (d) The kinetic plots show the relative expression pattern of 8 selected genes in B cell development trajectories through pseudotime analysis. (e) The kinetic plots show the relative expression pattern of 8 selected genes in B cells from different samples.

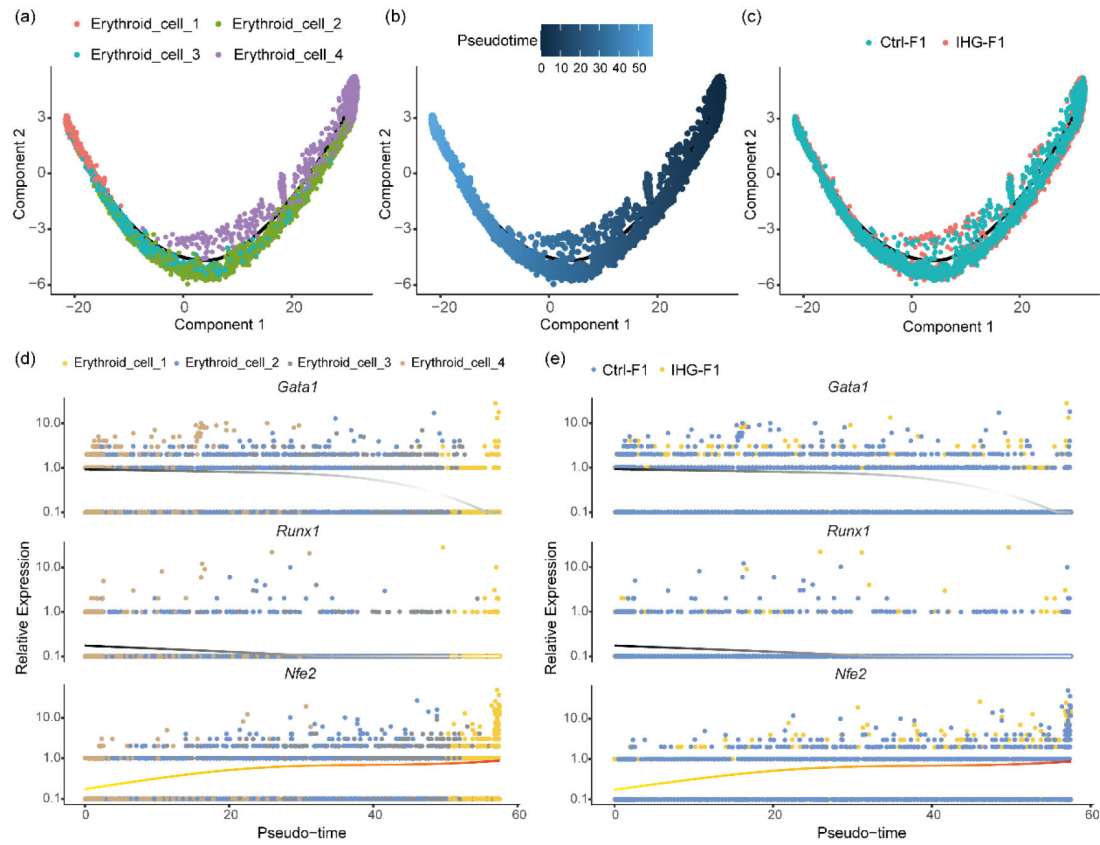


**Fig. S3** Intruterine hyperglycemia induces erythroid cell development retardation in the fetal liver. Pseudotime analysis by cell types (a), pseudotime (b), and samples (c). (d) The kinetic plots show the relative expression pattern of 3 selected genes in erythroid cell development trajectories through pseudotime. (e) The kinetic plots show the relative expression pattern of 3 selected genes in erythroid cells from different samples.

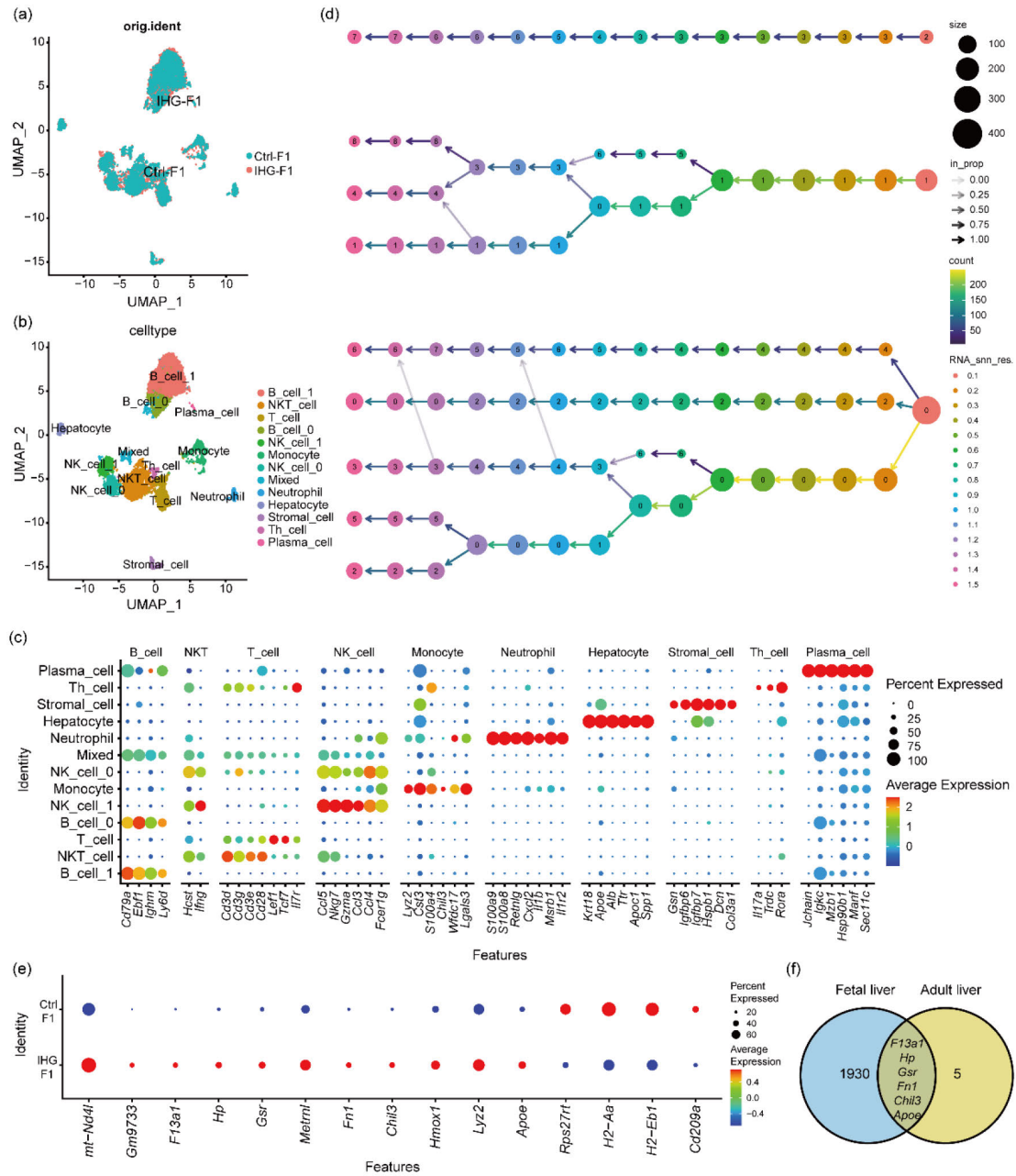


**Fig. S4** Cell clusters and subcluster analysis of 8-week adult liver. Dimensionality reduction clustering of different samples (a) and cell typing (b). (c) Key markers for cluster identification. (d) Cluster tree of monocyte subsets. (e) Different expression genes of monocytes in the Ctrl-F1 and IHG-F1 groups. (f) Upregulated genes of monocytes intersected at fetal and adult periods.

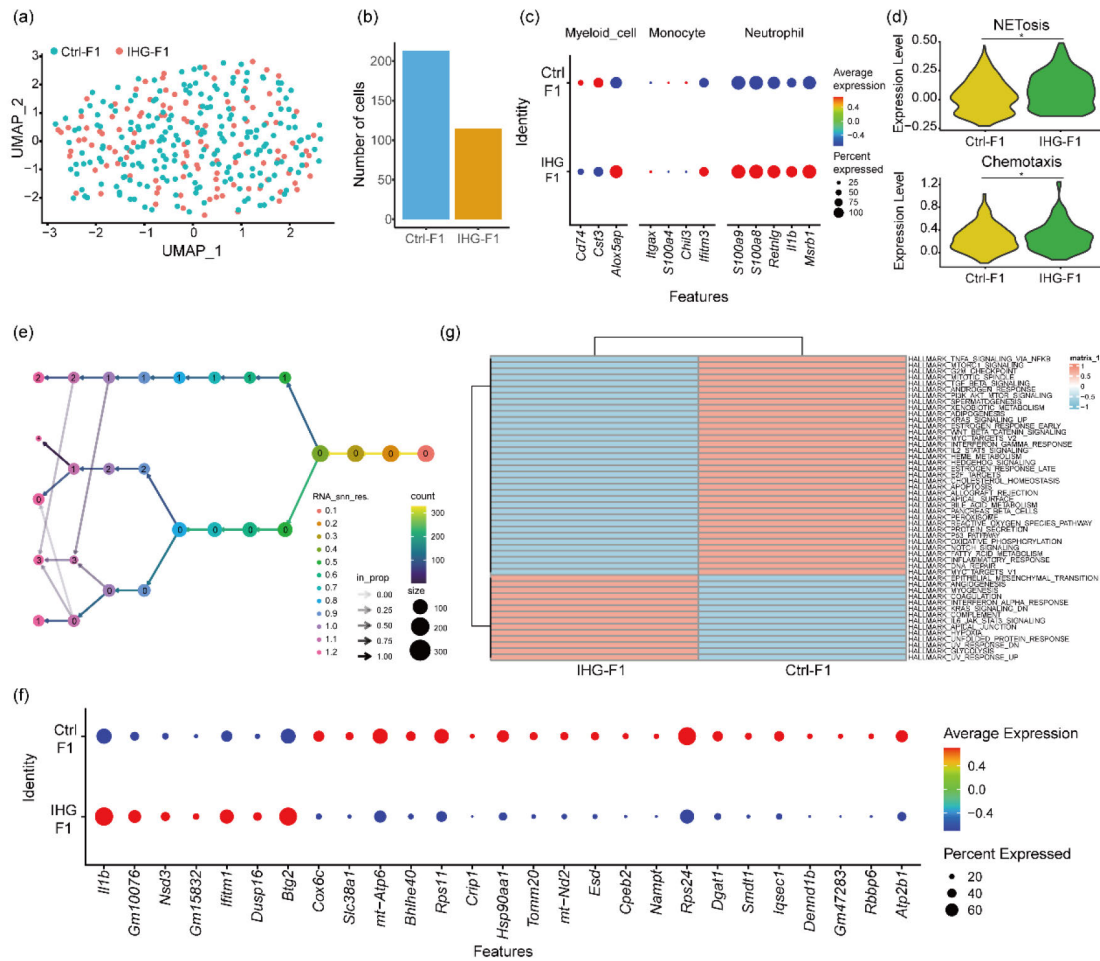


**Fig. S5** Neutrophil subset analysis of 8-week adult liver. (a) Distribution of neutrophils from different groups in UMAP. (b) Counts of neutrophils in the Ctrl-F1 and IHG-F1 groups. (c) Key markers for neutrophil identification. (d) Neutrophil function scoring in different groups. (e) Cluster tree of neutrophils. (f) Different expression genes of neutrophils in the Ctrl-F1 and IHG-F1 groups. (g) GSVA analysis of neutrophils from the Ctrl-F1 and IHG-F1 groups. \*  $P < 0.05$ .

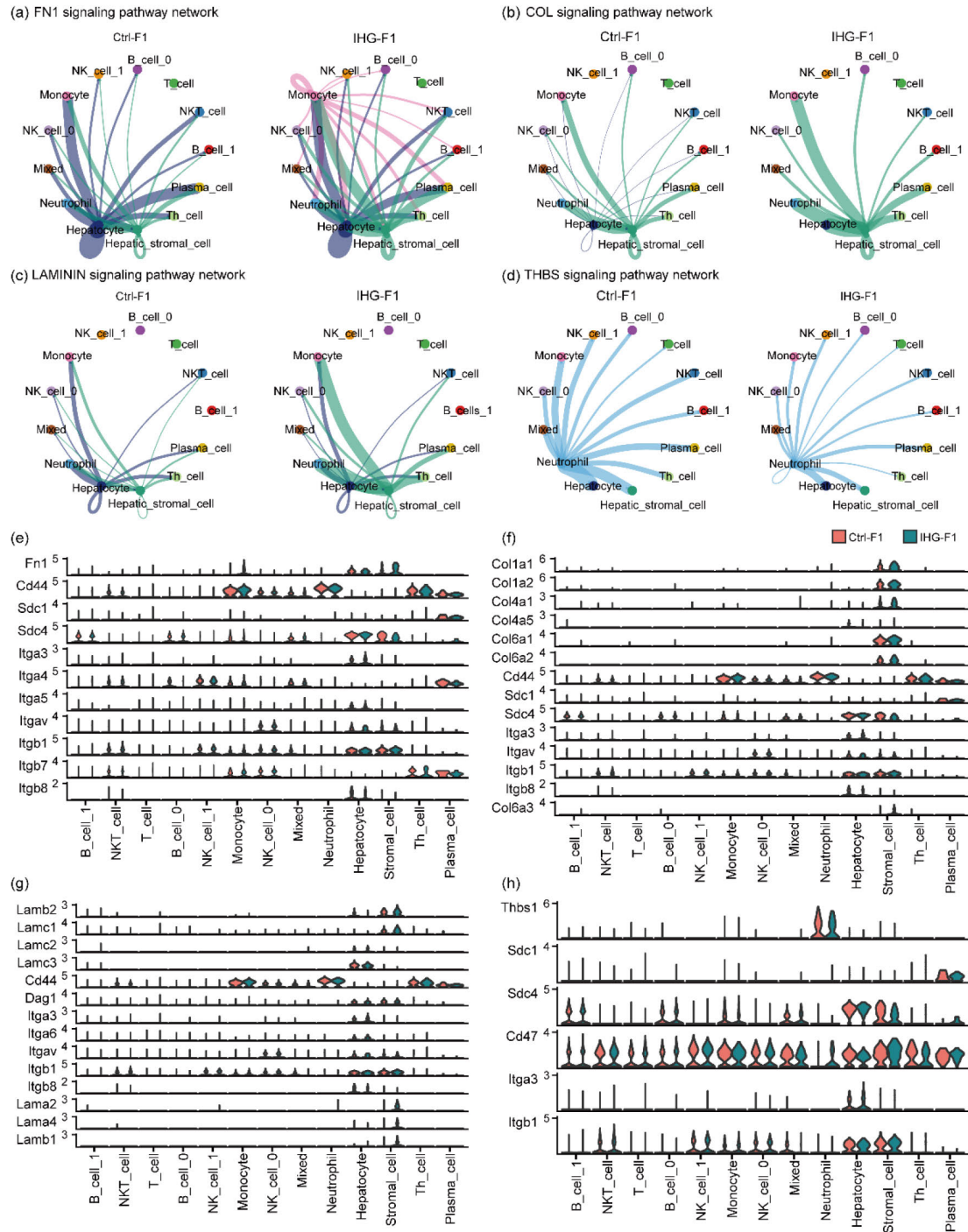


**Fig. S6** CellChat revealed anomalous cellular interactions in the IHG-F1 group. FN1 signaling pathway network (a), COLLAGEN signaling pathway network (b), and LAMININ signaling pathway network (c) were enhanced in the IHG-F1 groups. (d) The THBS signaling pathway network was attenuated in the IHG-F1 group. Expression level of FN1 (e), COLLAGEN (f), LAMININ (g), and THBS (h) ligand-receptor pairs in different samples.

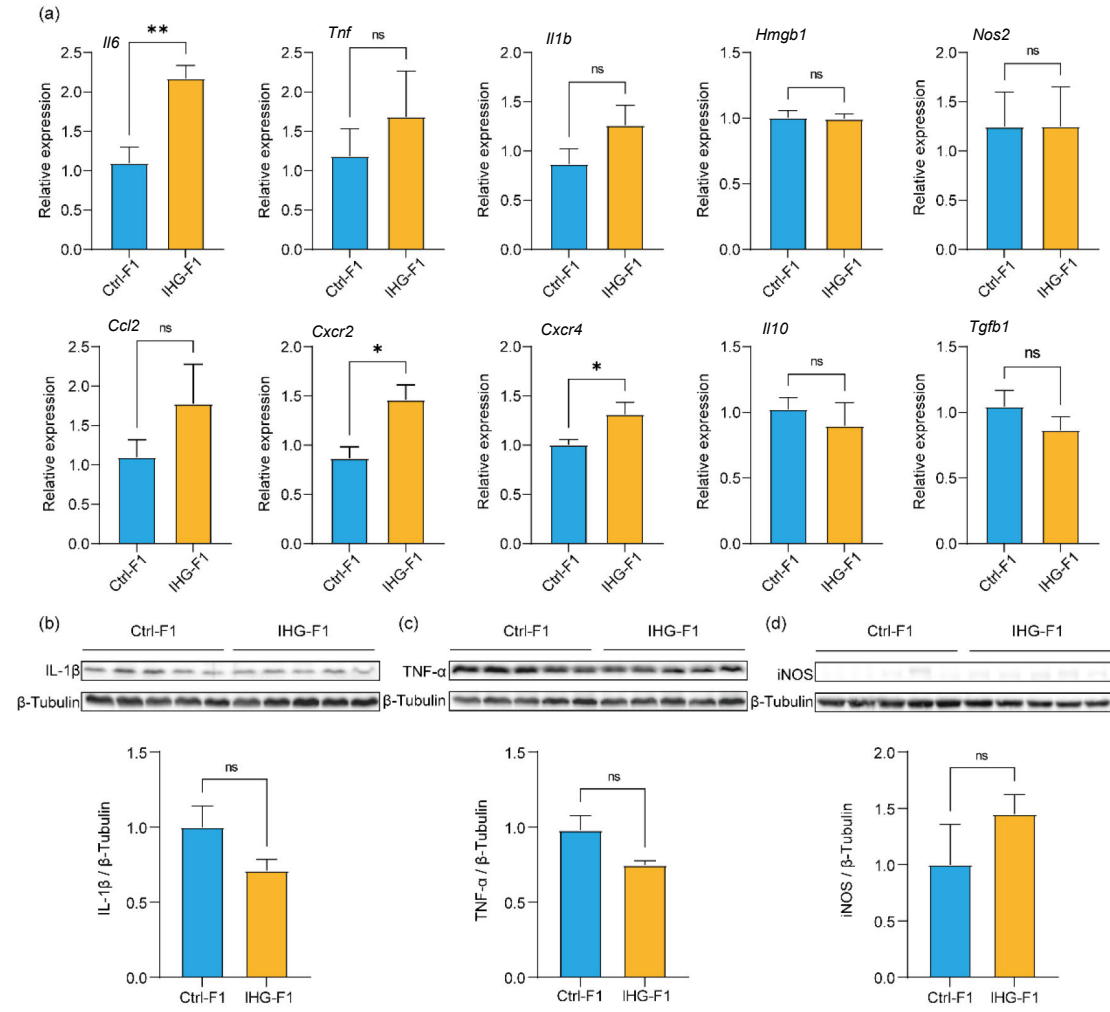


**Fig. S7** Transcription level of inflammatory factor increased in IHG-F1 liver without LPS treatment (8-week baseline). (a) Relative mRNA expression level of acute-phase response cytokines in livers from the Ctrl-F1 and IHG-F1 groups. Western blotting analysis of IL-1 $\beta$  (b), TNF- $\alpha$  (c), and iNOS (d) in liver tissue from the Ctrl-F1 and IHG-F1 groups. \*  $P < 0.05$ , \*\*  $P < 0.01$ , and \*\*\*  $P < 0.001$ ; ns: not significant. The values are expressed as mean  $\pm$  standard error of the mean (SEM),  $n \geq 3$ .