

Supporting Table S1. Clinical and laboratory data of 29 patients with nonalcoholic steatohepatitis (NASH) enrolled in this study.

| No. | Sex | Age | Body weight (kg) | Body height (cm) | Body mass index | Waist circumference (cm) | Bood pressure | NASH stage | DM | MS | AST (IU/L) | ALT (IU/L) | γ GT (IU/L) | TC (mg/dL) | TG (mg/dL) | HDL chol (mg/dL) | LDL chol (mg/dL) | Blood sugar (mg/dL) | HbA1c (%) | RBC ($\times 10^4/\mu\text{l}$) | Hb (g/dl) | WBC (/ μl) | Neutro (%) | Lympho (%) | Mono (%) | Plts ($\times 10^4/\mu\text{l}$) | Grade of fatty liver* | PIIIP (ng/mL) | Type IV collagen (ng/mL) | Hyaluronic acid (ng/mL) |
|-----|-----|-----|------------------|------------------|-----------------|--------------------------|---------------|------------|-----|-----|------------|------------|--------------------|------------|------------|------------------|------------------|---------------------|-----------|-----------------------------------|-----------|------------------------|------------|------------|----------|------------------------------------|-----------------------|---------------|--------------------------|-------------------------|
| N1 | M | 66 | 51 | 154 | 21.7 | 82 | 145/72 | advanced | IGT | No | 27 | 28 | 14 | 208 | 122 | 44 | 145 | 99 | 5.7 | 443 | 14 | 4130 | 43.2 | 49.6 | 4.6 | 19.5 | moderate to severe | 7.84 | 86 | 42 |
| N2 | M | 45 | 69 | 172 | 23.3 | 84 | 123/75 | early | DM | No | 61 | 72 | 21 | 168 | 147 | 40 | 112 | 111 | 5.7 | 486 | 14.2 | 5380 | 50.4 | 39.2 | 7.4 | 33.8 | moderate | 6.78 | 107 | 29 |
| N3 | M | 60 | 89 | 163 | 30.4 | 117 | 126/75 | early | DM | Yes | 15 | 12 | 29 | 195 | 152 | 44 | 127 | 109 | 5.9 | 530 | 15.7 | 5790 | 62.5 | 26.3 | 6.2 | 26 | moderate | 7.82 | 147 | 11 |
| N4 | M | 54 | 69 | 170 | 23.5 | 85 | 138/87 | advanced | DM | No | 22 | 22 | 30 | 276 | 188 | 82 | 151 | 127 | 6.5 | 492 | 15.1 | 3580 | 47.2 | 42.2 | 7.3 | 17.5 | moderate | 5.88 | 114 | 21 |
| N5 | F | 42 | 64 | 164 | 24 | 91 | 139/78 | advanced | No | Yes | 32 | 46 | 192 | 214 | 112 | 48 | 142 | 104 | 6 | 571 | 15.2 | 6280 | 62.4 | 28.5 | 6.4 | 27.9 | moderate | 10.2 | 123 | 11 |
| N6 | M | 42 | 55 | 166 | 19.9 | 73 | 128/89 | advanced | No | No | 21 | 23 | 75 | 181 | 99 | 49 | 114 | 90 | 5.6 | 517 | 15.8 | 7400 | 38 | 46.8 | 4.5 | 31.7 | moderate | 4.26 | 143 | ≤ 9 |
| N7 | M | 50 | 82 | 172 | 27.7 | 90 | 129/89 | early | No | No | 24 | 27 | 30 | 196 | 70 | 66 | 118 | 103 | 5.8 | 554 | 16.3 | 5750 | 59.3 | 28 | 6.8 | 29.3 | mild | 10.5 | 135 | 38 |
| N8 | M | 41 | 93 | 170 | 32.2 | 104 | 139/83 | early | No | No | 29 | 45 | 49 | 169 | 262 | 34 | 90 | 99 | 5.9 | 521 | 15.9 | 7550 | 50.5 | 42.4 | 4.4 | 30 | severe | 0.55 | 115 | 39 |
| N9 | M | 27 | 92 | 167 | 32.8 | 108 | 137/78 | early | No | Yes | 17 | 23 | 26 | 145 | 46 | 46 | 90 | 124 | 5.4 | 525 | 15.1 | 6800 | 60.5 | 27.5 | 5.4 | 21.7 | severe | 6.04 | 90 | 17 |
| N10 | M | 41 | 68 | 169 | 23.3 | 83 | 137/87 | early | No | No | 25 | 41 | 30 | 192 | 176 | 55 | 117 | 96 | 5.6 | 485 | 14.6 | 4540 | 53.1 | 36.6 | 7.9 | 25.8 | mild to moderate | 5.55 | 71 | ≤ 9 |
| N11 | M | 53 | 88 | 176 | 28.5 | 94 | 140/82 | advanced | No | Yes | 24 | 27 | 18 | 156 | 58 | 58 | 83 | 102 | 5.6 | 481 | 15.4 | 5890 | 58.1 | 29.7 | 7.1 | 20.4 | mild | 5.71 | 90 | 14 |
| N12 | F | 45 | 87 | 157 | 35.3 | 96 | 160/95 | advanced | IGT | Yes | 49 | 68 | 62 | 217 | 212 | 36 | 144 | 111 | 6.3 | 469 | 13.4 | 7160 | 47 | 34.2 | 3.8 | 23.5 | moderate | 0.7 | 159 | 20 |
| N13 | M | 50 | 85 | 167 | 29.9 | 98 | 146/97 | advanced | No | Yes | 24 | 26 | 31 | 161 | 62 | 62 | 90 | 98 | 5.6 | 529 | 17.5 | 6380 | 51.5 | 39.5 | 6.3 | 16 | severe | 6.98 | 105 | 14 |
| N14 | F | 68 | 51 | 154 | 21.5 | 76 | 116/78 | early | IGT | No | 18 | 13 | 12 | 156 | 111 | 59 | 81 | 104 | 6 | 476 | 14.9 | 4280 | 58.3 | 32.2 | 7.2 | 23.9 | mild | 9.29 | 132 | 44 |
| N15 | M | 41 | 66 | 165 | 24.2 | 92 | 125/70 | early | IGT | Yes | 27 | 29 | 14 | 143 | 52 | 53 | 77 | 88 | 6 | 499 | 14.6 | 5630 | 45.1 | 46.9 | 4.4 | 22.4 | moderate | 8.49 | 120 | 44 |
| N16 | F | 43 | 78 | 161 | 30.1 | 90 | 136/83 | advanced | No | Yes | 42 | 70 | 48 | 219 | 218 | 39 | 147 | 97 | 5.7 | 451 | 13.9 | 6310 | 56.9 | 32.2 | 6 | 22.8 | severe | 8.14 | 71 | 18 |
| N17 | M | 42 | 101 | 178 | 31.8 | 103 | 128/87 | early | DM | Yes | 19 | 48 | 29 | 201 | 109 | 53 | 130 | 103 | 6.5 | 518 | 15.1 | 6870 | 49.3 | 39.6 | 7.1 | 27.8 | moderate | 10.4 | 97 | 13 |
| N18 | M | 60 | 77 | 175 | 25.1 | 90 | 125/77 | early | IGT | Yes | 27 | 43 | 36 | 194 | 111 | 50 | 126 | 114 | 6 | 490 | 14.5 | 4370 | 53.3 | 33.4 | 6.2 | 21 | severe | 6.15 | 103 | 22 |
| N19 | M | 45 | 85 | 166 | 30.7 | 99 | 130/81 | early | IGT | Yes | 24 | 20 | 42 | 235 | 189 | 44 | 150 | 93 | 5.8 | 510 | 15.2 | 4090 | 50.6 | 32 | 7.1 | 22.7 | moderate | 10.5 | 79 | 28 |
| N20 | M | 51 | 73 | 170 | 25.2 | 93 | 135/76 | advanced | DM | Yes | 113 | 149 | 421 | 158 | 145 | 39 | 94 | 287 | 10.9 | 478 | 16.1 | 7810 | 49.8 | 34.6 | 6.8 | 24.9 | severe | 0.74 | 197 | 85 |
| N21 | M | 58 | 87 | 181 | 26.6 | 101 | 121/79 | advanced | DM | Yes | 28 | 26 | 48 | 156 | 139 | 48 | 88 | 124 | 6.7 | 448 | 13.9 | 3030 | 52.1 | 39.3 | 4 | 16.2 | severe | 0.67 | 162 | 109 |
| N22 | M | 45 | 95 | 174 | 31.4 | 104 | 132/79 | early | DM | Yes | 38 | 74 | 46 | 234 | 516 | 41 | 85 | 486 | 12.4 | 548 | 16.6 | 3900 | 55.9 | 35.6 | 5.4 | 18 | moderate | 9.97 | 106 | 55 |
| N23 | M | 29 | 79 | 165 | 28.9 | 93 | 120/74 | early | No | No | 34 | 63 | 35 | 202 | 173 | 38 | 127 | 94 | 5.5 | 481 | 15 | 5770 | 49.6 | 39 | 6.2 | 204 | severe | 12.3 | 127 | 10 |
| N24 | F | 31 | 70 | 159 | 27.8 | 91 | 131/77 | early | No | No | 36 | 73 | 23 | 155 | 71 | 52 | 89 | 102 | 5.8 | 497 | 14.2 | 7540 | 52.6 | 39.7 | 5 | 25.6 | moderate | 6.96 | 129 | 12 |
| N25 | M | 52 | 88 | 172 | 29.7 | 101 | 138/95 | early | No | No | 65 | 148 | 145 | 251 | 180 | 49 | 175 | 95 | 5.7 | 570 | 18 | 10400 | 61.7 | 26.5 | 5.8 | 28.2 | severe | 11.2 | 82 | 28 |
| N26 | F | 58 | 56 | 157 | 22.8 | 86 | 118/63 | early | No | No | 31 | 53 | 50 | 182 | 133 | 55 | 101 | 95 | 5.7 | 460 | 14 | 8000 | 41.5 | 52.5 | 3.4 | 28.6 | severe | 5.76 | 72 | 19 |
| N27 | M | 40 | 112 | 172 | 37.6 | 121 | 143/92 | advanced | No | No | 34 | 83 | 49 | 161 | 55 | 59 | 87 | 107 | 5.1 | 521 | 17.3 | 4800 | 55.9 | 27.7 | 8.5 | 17.4 | severe | 6.68 | 68 | 15 |
| N28 | M | 56 | 76 | 166 | 28 | 97 | 126/82 | advanced | I | yes | 36 | 60 | 70 | 173 | 105 | 54 | 114 | 119 | 6.5 | 569 | 17.2 | 6940 | 49.3 | 43.9 | 5.8 | 23.4 | severe | 10 | 143 | 29 |
| N29 | M | 56 | 80 | 183 | 23.9 | 97 | 147/94 | early | No | No | 28 | 39 | 44 | 212 | 142 | 54 | 141 | 120 | 6.1 | 582 | 17.4 | 5740 | 48.8 | 44.1 | 5.9 | 23.2 | moderate | 9.69 | 71 | 26 |

M, male; F, female; DM, diabetes mellitus; IGT, impaired glucose tolerance; MS, metabolic syndrome; AST, aspartate aminotransferase; ALT, alanine aminotransferase; γ GT, gamma-glutamyl transpeptidase; TC, total cholesterol; TG, triglyceride; HDL chol, high-density lipoprotein cholesterol; LDL chol, low-density lipoprotein cholesterol; HbA1c, hemoglobin A1c; RBC, red blood cell count; Hb, hemoglobin; WBC, white blood cell count; Neutro, neutrocytes; Lympho, lymphocyte; Mono, monocyte; Plts, platelet; PIIIP, type III procollagen N-terminal peptide.

*Grade of fatty liver was classified into the 3 categories (mild, moderate, and severe) based on the following ultrasonographic findings: (1) bright liver with increased hepatorenal contrast, (2) deep echo attenuation, and (2) difficulty in detecting intrahepatic vessels (vascular blurrings).

Supporting Table S2. Clinical and laboratory data of 26 non-NASH patients enrolled in this study.

| No. | Sex | Age | Body weight (kg) | Body height (cm) | Body mass index | Waist circumference (cm) | Blood pressure | Major illness | DM | MS | AST (IU/L) | ALT (IU/L) | γGT (IU/L) | TC (mg/dL) | TG (mg/dL) | HDL chol (mg/dL) | LDL chol (mg/dL) | Blood sugar (mg/dL) | HbA1c (%) | RBC (×10 ⁴ /μl) | Hb (g/dl) | WBC (/μl) | Neutro (%) | Lympho (%) | Mono (%) | Plts (×10 ⁴ /μl) |
|-----|-----|-----|------------------|------------------|-----------------|--------------------------|----------------|------------------------|-----|-----|------------|------------|------------|------------|------------|------------------|------------------|---------------------|-----------|----------------------------|-----------|-----------|------------|------------|----------|-----------------------------|
| C1 | F | 37 | 50 | 152 | 21.3 | 84 | 94/60 | hyperlipidemia | No | No | 13 | 10 | 14 | 245 | 71 | 73 | 152 | 58 | 5.7 | 453 | 13 | 5160 | 59.1 | 30.6 | 6.8 | 22.2 |
| C2 | F | 57 | 62 | 160 | 24.3 | 87 | 129/93 | IGT | IGT | No | 22 | 21 | 17 | 228 | 114 | 58 | 141 | 98 | 6 | 423 | 12.7 | 485 | 46.5 | 42.1 | 5.2 | 27 |
| C3 | F | 45 | 60 | 165 | 21.7 | 78 | 104/70 | chronic gastritis | No | No | 18 | 10 | 13 | 201 | 73 | 55 | 121 | 100 | 5.7 | 416 | 12.4 | 4240 | 51.2 | 40.8 | 4.7 | 19.7 |
| C4 | M | 51 | 72 | 170 | 24.5 | 90 | 142/86 | splenic cyst | IGT | Yes | 19 | 21 | 47 | 196 | 270 | 46 | 115 | 111 | 6.1 | 572 | 19.8 | 11040 | 67.5 | 24.6 | 4.9 | 19.6 |
| C5 | M | 41 | 66 | 151 | 29 | 83 | 117/78 | gallbladder polyp | No | No | 14 | 10 | 7 | 157 | 162 | 51 | 87 | 89 | 4.9 | 487 | 11.9 | 5510 | 70.8 | 22.9 | 3.8 | 38 |
| C6 | M | 49 | 75 | 180 | 23 | 96 | 122/72 | gallbladder polyp | No | No | 22 | 17 | 16 | 196 | 110 | 47 | 120 | 93 | 5.6 | 505 | 15.1 | 4980 | 49.2 | 40.8 | 5.8 | 21.2 |
| C7 | M | 54 | 73 | 165 | 26.8 | 90 | 124/77 | hepatic hemangioma | No | No | 22 | 32 | 84 | 223 | 159 | 45 | 152 | 102 | 5.6 | 527 | 16.4 | 8050 | 57.4 | 28.7 | 5.7 | 32.8 |
| C8 | M | 77 | 55 | 160 | 21.5 | 85 | 120/80 | IGT | IGT | No | 20 | 15 | 13 | 178 | 69 | 53 | 116 | 100 | 6.3 | 415 | 14 | 3720 | 50 | 38.4 | 8.6 | 20.2 |
| C9 | M | 70 | 61 | 163 | 22.9 | — | 127/85 | GERD | No | No | 22 | 20 | 33 | 181 | 103 | 43 | 131 | 94 | 5.6 | 448 | 13.8 | 3750 | 40.5 | 49.6 | 5.1 | 13.3 |
| C10 | F | 70 | 52 | 157 | 21 | 81 | 168/91 | colon polyp | No | No | 24 | 21 | 15 | 200 | 18 | 51 | 120 | 117 | 5.9 | 489 | 14.6 | 5030 | 49.5 | 42.9 | 4 | 27.4 |
| C11 | M | 65 | 57 | 165 | 20.6 | 72 | 120/75 | gallstone | No | No | 21 | 18 | 17 | 251 | 54 | 98 | 129 | 111 | 5.5 | 524 | 15.4 | 4870 | 51.9 | 30.9 | 7.4 | 18.6 |
| C12 | M | 55 | 61 | 162 | 23.1 | 78 | 135/79 | alcoholic fatty liver | No | No | 29 | 34 | 132 | 231 | 74 | 91 | 117 | 119 | 5.1 | 414 | 12.9 | 4080 | 60.6 | 32.8 | 4.2 | 18.4 |
| C13 | M | 33 | 122 | 177 | 38.6 | 119 | 142/86 | chronic gastritis | No | Yes | 25 | 44 | 100 | 250 | 268 | 49 | 152 | 109 | 5.8 | 512 | 16.1 | 6160 | 56.5 | 35.6 | 3.6 | 21.7 |
| C14 | M | 67 | 63 | 161 | 24.3 | 91 | 120/73 | GERD | IGT | No | 20 | 17 | 27 | 194 | 95 | 61 | 114 | 96 | 6 | 460 | 14.4 | 4870 | 60.2 | 31.4 | 3.9 | 16.1 |
| C15 | M | 64 | 69 | 159 | 27.4 | — | 128/75 | drug-induced hepatitis | No | No | 21 | 21 | 21 | 167 | 134 | 39 | 99 | 102 | 5.8 | 473 | 15 | 3950 | 49.7 | 42 | 5.3 | 23.5 |
| C16 | M | 49 | 67 | 179 | 20.9 | 81 | 128/79 | gastric erosion | No | No | 24 | 25 | 40 | 226 | 63 | 70 | 137 | 97 | 5.2 | 461 | 14.7 | 4310 | 50 | 42.5 | 4.2 | 24.5 |
| C17 | M | 61 | 60 | 168 | 21.2 | 94 | 133/88 | chronic gastritis | DM | No | 24 | 24 | 101 | 221 | 139 | 46 | 132 | 108 | 6.6 | 442 | 14.1 | 2880 | 52.1 | 38.2 | 5.2 | 21.3 |
| C18 | M | 34 | 51 | 163 | 19.2 | 68 | 119/71 | gallbladder polyp | No | No | 14 | 15 | 27 | 176 | 62 | 80 | 75 | 84 | 5.4 | 472 | 14.1 | 4970 | 50.2 | 39.4 | 7.2 | 20.6 |
| C19 | M | 60 | 79 | 175 | 25.6 | 94 | 131/81 | chronic gastritis | IGT | No | 30 | 26 | 29 | 183 | 118 | 43 | 112 | 94 | 6.1 | 478 | 13.7 | 5230 | 36.1 | 53.3 | 6.7 | 19.3 |
| C20 | M | 69 | 66 | 160 | 25.8 | 89 | 135/81 | chronic gastritis | IGT | Yes | 21 | 24 | 40 | 174 | 153 | 43 | 99 | 96 | 6 | 495 | 14.5 | 5430 | 70.9 | 18.4 | 5.3 | 24.9 |
| C21 | M | 63 | 54 | 166 | 19.6 | 73 | 126/76 | gastric erosion | — | No | 22 | 14 | — | — | — | — | — | — | — | 465 | 14.1 | 5150 | 64.7 | 27 | 5.6 | 25.8 |
| C22 | M | 58 | 82 | 171 | 27.8 | 93 | 142/96 | chronic gastritis | IGT | Yes | 29 | 27 | 52 | 215 | 105 | 49 | 148 | 114 | 6.2 | 467 | 14.4 | 5220 | 52.7 | 40.8 | 5.2 | 22.7 |
| C23 | F | 52 | 65 | 154 | 26.8 | 89 | 120/80 | hyperlipidemia | No | No | 18 | 19 | 18 | 223 | 86 | 70 | 130 | 99 | 5.9 | 422 | 13.3 | 5200 | 53.6 | 38.7 | 3.3 | 17.9 |
| C24 | F | 64 | 60 | 160 | 23.4 | 80 | 126/77 | hyperlipidemia | No | No | 22 | 16 | 20 | 230 | 105 | 56 | 150 | 96 | 5.6 | 474 | 13.8 | 5950 | 48.9 | 43.9 | 5 | 31.9 |
| C25 | F | 64 | 55 | 149 | 24.2 | 81 | 131/79 | NAFL, hypertension | IGT | No | 25 | 29 | 23 | 166 | 184 | 50 | 89 | 130 | 5.9 | 503 | 14.1 | 5230 | 57.5 | 33.3 | 5.7 | 20.6 |
| C26 | F | 62 | 63 | 154 | 26.3 | 88 | 126/74 | simple obesity | No | No | 15 | 11 | 12 | 190 | 67 | 60 | 113 | 110 | 5.9 | 446 | 13.4 | 4730 | 53.3 | 37.2 | 6.1 | 8.8 |

GERD, gastroesophageal reflux disease.

Supporting Table S3. List of antibodies used for immunofluorescence study and flow cytometric analysis.

1) Immunofluorescence study

| Primary antibodies | Target cell | Manufacturer | Catalog No. | Clone | Dilution |
|--------------------------------|-------------------------|-----------------------------------|-------------|---------|---------------|
| rabbit anti-MMP-1 moAb | — | Abcam, Cambridge, UK | ab52631 | EP1247Y | 1 : 100 - 200 |
| mouse anti-CD11b moAb | monocytes | Hycult Biotech, PA, USA | HM2125 | Bear-1 | 1 : 100 - 200 |
| rat anti-F4/80 moAb | Kupffer cells | Abcam, Cambridge, UK | ab6640 | A3-1 | 1 : 50 - 100 |
| mouse anti- α -SMA moAb | activated HSC | Sigma-Aldrich, MO, USA | A2547 | 1A4 | 1 : 200 - 500 |
| rat anti-GFAP moAb | quiescent HSC | Thermo Fisher Scientific, CA, USA | 13-0300 | 2.2B10 | 1 : 200 - 500 |
| mouse anti-OV-6 moAb | hepatic progenitor cell | R&D Systems, MN, USA | MAB2020 | OV-6 | 1 : 20 - 100 |
| mouse anti-CK19 moAb | hepatic progenitor cell | Abcam, Cambridge, UK | ab9221 | RCK108 | 1 : 100 - 200 |
| mouse anti-HNF4 α moAb | hepatocyte | Perseus Proteomics, Tokyo, Japan | PP-H1415-00 | H1415 | 1 : 50 - 100 |
| mouse anti-CD31 moAb | endothelial cell | BD Biosciences, NJ, USA | 550389 | WM59 | 1 : 100 |

moAb, monoclonal antibody; MMP-1, matrix metalloproteinase-1; α -SMA, α -smooth muscle actin; GFAP, glial fibrillary acidic protein, CK19, cytokeratin 19; HNF4 α , hepatocyte nuclear factor 4 α , HSC, hepatic stellate cell.

| Secondary antibodies | Manufacturer | Catalog No. | Dilution | Target primary antibodies |
|--|-----------------------------------|-------------|-----------|---|
| Alexa 555-conjugated goat anti-rabbit IgG | Thermo Fisher Scientific, CA, USA | A-21429 | 1 : 1,000 | anti-MMP-1 moAb |
| Alexa 488-conjugated goat anti-mouse IgG | Thermo Fisher Scientific, CA, USA | A-11029 | 1 : 1,000 | anti-CD11b & anti-CD31 moAb |
| Alexa 647-conjugated goat anti-rat IgG | Thermo Fisher Scientific, CA, USA | A-21247 | 1 : 1,000 | anti-F4/80 & anti-GFAP moAb |
| Alexa 488-conjugated goat anti-mouse IgG2a | Thermo Fisher Scientific, CA, USA | A-21131 | 1 : 1,000 | anti- α -SMA & anti-HNF4 α moAb |
| Alexa 647-conjugated goat anti-mouse IgG1 | Thermo Fisher Scientific, CA, USA | A-21240 | 1 : 1,000 | anti-OV-6 & anti-CK19 moAb |

2) Flow cytometric analysis

| Primary antibodies | Manufacturer | Catalog No. | Clone | Dilution |
|------------------------------------|--------------------------|-------------|-------|-------------|
| PC7-conjugated mouse anti-CD45 Ab | Beckman Coulter, CA, USA | IM3548U | J33 | 1 : 10 - 20 |
| FITC-conjugated mouse anti-CD14 Ab | Beckman Coulter, CA, USA | IM0645U | RM052 | 1 : 10 - 20 |
| PE-conjugated mouse anti-CD34 Ab | Beckman Coulter, CA, USA | IM1871U | 581 | 1 : 10 - 20 |

| Isotype control | Manufacturer | Catalog No. | Clone | Dilution |
|----------------------------|--------------------------|-------------|----------|----------|
| PC7-conjugated mouse IgG1 | Beckman Coulter, CA, USA | 737662 | 679.1Mc7 | 1 : 10 |
| FITC-conjugated mouse IgG2 | Beckman Coulter, CA, USA | A12689 | 7T4-1F5 | 1 : 10 |
| PE-conjugated mouse IgG1 | Beckman Coulter, CA, USA | A07796 | 679.1Mc7 | 1 : 10 |

Supporting Table S4. Histopathological findings of 29 NASH patients underdoing liver biopsy.

| No. | NASH stage | Matteoni type | Brunt grade | Brunt stage | NASH activity score | Steatosis | Lobular Inflammation | Ballooning | Fibrosis | Mallory body | Ductular reaction |
|-----|------------|---------------|-------------|-------------|---------------------|-----------|----------------------|------------|----------|--------------|-------------------|
| N1 | advanced | 4 | 2 | 3 | 6 | 2 | 2 | 2 | 3 | 0 | ++ |
| N2 | early | 3 | 2 | 1 | 6 | 2 | 2 | 2 | 1B | 1 | +/- |
| N3 | early | 3 | 2 | 1 | 4 | 3 | 1 | 2 | 2 | 0 | +/- |
| N4 | advanced | 4 | 2 | 2 | 7 | 2 | 3 | 2 | 3 | 0 | +/- |
| N5 | advanced | 4 | 3 | 3 | 6 | 3 | 2 | 1 | 3 | 0 | +++ |
| N6 | advanced | 4 | 2 | 3 | 7 | 2 | 3 | 2 | 2 | 0 | +/- |
| N7 | early | 3 | 2 | 1 | 4 | 1 | 1 | 2 | 1C | 0 | + |
| N8 | early | 3 | 2 | 2 | 7 | 3 | 2 | 2 | 1C | 0 | + |
| N9 | early | 3 | 3 | 2 | 7 | 3 | 2 | 2 | 1C | 0 | + |
| N10 | early | 3 | 2 | 2 | 5 | 2 | 3 | 2 | 1C | 0 | +++ |
| N11 | advanced | 4 | 2 | 3 | 4 | 1 | 2 | 1 | 3 | 0 | + |
| N12 | advanced | 4 | 3 | 3 | 7 | 3 | 2 | 2 | 2 | 0 | +++ |
| N13 | advanced | 4 | 3 | 2 | 6 | 2 | 2 | 2 | 1C | 0 | ++ |
| N14 | early | 3 | 3 | 2 | 6 | 2 | 3 | 1 | 2 | 0 | ++ |
| N15 | early | 3 | 2 | 1 | 5 | 2 | 1 | 2 | 1 | 1 | +/- |
| N16 | advanced | 4 | 3 | 3 | 8 | 3 | 3 | 2 | 3 | 1 | + |
| N17 | early | 3 | 2 | 2 | 5 | 2 | 1 | 2 | 1A | 0 | +/- |
| N18 | early | 3 | 3 | 2 | 6 | 3 | 1 | 2 | 1A | 1 | +/- |
| N19 | early | 3 | 3 | 2 | 7 | 3 | 2 | 2 | 2 | 0 | ++ |
| N20 | advanced | 4 | 3 | 4 | 6 | 2 | 3 | 1 | 4 | 1 | +++ |
| N21 | advanced | 4 | 3 | 3 | 5 | 2 | 2 | 1 | 3 | 0 | +++ |
| N22 | early | 3 | 3 | 1 | 7 | 3 | 2 | 2 | 2 | 0 | + |
| N23 | early | 3 | 3 | 2 | 6 | 3 | 2 | 1 | 2 | 1 | ++ |
| N24 | early | 3 | 3 | 2 | 8 | 3 | 2 | 3 | 1C | 1 | + |
| N25 | early | 3 | 2 | 1 | 5 | 2 | 1 | 2 | 1C | 1 | + |
| N26 | early | 3 | 3 | 2 | 5 | 1 | 2 | 2 | 1C | 1 | ++ |
| N27 | advanced | 4 | 2 | 3 | 6 | 2 | 3 | 2 | 3 | 0 | ++ |
| N28 | advanced | 3 | 2 | 2 | 5 | 2 | 1 | 2 | 2 | 0 | + |
| N29 | early | 3 | 2 | 2 | 5 | 1 | 2 | 2 | 1 | 0 | + |

Supporting Table S5. Comparison of clinical and laboratory data between non-NASH and NASH Patients.

| | Non-NASH | NASH | Early-stage NASH | Advanced-stage NASH |
|--|-------------------|--------------------|-------------------|---------------------|
| Number of patients | 26 | 29 | 17 | 12 |
| Sex (Men/Women) | 18/8 (69/31%) | 23/6 (77/23%) | 14/3 (82/18%) | 9/3(75/25%) |
| Age (years) | 56.6 ± 11.6 | 48.0 ± 10.2 | 46.5 ± 11.2 | 50.2 ± 7.7 |
| BMI (kg/m ²) | 24.3 ± 4.0** | 27.5 ± 4.4 | 27.7 ± 3.6 | 27.1 ± 5.2 |
| DM/Impaired glucose tolerance (GT)/normal GT | 1/8/16 (4/32/64%) | 7/7/15 (24/24/52%) | 4/4/9 (24/24/52%) | 3/3/6 (25/25/50%) |
| MS (+/-) | 4/22 (15/85%)** | 15/14 (52/48%) | 8/9 (47/53%) | 7/5 (58/42%) |
| AST (IU/L) | 21.4 ± 4.4** | 35.1 ± 19.9 | 33.4 ± 18.2 | 38.3 ± 23.9 |
| ALT (IU/L) | 20.8 ± 8.1** | 52.6 ± 33.8 | 57.1 ± 46.0 | 53.3 ± 35.2 |
| γ-GT (IU/L) | 36.7 ± 32.9* | 65.9 ± 83.8 | 41.6 ± 30.2 | 88.9 ± 109.5 |
| Total cholesterol (mg/dL) | 204.1 ± 27.7 | 187.7 ± 32.6 | 187.5 ± 30.1 | 190 ± 35.7 |
| LDL cholesterol (mg/dL) | 122 ± 21.4 | 112.4 ± 26.5 | 113.9 ± 26.1 | 116.5 ± 26.5 |
| HDL cholesterol (mg/dL) | 57.1 ± 15.4 | 49.3 ± 9.8 | 48.4 ± 6.8 | 51.5 ± 12.2 |
| Triglyceride (mg/dL) | 114.2 ± 60.8 | 152.3 ± 95.7 | 153.6 ± 81.4 | 125 ± 54.2 |
| Blood sugar (mg/dL) | 101.1 ± 13.8 | 125.6 ± 77.8 | 107.1 ± 15.6 | 122.4 ± 50.9 |
| HbA1c (%) | 5.78 ± 0.38 | 6.3 ± 1.6 | 6.0 ± 0.7 | 6.4 ± 1.5 |
| WBC | 5008 ± 1788* | 5978 ± 1572 | 5945 ± 1531 | 5829 ± 1463 |
| Neutro (%) | 54.3 ± 8.3 | 52.6 ± 6.3 | 54.1 ± 5.0 | 51.3 ± 6.6 |
| Lympho (%) | 36.4 ± 8.1 | 36.7 ± 7.3 | 35.4 ± 6.2 | 36.9 ± 7.1 |
| Mono (%) | 5.3 ± 1.3* | 6.0 ± 1.2 | 6.2 ± 1.2 | 6.1 ± 1.3 |
| Plts (10 ³ /mL) | 22.2 ± 6.0 | 29.9 ± 33.8 | 35.5 ± 42.3 | 21.6 ± 5.0 |
| Histological characteristics | | | | |
| Steatosis grade (0/1/2/3) | ND | 0/4/14/11 | 0/3/6/8 | 0/1/8/3 |
| Lobular inflammation grade (0/1/2/3) | ND | 0/7/15/7 | 0/6/9/2 | 0/1/6/5 |
| Ballooning grade (0/1/2) | ND | 0/6/23 | 0/2/15 | 0/4/8 |
| Fibrosis stage (1/2/3/4) | ND | 13/8/7/1 | 12/5/0/0 | 1/3/7/1 |
| PIIIP (ng/ml) | ND | 9.19 ± 12.32 | 7.28 ± 3.22 | 10.83 ± 18.41 |
| Type IV collagen (ng/ml) | ND | 111.2 ± 38.8 | 104.7 ± 23.0 | 121.4 ± 50.9 |
| Hyaluronic acid (ng/ml) | ND | 28.6 ± 23.0 | 22.4 ± 11.4 | 33.9 ± 31.4 |

GT, glucose tolerance; ND, not determined.

* **Statistically significant between non-NASH and NASH patients (* $P < 0.05$, ** $P < 0.01$)

Supporting Table S6. Medications administered to 29 NASH patients.

| No. | Dyslipidemia | Diabetes mellitus | Hyperuricemia | Hypertension | Others |
|-----|------------------------|-------------------|---------------|--------------|------------|
| N1 | no | no | no | no | |
| N2 | bezafibrate, ezetimibe | metformin | no | no | |
| N3 | bezafibrate, ezetimibe | canagliflozin | no | no | |
| N4 | no | pioglitazone | no | no | |
| N5 | pravastatin | no | no | no | |
| N6 | bezafibrate | pioglitazone | no | no | |
| N7 | bezafibrate | pioglitazone | allopurinol | azilsartan | |
| N8 | bezafibrate, ezetimibe | pioglitazone | benzbromarone | no | |
| N9 | no | no | no | azilsartan | |
| N10 | no | no | no | no | UDCA |
| N11 | no | no | benzbromarone | no | famotidine |
| N12 | bezafibrate, ezetimibe | voglibose | no | no | |
| N13 | no | pioglitazone | no | no | |
| N14 | atorvastatin | pioglitazone | no | no | UDCA |
| N15 | bezafibrate, ezetimibe | pioglitazone | no | no | |
| N16 | bezafibrate | pioglitazone | no | no | |
| N17 | bezafibrate | metformin | no | no | celecoxib |
| N18 | bezafibrate | no | febuxostat | no | |
| N19 | bezafibrate | no | febuxostat | no | |
| N20 | ezetimibe | pioglitazone | no | no | |
| N21 | bezafibrate | metformin | no | no | |
| N22 | bezafibrate | pioglitazone | benzbromarone | no | |
| N23 | no | no | no | no | |
| N24 | no | no | no | no | |
| N25 | no | no | no | no | |
| N26 | bezafibrate, ezetimibe | no | no | no | |
| N27 | ezetimibe | no | no | no | |
| N28 | rosuvastatin | no | no | no | |
| N29 | bezafibrate | no | febuxostat | azilsartan | |

UCDA, ursodeoxycholic acid.

Supporting Table S7. Medications administered to 26 non-NASH patients.

| No. | Dyslipidemia | Diabetes mellitus | Hyperuricemia | Others |
|-----|--------------|-------------------|---------------|--------------|
| C1 | pravastatin | no | no | |
| C2 | rosuvastatin | no | no | |
| C3 | no | no | no | |
| C4 | no | no | no | |
| C5 | no | no | no | UDCA |
| C6 | no | no | no | |
| C7 | no | no | no | |
| C8 | bezafibrate | metformin | no | |
| C9 | no | no | no | esomeprazole |
| C10 | no | no | no | |
| C11 | no | no | no | UDCA |
| C12 | no | no | no | |
| C13 | rosuvastatin | no | no | |
| C14 | pravastatin | no | no | famotidine |
| C15 | no | pioglitazone | no | |
| C16 | no | no | no | famotidine |
| C17 | no | no | no | esomeprazole |
| C18 | no | no | no | |
| C19 | no | no | no | vonoprazan |
| C20 | rosuvastatin | no | no | |
| C21 | no | no | no | famotidine |
| C22 | no | no | no | |
| C23 | pravastatin | no | no | |
| C24 | bezafibrate | no | no | |
| C25 | no | no | no | |
| C26 | no | no | no | |

Supporting Table S8. Flow cytometric analysis of PBMNCs in 29 NASH patients.

| No. | R1 (%) | R2 (%) | R3 (%) | R4 (%) |
|-----|--------|--------|--------|--------|
| N1 | 98.45 | 1.26 | 0.05 | 0.06 |
| N2 | 93.94 | 5.18 | 0.15 | 0.16 |
| N3 | 96.42 | 2.34 | 0.67 | 0.06 |
| N4 | 96.86 | 2.29 | 0.42 | 0.03 |
| N5 | 90.73 | 8.40 | 0.71 | 0.02 |
| N6 | 92.86 | 6.55 | 0.08 | 0.11 |
| N7 | 76.61 | 19.59 | 1.47 | 0.15 |
| N8 | 91.32 | 6.67 | 1.05 | 0.28 |
| N9 | 94.08 | 3.85 | 1.22 | 0.08 |
| N10 | 90.14 | 7.71 | 1.40 | 0.07 |
| N11 | 88.80 | 9.57 | 0.57 | 0.06 |
| N12 | 93.89 | 3.10 | 2.22 | 0.03 |
| N13 | 85.62 | 13.17 | 0.13 | 0.31 |
| N14 | 78.36 | 19.80 | 0.30 | 0.13 |
| N15 | 98.89 | 0.83 | 0.14 | 0.02 |
| N16 | 97.69 | 1.80 | 0.25 | 0.02 |
| N17 | 97.51 | 2.08 | 0.12 | 0.04 |
| N18 | 95.36 | 3.33 | 0.78 | 0.04 |
| N19 | 92.31 | 6.92 | 0.73 | 0.01 |
| N20 | 94.14 | 3.39 | 1.94 | 0.11 |
| N21 | 88.77 | 11.04 | 0.32 | 0.05 |
| N22 | 93.15 | 4.57 | 1.15 | 0.61 |
| N23 | 91.18 | 8.58 | 0.06 | 0.09 |
| N24 | 98.13 | 1.45 | 0.10 | 0.12 |
| N25 | 96.67 | 2.52 | 0.56 | 0.04 |
| N26 | 98.91 | 0.89 | 0.09 | 0.03 |
| N27 | 93.78 | 4.29 | 0.31 | 0.04 |
| N28 | 98.34 | 0.81 | 0.49 | 0.02 |
| N29 | 97.19 | 0.37 | 1.90 | 0.60 |

PBMNC, peripheral blood mononuclear cells.

Note: Proportions of each PBMNC fraction are shown by percentage among whole CD45⁺ cells.

R1, CD45⁺CD14⁻CD34⁻ cells; R2, CD45⁺CD14⁺CD34⁻ cells; R3, CD45⁺CD14⁺CD34⁺ cells;

R4, CD45⁺CD14⁻CD34⁺ cells.

Supporting Table S9. Flow cytometric analysis of PBMNCs in 26 non-NASH patients.

| No. | R1 (%) | R2 (%) | R3 (%) | R4 (%) |
|-----|--------|--------|--------|--------|
| C1 | 96.3 | 0.19 | 2.37 | 6.16 |
| C2 | 94.4 | 4.14 | 0.72 | 0.14 |
| C3 | 96.6 | 2.55 | 0.47 | 0.06 |
| C4 | 97.5 | 1.90 | 0.33 | 0.10 |
| C5 | 97.5 | 2.24 | 0.01 | 0.16 |
| C6 | 98.1 | 1.41 | 0.08 | 0.04 |
| C7 | 82.2 | 16.2 | 0.17 | 0.16 |
| C8 | 83.3 | 15.3 | 0.65 | 0.05 |
| C9 | 91.2 | 8.09 | 0.11 | 0.10 |
| C10 | 94.1 | 4.91 | 0.32 | 0.05 |
| C11 | 63.0 | 29.2 | 5.90 | 0.14 |
| C12 | 74.8 | 22.6 | 1.63 | 0.04 |
| C13 | 93.6 | 5.58 | 0.51 | 0.07 |
| C14 | 89.0 | 9.57 | 0.51 | 0.08 |
| C15 | 89.3 | 9.55 | 0.40 | 0.08 |
| C16 | 74.3 | 23.0 | 0.46 | 0.11 |
| C17 | 87.7 | 10.67 | 0.79 | 0.02 |
| C18 | 96.6 | 3.20 | 0.08 | 0.02 |
| C19 | 74.7 | 19.93 | 3.50 | 0.07 |
| C20 | 94.6 | 4.63 | 0.28 | 0.04 |
| C21 | 96.2 | 2.71 | 0.50 | 0.32 |
| C22 | 95.2 | 1.27 | 3.24 | 0.07 |
| C23 | 96.65 | 3.09 | 0.28 | 0.04 |
| C24 | 87.75 | 12.44 | 0.05 | 0.05 |
| C25 | 76.70 | 16.36 | 6.88 | 0.47 |
| C26 | 95.46 | 3.22 | 0.77 | 0.02 |

Supporting Table S10. Correlation between R3 population and histopathological features in 29 NASH patients.

| | NASH (n = 29) | Early NASH (n = 17) | Advanced NASH (n = 12) |
|--------------------------|------------------|------------------------|---------------------------|
| Steatosis | | | |
| 1 | 1.20 ± 0.83 | 1.36 ± 0.87 | 0.57 |
| 2 | 0.55 ± 0.63 | 0.45 ± 0.50 | 0.62 ± 0.73 |
| 3 | 0.84 ± 0.67 | 0.78 ± 0.63 | 1.00 ± 0.85 |
| Inflammation | | | |
| 1 | 0.78 ± 0.64 | 0.82 ± 0.68 | 0.49 |
| 2 | 0.77 ± 0.73 | 0.77 ± 0.75 | 0.77 ± 0.76 |
| 3 | 0.74 ± 0.75 | 0.85 ± 0.78 | 0.69 ± 0.85 |
| Ballooning | | | |
| 1 | 0.09 ± 0.09 | 0.85 ± 0.78 | 1.03 ± 0.68 |
| 2 | 0.12 ± 0.16 | 0.79 ± 0.70 | 0.49 ± 0.72 |
| Fibrosis | | | |
| 1 | 0.71 ± 0.70 | 0.79 ± 0.70 | 0.11 ± 0.04 |
| 2 | 0.92 ± 0.80 | 0.79 ± 0.72 | 1.36 ± 1.22 |
| 3 | 0.59 ± 0.52 | | 0.59 ± 0.52 |
| 4 | 1.94 | | 1.94 |
| NAS | | | |
| 4 | 0.10 ± 0.67 | 0.58 ± 0.77 | 0.42 |
| 5 | 0.54 ± 0.74 | 0.66 ± 0.72 | 0.89 ± 0.91 |
| 6 | 1.12 ± 0.58 | 1.09 ± 0.67 | 0.98 ± 0.85 |
| 7 | 0.74 ± 0.77 | 0.78 ± 0.78 | 0.36 ± 0.33 |
| 8 | 0.18 ± 0.11 | 1.15 | 0.08 |
| Ductular reaction | | | |
| 0 | 0.33 ± 0.70 | 0.37 ± 0.32 | 0.25 ± 0.17 |
| 1 | 0.92 ± 0.64 | 1.00 ± 0.67 | 0.53 ± 0.06 |
| 2 | 0.49 ± 0.74 | 0.68 ± 0.91 | 0.16 ± 0.13 |
| 3 | 1.32 ± 0.71 | 1.40 | 1.31 ± 0.78 |

NAS, NASH activity score.

Note: Values represent the populations of R3 fraction (means ± SD %) in patients who are classified into different categories according the histopathological features of their liver biopsy specimens.

Supporting Table S11. Correlation between R4 population and histopathological features in 29 NASH patients.

| | NASH (n = 29) | Early NASH (n = 17) | Advanced NASH (n = 12) |
|--------------------------|------------------|------------------------|---------------------------|
| Steatosis | | | |
| 1 | 0.17 ± 0.24 | 0.20 ± 0.27 | 0.06 |
| 2 | 0.08 ± 0.08 | 0.08 ± 0.06 | 0.08 ± 0.09 |
| 3 | 0.12 ± 0.16 | 0.14 ± 0.17 | 0.09 ± 0.13 |
| Inflammation | | | |
| 1 | 0.05 ± 0.04 | 0.05 ± 0.04 | 0.02 |
| 2 | 0.14 ± 0.18 | 0.18 ± 0.21 | 0.09 ± 0.12 |
| 3 | 0.08 ± 0.04 | 0.10 ± 0.04 | 0.07 ± 0.04 |
| Ballooning | | | |
| 1 | 0.82 ± 0.70 | 0.10 ± 0.04 | 0.09 ± 0.10 |
| 2 | 0.75 ± 0.71 | 0.14 ± 0.18 | 0.08 ± 0.10 |
| Fibrosis | | | |
| 1 | 0.14 ± 0.14 | 0.13 ± 0.15 | 0.21 ± 0.14 |
| 2 | 0.12 ± 0.19 | 0.15 ± 0.21 | 0.03 ± 0.01 |
| 3 | 0.06 ± 0.08 | | 0.06 ± 0.08 |
| 4 | 0.11 | | 0.11 |
| NAS | | | |
| 4 | 0.11 ± 0.05 | 0.07 ± 0.07 | 0.03 |
| 5 | 0.10 ± 0.19 | 0.21 ± 0.21 | 0.05 ± 0.05 |
| 6 | 0.11 ± 0.10 | 0.06 ± 0.02 | 0.12 ± 0.14 |
| 7 | 0.10 ± 0.18 | 0.07 ± 0.05 | 0.04 ± 0.02 |
| 8 | 0.07 ± 0.07 | 0.61 | 0.11 |
| Ductular reaction | | | |
| 0 | 0.06 ± 0.14 | 0.06 ± 0.06 | 0.05 ± 0.05 |
| 1 | 0.18 ± 0.21 | 0.21 ± 0.22 | 0.04 ± 0.03 |
| 2 | 0.09 ± 0.10 | 0.06 ± 0.05 | 0.14 ± 0.15 |
| 3 | 0.08 ± 0.09 | 0.07 | 0.08 ± 0.10 |

Note: Values represent the populations of R4 fraction (means ± SD %) in patients who are classified into different categories according the histopathological features of their liver biopsy specimens.

Supporting Table S12. Populations of MMP-1-positive cells in monocytic lineage cells after co-culture with steatotic hepatocytes obtained from 3 NASH patients.

| Patients | N24 | N27 | N29 |
|--|--------------|---------------|-----------------|
| CD45 ⁺ CD14 ⁺ CD34 ⁻ cells (R2) | 7/44 (15.9%) | 4/31 (12.9%) | 36/166 (21.7%) |
| CD45 ⁺ CD14 ⁺ CD34 ⁺ cells (R3) | ND | 21/52 (40.4%) | 108/126 (85.7%) |

ND, not determined by a lack of enough number of cells for co-culture.

Note: Cells were collected from each well of a Lab-Tek chamber slide and sorted by flow cytometry. Values represent the populations of MMP-1-positive cells out of CD14⁺ monocytic lineage cells (%) in each fraction observed under a confocal laser-scanning microscope.