

## **Supplementary materials**

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**Supplementary Table S1. All baseline characteristics of the study population.**

| Variables                               |                 | No SLD<br>without<br>CMRF<br>(n=20504) | No SLD<br>with<br>CMRF<br>(n=125258<br>) | MASLD<br>(n=79148) | MetALD<br>(n=11342) | ALD<br>(n=3822) | P-value |
|-----------------------------------------|-----------------|----------------------------------------|------------------------------------------|--------------------|---------------------|-----------------|---------|
| Sex (%)                                 | Male            | 9906 (48.3)                            | 52908<br>(42.2)                          | 53140<br>(67.1)    | 10864<br>(95.8)     | 3742 (97.9)     | < 0.001 |
|                                         | Female          | 10598<br>(51.7)                        | 72350<br>(57.8)                          | 26008<br>(32.9)    | 478 (4.2)           | 80 (2.1)        |         |
| Age (years)                             | Mean<br>(SD)    | 55.0 (7.2)                             | 59.0 (8.9)                               | 58.9 (8.5)         | 55.9 (7.2)          | 57.4 (8.2)      | < 0.001 |
| Income level<br>(%)                     | 1st<br>quartile | 2748 (13.4)                            | 18526<br>(14.8)                          | 10566<br>(13.3)    | 1268 (11.2)         | 489 (12.8)      | < 0.001 |
|                                         | 2nd<br>quartile | 4460 (21.8)                            | 26962<br>(21.5)                          | 15346<br>(19.4)    | 2067 (18.2)         | 765 (20.0)      |         |
|                                         | 3rd<br>quartile | 5610 (27.4)                            | 36077<br>(28.8)                          | 23463<br>(29.6)    | 3563 (31.4)         | 1263 (33.0)     |         |
|                                         | 4th<br>quartile | 7686 (37.5)                            | 43693<br>(34.9)                          | 29773<br>(37.6)    | 4444 (39.2)         | 1305 (34.1)     |         |
| Residence (%)                           | Rural           | 6248 (30.5)                            | 43482<br>(34.7)                          | 27785<br>(35.1)    | 3969 (35.0)         | 1580 (41.3)     | < 0.001 |
|                                         | Urban           | 14256<br>(69.5)                        | 81776<br>(65.3)                          | 51363<br>(64.9)    | 7373 (65.0)         | 2242 (58.7)     |         |
| Hypertension<br>(%)                     |                 | 0 (0.0)                                | 53535<br>(42.7)                          | 44565<br>(56.3)    | 6243 (55.0)         | 2176 (56.9)     | < 0.001 |
| Diabetes (%)                            |                 | 0 (0.0)                                | 13107<br>(10.5)                          | 15298<br>(19.3)    | 2221 (19.6)         | 783 (20.5)      | < 0.001 |
| Dyslipidemia<br>(%)                     |                 | 0 (0.0)                                | 43916<br>(35.1)                          | 41284<br>(52.2)    | 4583 (40.4)         | 1429 (37.4)     | < 0.001 |
|                                         | 0               | 13376<br>(65.2)                        | 63059<br>(50.3)                          | 36564<br>(46.2)    | 6091 (53.7)         | 1925 (50.4)     | < 0.001 |
| Charlson<br>comorbidity<br>index (%)    | 1               | 5205 (25.4)                            | 34368<br>(27.4)                          | 21404<br>(27.0)    | 2985 (26.3)         | 1047 (27.4)     |         |
|                                         | 2               | 1529 (7.5)                             | 15632<br>(12.5)                          | 10819<br>(13.7)    | 1311 (11.6)         | 482 (12.6)      |         |
|                                         | ≥ 3             | 394 (1.9)                              | 12199 (9.7)                              | 10361<br>(13.1)    | 955 (8.4)           | 368 (9.6)       |         |
| Body mass<br>index (kg/m <sup>2</sup> ) | Mean<br>(SD)    | 20.8 (1.5)                             | 22.9 (2.2)                               | 26.1 (2.5)         | 25.4 (2.5)          | 25.3 (2.6)      | < 0.001 |
| Waist<br>circumference<br>(cm)          | Mean<br>(SD)    | 73.2 (5.8)                             | 78.3 (6.3)                               | 88.2 (6.2)         | 88.0 (6.3)          | 88.1 (6.7)      | < 0.001 |

|                                                          |                |              |              |              |               |               |         |
|----------------------------------------------------------|----------------|--------------|--------------|--------------|---------------|---------------|---------|
| Systolic blood pressure (mmHg)                           | Mean (SD)      | 111.7 (9.4)  | 124.5 (15.0) | 128.7 (14.8) | 130.4 (14.5)  | 131.1 (15.1)  | < 0.001 |
| Diastolic blood pressure (mmHg)                          | Mean (SD)      | 70.1 (7.3)   | 76.9 (9.8)   | 79.9 (9.8)   | 81.7 (9.7)    | 81.7 (9.8)    | < 0.001 |
| Fasting blood glucose (mg/dL)                            | Mean (SD)      | 87.8 (7.4)   | 98.4 (21.6)  | 105.7 (28.2) | 108.5 (29.6)  | 109.7 (30.0)  | < 0.001 |
| Total cholesterol (mg/dL)                                | Mean (SD)      | 189.6 (25.5) | 198.9 (36.8) | 206.7 (38.5) | 203.2 (36.8)  | 201.1 (37.9)  | < 0.001 |
| Triglyceride (mg/dL)                                     | Mean (SD)      | 81.2 (28.3)  | 106.7 (48.5) | 187.9 (96.4) | 201.3 (116.6) | 202.9 (121.4) | < 0.001 |
| HDL cholesterol (mg/dL)                                  | Mean (SD)      | 62.2 (19.1)  | 56.2 (23.1)  | 50.5 (25.6)  | 53.5 (20.0)   | 56.0 (29.7)   | < 0.001 |
| LDL cholesterol (mg/dL)                                  | Mean (SD)      | 111.3 (24.2) | 121.9 (35.8) | 120.1 (39.4) | 110.8 (41.5)  | 106.7 (43.0)  | < 0.001 |
| Aspartate aminotransferase (U/L)                         | Mean (SD)      | 23.3 (9.5)   | 23.6 (8.1)   | 27.6 (14.4)  | 31.4 (24.9)   | 34.3 (24.8)   | < 0.001 |
| Alanine aminotransferase (U/L)                           | Mean (SD)      | 18.8 (10.9)  | 20.3 (10.0)  | 29.4 (18.0)  | 31.3 (23.1)   | 32.5 (23.2)   | < 0.001 |
| gamma-glutamyl transpeptidase (U/L)                      | Mean (SD)      | 21.9 (17.0)  | 22.2 (14.2)  | 48.8 (50.7)  | 86.7 (89.4)   | 110.4 (119.6) | < 0.001 |
| Hemoglobin (g/dL)                                        | Mean (SD)      | 13.5 (1.4)   | 13.5 (1.4)   | 14.3 (1.4)   | 14.9 (1.2)    | 14.9 (1.3)    | < 0.001 |
| Glomerular filtration rate (mL/min/1.73 m <sup>2</sup> ) | Mean (SD)      | 81.8 (30.9)  | 79.0 (29.2)  | 77.0 (32.1)  | 80.7 (34.8)   | 81.4 (32.3)   | < 0.001 |
| Smoking (%)                                              | Never          | 14133 (68.9) | 92139 (73.6) | 44758 (56.5) | 2843 (25.1)   | 948 (24.8)    | < 0.001 |
|                                                          | Former         | 2730 (13.3)  | 17392 (13.9) | 18113 (22.9) | 3806 (33.6)   | 1224 (32.0)   |         |
|                                                          | Current smoker | 3641 (17.8)  | 15727 (12.6) | 16277 (20.6) | 4693 (41.4)   | 1650 (43.2)   |         |
| Alcohol drinking (%)                                     |                | 7763 (37.9)  | 40106 (32.0) | 35517 (44.9) | 11342 (100.0) | 3822 (100.0)  | < 0.001 |
| Amount of Alcohol                                        | Mean (SD)      | 41.3 (95.9)  | 37.0 (96.8)  | 39.1 (57.1)  | 287.3 (70.1)  | 644.7 (262.2) | < 0.001 |

|                          |                        |                 |                 |                 |                |                |         |
|--------------------------|------------------------|-----------------|-----------------|-----------------|----------------|----------------|---------|
| drinking<br>(g/week)     |                        |                 |                 |                 |                |                |         |
| Physical<br>activity (%) | No                     | 13586<br>(66.4) | 85298<br>(68.2) | 51517<br>(65.2) | 6719<br>(59.4) | 2519<br>(66.0) | < 0.001 |
|                          | 1-2<br>times/w<br>eeek | 4240<br>(20.7)  | 22758<br>(18.2) | 17117<br>(21.7) | 2819<br>(24.9) | 742 (19.4)     |         |
|                          | 3-4<br>times/w<br>eeek | 1670 (8.2)      | 10325<br>(8.3)  | 6631 (8.4)      | 1183<br>(10.5) | 296 (7.8)      |         |
|                          | 5<br>times/w<br>eeek   | 966 (4.7)       | 6625 (5.3)      | 3738 (4.7)      | 599 (5.3)      | 258 (6.8)      |         |
| Fatty liver<br>index     | Mean<br>(SD)           | 7.6 (5.5)       | 15.0 (7.7)      | 50.9 (15.8)     | 57.7 (17.7)    | 60.2 (18.1)    | < 0.001 |

**Supplementary Table S2. The operational definition of variables.**

|                                                                                                                                           | ICD-10 codes                                                                                                                                                                                                                            | Definition                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| <b>Exclusion criteria</b>                                                                                                                 |                                                                                                                                                                                                                                         |                                                                                    |
| Viral hepatitis,<br>autoimmune hepatitis,<br>alcoholic liver disease,<br>toxic liver disease,<br>Wilson's disease,<br>biliary cholangitis | B15, B16, B17, B18, B19, K70, K71, K743,<br>K744, K745, K754, E830, E831                                                                                                                                                                | Admission ≥ 1 or<br>outpatient clinic ≥ 1                                          |
| Any cancer                                                                                                                                | C code                                                                                                                                                                                                                                  | Admission ≥ 1 or<br>outpatient clinic ≥ 1                                          |
| Decompensated<br>liver cirrhosis                                                                                                          | R17, R18, K72, I850, I864, I983, K767                                                                                                                                                                                                   | Admission ≥ 1 or<br>outpatient clinic ≥ 1                                          |
| <b>Outcomes</b>                                                                                                                           |                                                                                                                                                                                                                                         |                                                                                    |
| Aortic aneurysm                                                                                                                           | I711, I712, I713, I714, I715, I716, I718,<br>I719                                                                                                                                                                                       | Admission ≥ 1 or<br>outpatient clinic ≥ 2                                          |
| Aortic dissection                                                                                                                         | I710                                                                                                                                                                                                                                    | Admission ≥ 1 or<br>outpatient clinic ≥ 2                                          |
| <b>Hepatic steatosis assessment</b>                                                                                                       |                                                                                                                                                                                                                                         |                                                                                    |
| Fatty liver index (FLI)                                                                                                                   | $FLI = \frac{1}{1+e^{-x}} \times 100$<br>where $x = 0.953 \times \ln(\text{triglyceride, mg/dL}) + 0.139 \times \text{BMI (kg/m}^2) + 0.718 \times \ln(\gamma\text{-GTP, U/L}) + 0.053 \times \text{waist circumference (cm)} - 15.745$ |                                                                                    |
| Hepatic steatosis index<br>(HSI)                                                                                                          | $HSI = 8 \times \text{ALT/AST ratio} + \text{BMI (kg/m}^2) (+2, \text{ if diabetes; } +2, \text{ if female})$                                                                                                                           |                                                                                    |
| <b>Cardiometabolic risk factors</b>                                                                                                       |                                                                                                                                                                                                                                         |                                                                                    |
| Hypertension                                                                                                                              | I10, I11                                                                                                                                                                                                                                | Admission ≥ 1 or<br>outpatient clinic ≥ 1 with any<br>anti-hypertensive medication |
| Diabetes                                                                                                                                  | E11, E12, E13, E14                                                                                                                                                                                                                      | Admission ≥ 1 or<br>outpatient clinic ≥ 1 with any<br>anti-diabetic medication     |
| Dyslipidemia                                                                                                                              | E78                                                                                                                                                                                                                                     | Admission ≥ 1 or<br>outpatient clinic ≥ 1 with any<br>lipid-lowering medication    |

**Supplementary Table S3. Baseline characteristics of study population according to the number of cardiometabolic risk factors.**

| Variables                      |              | No CMRF      | any 1 CMRF   | any 2 CMRF   | any 3 CMRF   | any 4 CMRF   | all 5 CMRF   | P-value |
|--------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------|
| Sex (%)                        | Male         | 9930 (48.4)  | 21175 (54.1) | 28729 (56.2) | 29292 (55.8) | 25860 (53.4) | 15574 (54.9) | <0.001  |
|                                | Female       | 10598 (51.6) | 17931 (45.9) | 22379 (43.8) | 23238 (44.2) | 22563 (46.6) | 12805 (45.1) |         |
| Age (years)                    | Mean (SD)    | 55.0 (7.2)   | 56.7 (8.2)   | 57.9 (8.5)   | 58.6 (8.6)   | 60.0 (8.8)   | 61.3 (8.9)   | <0.001  |
| Income level (%)               | 1st quartile | 2751 (13.4)  | 5355 (13.7)  | 7085 (13.9)  | 7223 (13.8)  | 7035 (14.5)  | 4148 (14.6)  | <0.001  |
|                                | 2nd quartile | 4467 (21.8)  | 8285 (21.2)  | 10632 (20.8) | 10826 (20.6) | 9734 (20.1)  | 5656 (19.9)  |         |
|                                | 3rd quartile | 5620 (27.4)  | 11144 (28.5) | 14841 (29.0) | 15479 (29.5) | 14401 (29.7) | 8491 (29.9)  |         |
|                                | 4th quartile | 7690 (37.5)  | 14322 (36.6) | 18550 (36.3) | 19002 (36.2) | 17253 (35.6) | 10084 (35.5) |         |
| Residence (%)                  | Rural        | 6256 (30.5)  | 13298 (34.0) | 17666 (34.6) | 18480 (35.2) | 17341 (35.8) | 10023 (35.3) | <0.001  |
|                                | Urban        | 14272 (69.5) | 25808 (66.0) | 33442 (65.4) | 34050 (64.8) | 31082 (64.2) | 18356 (64.7) |         |
| Hypertension (%)               |              | 0 (0.0)      | 7431 (19.0)  | 19190 (37.5) | 23958 (45.6) | 31834 (65.7) | 24106 (84.9) | <0.001  |
| Diabetes (%)                   |              | 0 (0.0)      | 928 (2.4)    | 3148 (6.2)   | 6198 (11.8)  | 8336 (17.2)  | 12799 (45.1) | <0.001  |
| Dyslipidemia (%)               |              | 0 (0.0)      | 0 (0.0)      | 6925 (13.5)  | 21588 (41.1) | 36099 (74.5) | 26600 (93.7) | <0.001  |
| Charlson comorbidity index (%) | 0            | 13391 (65.2) | 24005 (61.4) | 28592 (55.9) | 26598 (50.6) | 20235 (41.8) | 8194 (28.9)  | <0.001  |

| Variables                                  |           | No CMRF      | any 1 CMRF   | any 2 CMRF   | any 3 CMRF   | any 4 CMRF   | all 5 CMRF    | P-value |
|--------------------------------------------|-----------|--------------|--------------|--------------|--------------|--------------|---------------|---------|
|                                            | 1         | 5210 (25.4)  | 10122 (25.9) | 13891 (27.2) | 14557 (27.7) | 13838 (28.6) | 7391 (26.0)   |         |
|                                            | 2         | 1532 (7.5)   | 3477 (8.9)   | 5507 (10.8)  | 6608 (12.6)  | 7507 (15.5)  | 5142 (18.1)   |         |
|                                            | ≥ 3       | 395 (1.9)    | 1502 (3.8)   | 3118 (6.1)   | 4767 (9.1)   | 6843 (14.1)  | 7652 (27.0)   |         |
| <b>Body mass index (kg/m<sup>2</sup>)</b>  | Mean (SD) | 20.8 (1.5)   | 22.6 (2.4)   | 23.6 (2.6)   | 24.3 (2.7)   | 25.1 (2.6)   | 26.1 (2.5)    | <0.001  |
| <b>Waist circumference (cm)</b>            | Mean (SD) | 73.2 (5.8)   | 77.9 (7.1)   | 80.9 (7.6)   | 82.9 (7.6)   | 84.8 (7.3)   | 87.5 (7.0)    | <0.001  |
| <b>Systolic blood pressure (mmHg)</b>      | Mean (SD) | 111.7 (9.4)  | 119.4 (13.3) | 124.7 (14.9) | 126.5 (14.9) | 130.0 (14.5) | 133.1 (14.4)  | <0.001  |
| <b>Diastolic blood pressure (mmHg)</b>     | Mean (SD) | 70.1 (7.3)   | 74.5 (9.0)   | 77.5 (9.8)   | 78.4 (9.8)   | 80.2 (9.7)   | 81.4 (9.9)    | <0.001  |
| <b>Fasting blood glucose (mg/dL)</b>       | Mean (SD) | 87.8 (7.4)   | 92.1 (13.6)  | 96.2 (18.6)  | 100.9 (23.4) | 104.5 (27.7) | 121.9 (32.8)  | <0.001  |
| <b>Total cholesterol (mg/dL)</b>           | Mean (SD) | 189.6 (25.5) | 191.4 (25.9) | 197.2 (31.0) | 205.2 (37.5) | 209.3 (43.2) | 206.4 (47.0)  | <0.001  |
| <b>Triglyceride (mg/dL)</b>                | Mean (SD) | 81.3 (28.3)  | 94.8 (39.9)  | 116.9 (60.2) | 148.9 (80.2) | 175.7 (96.7) | 185.9 (110.8) | <0.001  |
| <b>HDL cholesterol (mg/dL)</b>             | Mean (SD) | 62.2 (19.1)  | 59.2 (20.9)  | 56.5 (25.0)  | 53.0 (25.2)  | 50.8 (24.0)  | 49.9 (23.6)   | <0.001  |
| <b>LDL cholesterol (mg/dL)</b>             | Mean (SD) | 111.3 (24.2) | 113.6 (25.0) | 118.2 (30.8) | 123.6 (38.4) | 124.7 (44.5) | 120.6 (46.7)  | <0.001  |
| <b>Aspartate aminotransferase (U/L)</b>    | Mean (SD) | 23.3 (9.5)   | 24.1 (9.6)   | 25.0 (13.0)  | 25.6 (12.8)  | 26.4 (13.3)  | 27.7 (14.3)   | <0.001  |
| <b>Alanine aminotransferase (U/L)</b>      | Mean (SD) | 18.8 (10.9)  | 20.7 (11.7)  | 22.6 (14.6)  | 24.5 (14.6)  | 26.3 (16.1)  | 28.9 (18.4)   | <0.001  |
| <b>gamma-glutamyl transpeptidase (U/L)</b> | Mean (SD) | 22.1 (18.8)  | 28.0 (34.6)  | 32.8 (41.0)  | 37.7 (46.3)  | 40.8 (49.3)  | 46.2 (56.2)   | <0.001  |

| Variables                                                   |                   | No CMRF         | any 1<br>CMRF   | any 2<br>CMRF   | any 3<br>CMRF   | any 4<br>CMRF   | all 5<br>CMRF   | P-value |
|-------------------------------------------------------------|-------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------|
| Hemoglobin (g/dL)                                           | Mean (SD)         | 13.5 (1.4)      | 13.7 (1.5)      | 13.9 (1.5)      | 14.0 (1.5)      | 14.0 (1.5)      | 14.0 (1.5)      | <0.001  |
| Glomerular filtration<br>rate (mL/min/1.73 m <sup>2</sup> ) | Mean (SD)         | 81.8 (30.9)     | 80.8 (31.0)     | 79.5 (30.4)     | 78.4 (29.6)     | 77.1 (30.4)     | 75.4 (32.6)     | <0.001  |
| Smoking (%)                                                 | Never             | 14138<br>(68.9) | 25623<br>(65.5) | 32700<br>(64.0) | 33162<br>(63.1) | 31018<br>(64.1) | 18180<br>(64.1) | <0.001  |
|                                                             | Former            | 2736 (13.3)     | 6407 (16.4)     | 9349 (18.3)     | 9883 (18.8)     | 9076 (18.7)     | 5814 (20.5)     |         |
|                                                             | Current<br>smoker | 3654 (17.8)     | 7076 (18.1)     | 9059 (17.7)     | 9485 (18.1)     | 8329 (17.2)     | 4385 (15.5)     |         |
| Alcohol drinking (%)                                        |                   | 7787 (37.9)     | 16366<br>(41.9) | 21916<br>(42.9) | 22154<br>(42.2) | 19139<br>(39.5) | 11188<br>(39.4) | <0.001  |
| Amount of Alcohol<br>drinking (g/week)                      | Mean (SD)         | 42.0 (98.2)     | 55.9 (120.3)    | 62.2 (131.3)    | 64.3 (133.4)    | 60.1 (131.0)    | 62.6 (135.3)    | <0.001  |
| Physical activity (%)                                       | No                | 13607<br>(66.4) | 25632<br>(65.7) | 33589<br>(65.8) | 34968<br>(66.7) | 32668<br>(67.6) | 19175<br>(67.7) | <0.001  |
|                                                             | 1-2<br>times/week | 4242 (20.7)     | 8107 (20.8)     | 10275<br>(20.1) | 10594<br>(20.2) | 9215 (19.1)     | 5243 (18.5)     |         |
|                                                             | 3-4<br>times/week | 1671 (8.2)      | 3234 (8.3)      | 4443 (8.7)      | 4239 (8.1)      | 4085 (8.4)      | 2433 (8.6)      |         |
|                                                             | 5 times/week      | 966 (4.7)       | 2040 (5.2)      | 2705 (5.3)      | 2626 (5.0)      | 2376 (4.9)      | 1473 (5.2)      |         |
| Fatty liver index                                           | Mean (SD)         | 7.7 (5.6)       | 15.5 (12.8)     | 23.6 (17.2)     | 32.2 (20.8)     | 40.0 (22.6)     | 47.5 (22.4)     | <0.001  |

**Supplementary Table S4. Sensitivity analysis using a Fatty Liver Index cutoff of 60 and the Hepatic Steatosis Index.**

| Group                           | Number | Events | Follow-up duration (person-years) | Incidence rate (per 1000 person-years) | Crude HR (95% CIs, P-value)   | Adjusted HR (95% CIs, P-value) |
|---------------------------------|--------|--------|-----------------------------------|----------------------------------------|-------------------------------|--------------------------------|
| <b>FLI <math>\geq</math> 60</b> |        |        |                                   |                                        |                               |                                |
| <b>Aneurysm</b>                 |        |        |                                   |                                        |                               |                                |
| No SLD without CMRF             | 20252  | 42     | 196825                            | 0.21                                   | 1<br>(Reference)              | 1<br>(Reference)               |
| No SLD with CMRF                | 191311 | 841    | 1819435                           | 0.46                                   | 2.16<br>(1.59-2.95, p<0.001)  | 1.45<br>(1.06-1.99, p=0.019)   |
| MASLD                           | 21486  | 102    | 202932                            | 0.5                                    | 2.36<br>(1.65-3.38, p<0.001)  | 1.49<br>(1.04-2.15, p=0.031)   |
| MetALD                          | 4854   | 21     | 45839                             | 0.46                                   | 2.15<br>(1.28-3.64, p=0.004)  | 1.41<br>(0.83-2.39, p=0.205)   |
| ALD                             | 1898   | 12     | 17768                             | 0.68                                   | 3.17<br>(1.67-6.01, p<0.001)  | 1.79<br>(0.94-3.41, p=0.078)   |
| <b>Dissection</b>               |        |        |                                   |                                        |                               |                                |
| No SLD without CMRF             | 20252  | 8      | 196957                            | 0.04                                   | 1<br>(Reference)              | 1<br>(Reference)               |
| No SLD with CMRF                | 191311 | 248    | 1821678                           | 0.14                                   | 3.34<br>(1.65-6.76, p=0.001)  | 2.14<br>(1.05-4.34, p=0.036)   |
| MASLD                           | 21486  | 25     | 203217                            | 0.12                                   | 3.03<br>(1.37-6.72, p=0.006)  | 1.74<br>(0.78-3.89, p=0.180)   |
| MetALD                          | 4854   | 3      | 45913                             | 0.07                                   | 1.61<br>(0.43-6.08, p=0.480)  | 1.02<br>(0.27-3.89, p=0.972)   |
| ALD                             | 1898   | 1      | 17798                             | 0.06                                   | 1.38<br>(0.17-11.05, p=0.760) | 0.77<br>(0.10-6.20, p=0.807)   |
| <b>HSI</b>                      |        |        |                                   |                                        |                               |                                |
| <b>Aneurysm</b>                 |        |        |                                   |                                        |                               |                                |
| No SLD without CMRF             | 20424  | 42     | 195847                            | 0.21                                   | 1<br>(Reference)              | 1<br>(Reference)               |
| No SLD with CMRF                | 170889 | 779    | 1618979                           | 0.48                                   | 2.24<br>(1.64-3.06, p<0.001)  | 1.45<br>(1.06-1.98, p=0.021)   |

| Group               | Number | Events | Follow-up duration (person-years) | Incidence rate (per 1000 person-years) | Crude HR (95% CIs, P-value)   | Adjusted HR (95% CIs, P-value) |
|---------------------|--------|--------|-----------------------------------|----------------------------------------|-------------------------------|--------------------------------|
| MASLD               | 44385  | 179    | 426206                            | 0.42                                   | 1.95<br>(1.39-2.73, p<0.001)  | 1.50<br>(1.06-2.11, p=0.021)   |
| MetALD              | 3293   | 12     | 31424                             | 0.38                                   | 1.78<br>(0.94-3.39, p=0.077)  | 1.33<br>(0.70-2.53, p=0.388)   |
| ALD                 | 979    | 6      | 9336                              | 0.64                                   | 2.99<br>(1.27-7.04, p=0.012)  | 1.91<br>(0.81-4.51, p=0.139)   |
| Dissection          |        |        |                                   |                                        |                               |                                |
| No SLD without CMRF | 20424  | 8      | 195979                            | 0.04                                   | 1<br>(Reference)              | 1<br>(Reference)               |
| No SLD with CMRF    | 170889 | 215    | 1621039                           | 0.13                                   | 3.24<br>(1.60-6.57, p=0.001)  | 2.05<br>(1.01-4.16, p=0.048)   |
| MASLD               | 44385  | 57     | 426715                            | 0.13                                   | 3.25<br>(1.55-6.82, p=0.002)  | 2.06<br>(0.97-4.37, p=0.059)   |
| MetALD              | 3293   | 5      | 31467                             | 0.16                                   | 3.90<br>(1.27-11.91, p=0.017) | 2.75<br>(0.89-8.48, p=0.078)   |
| ALD                 | 979    | 0      | 9359                              | 0                                      | Not available                 | Not available                  |

\*The model was adjusted for age, sex, income level, residence, Charlson comorbidity index, hemoglobin level, glomerular filtration rate, smoking status and physical activity. CI, confidence interval; CMRF, cardiometabolic risk factor; HR, hazard ratio; MASLD, metabolic dysfunction-associated steatotic liver disease; SLD, steatotic liver disease

**Supplementary Table S5. Associations of individual cardiometabolic risk factor components with the risks of aortic aneurysm and aortic dissection.**

| Group               | Number | Events | Follow-up duration (person-years) | Incidence rate (per 1000 person-years) | Crude HR (95% CIs, P-value)  | Adjusted HR (95% CIs, P-value) |
|---------------------|--------|--------|-----------------------------------|----------------------------------------|------------------------------|--------------------------------|
| <b>Aneurysm</b>     |        |        |                                   |                                        |                              |                                |
| Visceral obesity    | 156361 | 695    | 1493177                           | 0.47                                   | 1.13<br>(0.99-1.29, p=0.061) | 1.18<br>(1.03-1.35, p=0.019)   |
| Insulin resistance  | 94456  | 434    | 890402                            | 0.49                                   | 1.16<br>(1.03-1.32, p=0.016) | 0.88<br>(0.77-1.00, p=0.044)   |
| Hypertension        | 142825 | 815    | 1347372                           | 0.6                                    | 2.79<br>(2.39-3.25, p<0.001) | 1.71<br>(1.45-2.00, p<0.001)   |
| High triglyceride   | 126288 | 620    | 1198527                           | 0.52                                   | 1.41<br>(1.24-1.60, p<0.001) | 1.18<br>(1.04-1.34, p=0.010)   |
| Low HDL-cholesterol | 114569 | 600    | 1090621                           | 0.55                                   | 1.56<br>(1.38-1.77, p<0.001) | 1.48<br>(1.30-1.69, p<0.001)   |
| <b>Dissection</b>   |        |        |                                   |                                        |                              |                                |
| Visceral obesity    | 156361 | 204    | 1495098                           | 0.14                                   | 1.33<br>(1.03-1.72, p=0.031) | 1.23<br>(0.95-1.60, p=0.119)   |
| Insulin resistance  | 94456  | 115    | 891629                            | 0.13                                   | 1.06<br>(0.84-1.34, p=0.632) | 0.80<br>(0.63-1.03, p=0.081)   |
| Hypertension        | 142825 | 230    | 1349587                           | 0.17                                   | 2.90<br>(2.16-3.89, p<0.001) | 1.85<br>(1.36-2.51, p<0.001)   |
| High triglyceride   | 126288 | 174    | 1200231                           | 0.14                                   | 1.42<br>(1.12-1.80, p=0.004) | 1.12<br>(0.88-1.43, p=0.346)   |
| Low HDL-cholesterol | 114569 | 157    | 1092344                           | 0.14                                   | 1.33<br>(1.06-1.69, p=0.015) | 1.09<br>(0.86-1.39, p=0.480)   |

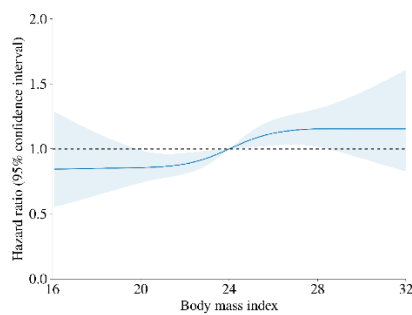
\*The model was adjusted for age, sex, income level, residence, Charlson comorbidity index, hemoglobin level, glomerular filtration rate, smoking status and physical activity.

## Supplementary Figure S1. Restricted cubic spline plots for the association between individual cardiometabolic risk factors and incident aortic aneurysm and dissection.

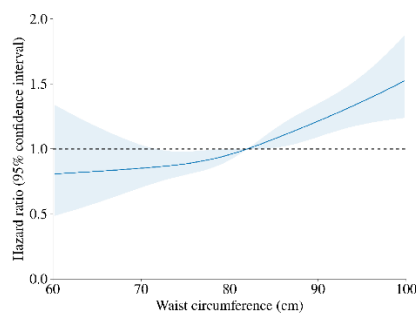
\*The model was adjusted for age, sex, income level, residence, Charlson comorbidity index, hemoglobin level, glomerular filtration rate, smoking status and physical activity. HDL-C, high-density lipoprotein cholesterol.

### 1) Aortic aneurysm

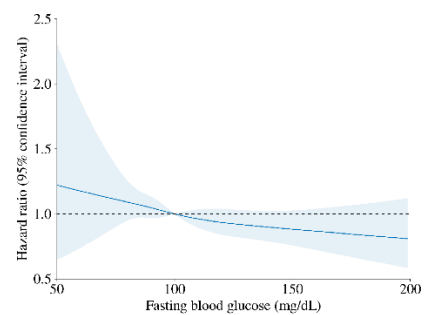
1) Body mass index



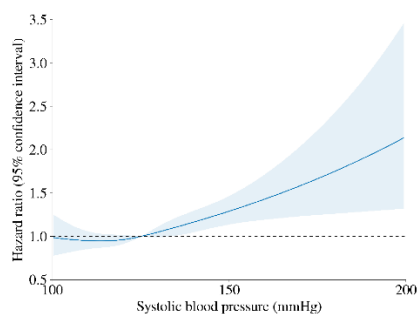
2) Waist circumference



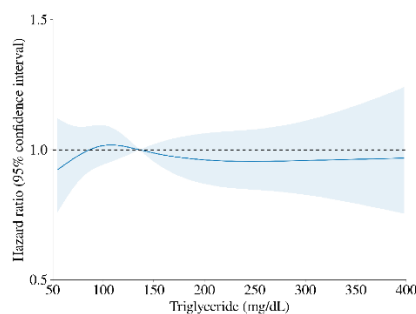
3) Fasting blood glucose



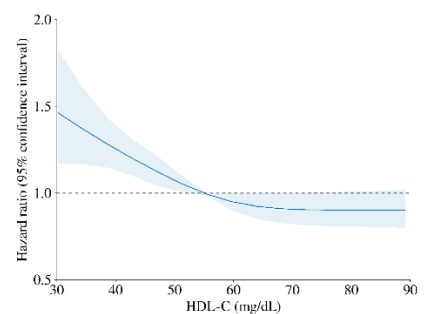
4) Systolic blood pressure



5) Triglyceride

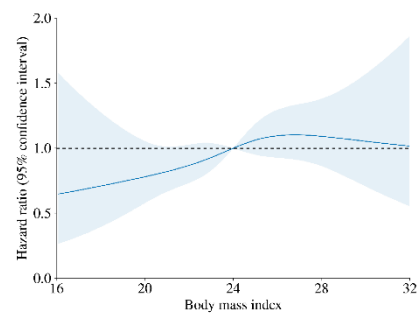


6) HDL cholesterol

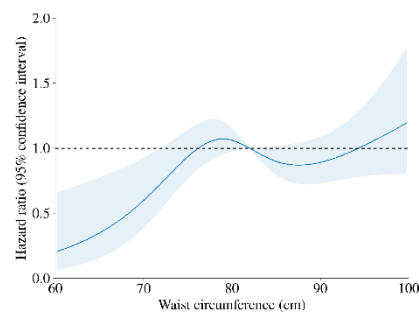


## 2) Aortic dissection

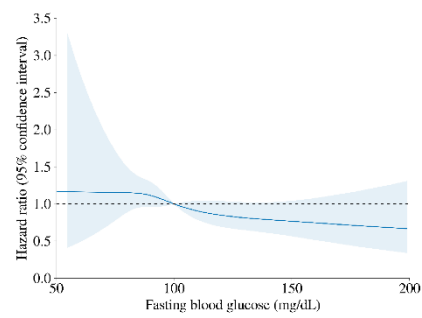
### 1) Body mass index



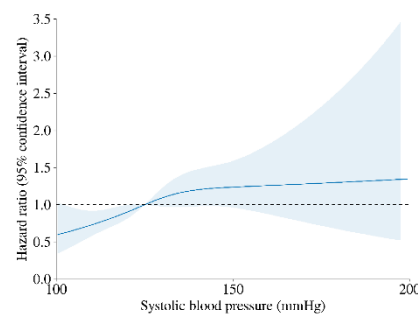
### 2) Waist circumference



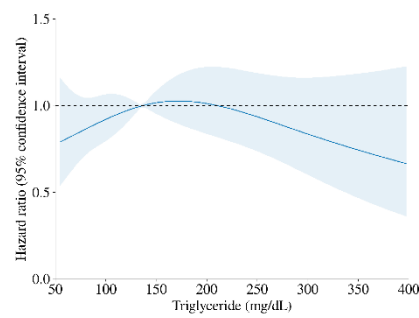
### 3) Fasting blood glucose



### 4) Systolic blood pressure



### 5) Triglyceride



### 6) HDL cholesterol

