

Supplementary Table 3. Baseline characteristics according to changes in DKD phenotype (sensitivity analysis)

| First examination (2009–2012)        | Group 1 <sup>a</sup> (GFR <sup>low</sup> PU <sup>+</sup> ), 94.7% |  |  |  | Group 2 <sup>a</sup> (GFR <sup>low</sup> PU <sup>+</sup> ), 1.7% |  |  | Group 3 <sup>a</sup> (GFR <sup>low</sup> PU <sup>-</sup> ), 3.6% |  |  |         |
|--------------------------------------|---|--|--|--|--|--|--|--|--|--|---------|
|                                      | Group 1 <sup>a</sup> (GFR <sup>low</sup> PU <sup>-</sup> )        | Group 2 <sup>a</sup> (GFR <sup>low</sup> PU <sup>+</sup> ) | Group 3 <sup>b</sup> (GFR <sup>low</sup> PU <sup>-</sup> ) | Group 4 <sup>b</sup> (GFR <sup>low</sup> PU <sup>+</sup> ) | Group 1 <sup>a</sup> (GFR <sup>low</sup> PU <sup>-</sup> )       | Group 2 <sup>a</sup> (GFR <sup>low</sup> PU <sup>+</sup> ) | Group 3 <sup>b</sup> (GFR <sup>low</sup> PU <sup>-</sup> ) | Group 4 <sup>b</sup> (GFR <sup>low</sup> PU <sup>+</sup> )       | Group 3 <sup>a</sup> (GFR <sup>low</sup> PU <sup>-</sup> ) | Group 4 <sup>b</sup> (GFR <sup>low</sup> PU <sup>+</sup> ) | P value |
| Second examination (2011–2014)       | 1→1   | 1→2  | 1→3  | 1→4  | 2→1  | 2→2  | 2→3  | 2→4  | 3→3  | 3→4  |         |
| Category of changes in DKD phenotype |   |  |  |  |  |  |  |  |  |  |         |
| Number                               | 1,193,590 (88.6)  | 15,637 (1.2)   | 63,530 (4.7)   | 2,181 (0.2)  | 15,522 (1.2)   | 4,784 (0.4)  | 1,814 (0.1)  | 1,243 (0.1)  | 46,124 (3.4)   | 2,345 (0.2)  |         |
| Male sex                             | 781,842 (65.5)  | 11,217 (71.7)  | 29,875 (47.0)  | 1,427 (65.4)   | 10,847 (69.9)  | 3,766 (78.7)   | 1,107 (61.0)   | 938 (75.5)   | 19,775 (42.9)  | 1,420 (60.6)   | <0.001  |
| Age, yr                              | 56.3±11.9   | 57.3±11.7  | 66.4±9.7   | 65.2±10.1  | 57.2±11.3  | 57.5±11.0  | 66.0±9.7   | 62.8±10.0  | 70.1±8.3   | 68.7±9.1   | <0.001  |
| BMI, kg/m <sup>2</sup>               | 24.9±3.3  | 25.5±3.6   | 25.1±3.2   | 25.2±3.4   | 25.4±3.5   | 25.8±3.7   | 25.4±3.4   | 25.2±3.4   | 25.1±3.3   | 25.1±3.4   | <0.001  |
| WC, cm                               | 84.9±8.5  | 86.9±8.9   | 85.6±8.5   | 86.8±8.6   | 86.5±8.8   | 88.1±9.0   | 87.1±8.8   | 87.4±8.5   | 86.3±8.6   | 87.0±9.0   | <0.001  |
| Current smoker                       | 326,674 (27.4)  | 4,995 (31.9)   | 9,041 (14.2)   | 445 (20.4)   | 4,677 (30.1)   | 1,657 (34.6)   | 344 (19.0)   | 319 (25.7)   | 4,684 (10.2)   | 389 (16.6)   | <0.001  |
| Heavy drinker                        | 121,528 (10.2)  | 2,145 (13.7)   | 3,109 (4.9)  | 151 (6.9)  | 1,970 (12.7)   | 650 (13.6)   | 122 (6.7)  | 76 (6.1)   | 1,309 (2.8)  | 87 (3.7)   | <0.001  |
| Regular exercise                     | 269,690 (22.6)  | 3,198 (20.5)   | 13,405 (21.1)  | 484 (22.2)   | 3,458 (22.3)   | 1,024 (21.4)   | 366 (20.2)   | 274 (22.0)   | 9,134 (19.8)   | 470 (20.0)   | <0.001  |
| Comorbidities                        |   |  |  |  |  |  |  |  |  |  |         |
| Hypertension                         | 618,437 (51.8)  | 11,234 (71.8)  | 47,629 (75.0)  | 1,881 (86.2)   | 10,896 (70.2)  | 3,823 (79.9)   | 1,604 (88.4)   | 1,137 (91.5)   | 38,740 (84.0)  | 2,136 (91.1)   | <0.001  |
| Dyslipidemia                         | 481,744 (40.4)  | 8,130 (52.0)   | 33,731 (53.1)  | 1,313 (60.2)   | 7,794 (50.2)   | 2,908 (60.8)   | 1,094 (60.3)   | 870 (70.0)   | 26,319 (57.1)  | 1,488 (63.5)   | <0.001  |
| IHD                                  | 173,837 (14.6)  | 2,833 (18.1)   | 16,183 (25.5)  | 607 (27.8)   | 2,748 (17.7)   | 981 (20.5)   | 513 (28.3)   | 351 (28.2)   | 15,167 (32.9)  | 820 (35.0)   | <0.001  |
| AF                                   | 10,555 (0.9)  | 266 (1.7)  | 1,364 (2.2)  | 55 (2.5)   | 269 (1.7)  | 94 (2.0)   | 41 (2.3)   | 25 (2.0)   | 1,413 (3.1)  | 86 (3.7)   | <0.001  |
| Stroke                               | 64,227 (5.4)  | 1,248 (8.0)  | 7,839 (12.3)   | 299 (13.7)   | 1,148 (7.4)  | 435 (9.1)  | 296 (16.3)   | 190 (15.3)   | 7,666 (16.6)   | 459 (19.6)   | <0.001  |
| PAD                                  | 198,090 (16.6)  | 3,205 (20.5)   | 17,718 (27.9)  | 613 (28.1)   | 3,106 (20.0)   | 1,072 (22.4)   | 533 (29.4)   | 381 (30.7)   | 14,259 (30.9)  | 751 (32.0)   | <0.001  |
| CVD                                  | 349,194 (29.3)  | 5,669 (36.3)   | 31,155 (49.0)  | 1,131 (51.9)   | 5,459 (35.2)   | 1,916 (40.1)   | 962 (53.0)   | 655 (52.7)   | 26,634 (57.7)  | 1,424 (60.7)   | <0.001  |
| Heart failure                        | 26,522 (2.2)  | 516 (3.3)  | 3,795 (6.0)  | 153 (7.0)  | 507 (3.3)  | 194 (4.1)  | 131 (7.2)  | 89 (7.2)   | 4,196 (9.1)  | 224 (9.6)  | <0.001  |
| Severity of diabetes                 |   |  |  |  |  |  |  |  |  |  |         |
| FPG ≥150 mg/dL                       | 281,732 (23.6)  | 7,411 (47.4)   | 14,513 (22.8)  | 864 (39.6)   | 5,269 (34.0)   | 2,321 (48.5)   | 572 (31.5)   | 509 (41.0)   | 9,470 (20.5)   | 763 (32.5)   | <0.001  |
| FBS, mg/dL                           | 133,8±43.0  | 155.2±53.6   | 133.1±45.5   | 149.2±57.7   | 142.1±50.3   | 158.7±56.2   | 139.5±57.2   | 151.0±60.3   | 129.2±43.9   | 140.2±52.1   | <0.001  |
| DM ≥5 years                          | 387,419 (32.5)  | 7,706 (49.3)   | 31,613 (49.8)  | 1,435 (65.8)   | 6,963 (44.9)   | 2,976 (62.2)   | 1,192 (65.7)   | 972 (78.2)   | 28,582 (62.0)  | 1,801 (76.8)   | <0.001  |
| Insulin use                          | 80,207 (6.7)  | 2,448 (15.7)   | 7,651 (12.0)   | 642 (29.4)   | 2,064 (13.3)   | 1,050 (22.0)   | 497 (27.4)   | 474 (38.1)   | 8,051 (17.5)   | 777 (33.1)   | <0.001  |
| ≥2 GLD                               | 480,320 (40.2)  | 8,650 (55.3)   | 34,141 (53.7)  | 1,355 (62.1)   | 8,619 (55.5)   | 3,042 (63.6)   | 1,177 (64.9)   | 870 (70.0)   | 26,331 (57.1)  | 1,468 (62.6)   | <0.001  |
| PDR                                  | 4,784 (0.4)   | 349 (2.2)  | 621 (1.0)  | 99 (4.5)   | 250 (1.6)  | 198 (4.1)  | 75 (4.1)   | 119 (9.6)  | 512 (1.1)  | 87 (3.7)   | <0.001  |
| Medication                           |   |  |  |  |  |  |  |  |  |  |         |
| RAS inhibitor                        | 412,022 (34.5)  | 7,908 (50.6)   | 37,399 (58.9)  | 1,569 (71.9)   | 8,161 (52.6)   | 3,005 (62.8)   | 1,411 (77.8)   | 1,027 (82.6)   | 32,019 (69.4)  | 1,856 (79.2)   | <0.001  |
| Sulfonylurea                         | 420,033 (35.2)  | 7,965 (50.9)   | 31,859 (50.2)  | 1,300 (59.6)   | 7,650 (49.3)   | 2,801 (58.6)   | 1,113 (61.4)   | 827 (66.5)   | 25,208 (54.7)  | 1,447 (61.7)   | <0.001  |
| TZD                                  | 52,535 (4.4)  | 838 (5.4)  | 3,812 (6.0)  | 140 (6.4)  | 904 (5.8)  | 304 (6.4)  | 125 (6.9)  | 87 (7.0)   | 3,047 (6.6)  | 179 (7.6)  | <0.001  |

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Supplementary Table 3. Continued

| First examination (2009–2012)                | Group 1 <sup>a</sup> (GFR <sup>low</sup> PU <sup>+</sup> ), 94.7% |  |  |  | Group 2 <sup>a</sup> (GFR <sup>low</sup> PU <sup>+</sup> ), 1.7% |  |  |  | Group 3 <sup>a</sup> (GFR <sup>low</sup> PU <sup>+</sup> ), 3.6% |  |  |  |         |
|--|---|--|--|--|--|--|--|--|--|--|--|--|---------|
|  | Group 1 <sup>a</sup> (GFR <sup>low</sup> PU <sup>-</sup> )        | Group 2 <sup>a</sup> (GFR <sup>low</sup> PU <sup>+</sup> ) | Group 3 <sup>b</sup> (GFR <sup>low</sup> PU <sup>-</sup> ) | Group 4 <sup>b</sup> (GFR <sup>low</sup> PU <sup>+</sup> ) | Group 1 <sup>a</sup> (GFR <sup>low</sup> PU <sup>-</sup> )       | Group 2 <sup>a</sup> (GFR <sup>low</sup> PU <sup>+</sup> ) | Group 3 <sup>b</sup> (GFR <sup>low</sup> PU <sup>-</sup> ) | Group 4 <sup>b</sup> (GFR <sup>low</sup> PU <sup>+</sup> ) | Group 1 <sup>a</sup> (GFR <sup>low</sup> PU <sup>-</sup> )       | Group 2 <sup>a</sup> (GFR <sup>low</sup> PU <sup>+</sup> ) | Group 3 <sup>b</sup> (GFR <sup>low</sup> PU <sup>-</sup> ) | Group 4 <sup>b</sup> (GFR <sup>low</sup> PU <sup>+</sup> ) | P value |
| Category of changes in DKD phenotype         | 1→1   | 1→2  | 1→3  | 1→4  | 2→1  | 2→2  | 2→3  | 2→4  | 3→3  | 3→4  |  |  |         |
| SBP, mm Hg                                   | 127.5±14.9  | 132.1±16.8   | 129.2±15.7   | 132.7±18.1   | 129.8±15.6   | 134.3±17   | 131.4±17   | 135.2±17.9   | 130.1±16.1   | 134.3±17.6   | <0.001   |  |         |
| DBP, mm Hg                                   | 78.5±9.8  | 80.8±11  | 77.6±10.1  | 79.2±11.2  | 79.4±10.3  | 81.4±11  | 78±10.6  | 80±11.4  | 76.9±10.2  | 78.3±10.8  | <0.001   |  |         |
| eGFR, mL/min/1.73 m <sup>2</sup>             | 91.8±37.7   | 90.8±37.4  | 54.3±5.4   | 52.9±6.4   | 92.1±43.2  | 89.1±40.5  | 52.9±6.3   | 51.1±7.2   | 50.6±7.3   | 47.8±8.1   | <0.001   |  |         |
| eGFR at 1st exam, mL/min/1.73 m <sup>2</sup> | 90.5±34.9   | 91.8±48.0  | 78.4±32.2  | 80.0±44.8  | 89.6±33.7  | 88.7±26.3  | 76.2±16.0  | 74.6±20.0  | 50.1±10.0  | 48.3±10.0  | <0.001   |  |         |
| PU   | 0   | 15,639 (100)   | 0  | 2,181 (100)  | 0  | 4,786 (100)  | 0(0)   | 1,243 (100)  | 0  | 2,345 (100)  | <0.001   |  |         |
| PU at 1st exam                               | 0   | 0  | 0  | 0  | 15,522 (100)   | 4,786 (100)  | 1,814 (100)  | 1,243 (100)  | 0  | 0  | <0.001   |  |         |
| Non-HDL-C, mg/dL                             | 140.9±40.7  | 146.7±51.5   | 139.9±42.1   | 144.6±49   | 140.4±44.1   | 148.2±47.9   | 138±43   | 147.2±47.4   | 135.9±44.7   | 138.3±43   | <0.001   |  |         |
| AST, IU/L                                    | 25.72 (25.7–25.74)  | 28.55 (28.41–28.7)   | 25.07 (24.99–25.15)  | 25.81 (25.44–26.2)   | 26.81 (26.69–26.92)  | 27.27 (27.07–27.48)  | 24.84 (24.49–25.18)  | 23.71 (23.35–24.08)  | 24.15 (24.06–24.23)  | 24.13 (23.82–24.45)  | <0.001   |  |         |
| ALT, IU/L                                    | 25.72 (25.7–25.75)  | 28.87 (28.7–29.05)   | 22.47 (22.38–22.57)  | 23.39 (22.97–23.82)  | 27.04 (26.89–27.19)  | 27.65 (27.4–27.91)   | 22.29 (21.89–22.7)   | 21.67 (21.25–22.09)  | 20.5 (20.4–20.61)  | 20.81 (20.46–21.16)  | <0.001   |  |         |
| γ-GTP, IU/L                                  | 35.57 (35.52–35.62)   | 46.15 (45.75–46.55)  | 29.54 (29.37–29.71)  | 35.37 (34.5–36.27)   | 40.97 (40.64–41.3)   | 45.99 (45.38–46.6)   | 31.47 (30.71–32.25)  | 33.03 (32.14–33.94)  | 26.57 (26.4–26.75)   | 29.53 (28.87–30.19)  | <0.001   |  |         |

Values are presented as number (%), mean ± standard deviation, or geometric mean (95% confidence interval). Results are based on data from the second examination.

DKD, diabetic kidney disease; GFR, glomerular filtration rate; PU, proteinuria; BMI, body mass index; WC, waist circumference; IHD, ischemic heart disease; AF, atrial fibrillation; PAD, peripheral artery disease; CVD, cardiovascular disease; FPG, fasting plasma glucose; DM, diabetes mellitus; GLD, glucose-lowering drug; PDR, proliferative diabetic retinopathy; RAS, renin-angiotensin system; TZD, thiazolidinedione; SBP, systolic blood pressure; DBP, diastolic blood pressure; eGFR, estimated glomerular filtration rate; HDL-C, high-density lipoprotein cholesterol; AST, aspartate aminotransferase; ALT, alanine aminotransferase; γ-GTP, gamma-glutamyltransferase.

<sup>a</sup>Group 1, eGFR ≥ 60 mL/min/1.73 m<sup>2</sup>, PU<sup>-</sup>; Group 2, eGFR ≥ 60 mL/min/1.73 m<sup>2</sup>, PU<sup>+</sup>; Group 3, eGFR < 60 mL/min/1.73 m<sup>2</sup>, PU<sup>-</sup>; Group 4, eGFR < 60 mL/min/1.73 m<sup>2</sup>, PU<sup>+</sup>. <sup>b</sup>In case of group 3 and 4 at second examination, only patients with eGFR 30 to 60 mL/min/1.73 m<sup>2</sup> were included according to the study inclusion criteria.