Preliminary analysis of estimated glomerular filtration rate using the PROMISE cohort

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May 12, 2016

# Subject Characterization

TABLE 1: Subject characteristic according to estimated GFR categories at baseline.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | Normal (n=574) | Mild (n=112) | Moderate (n=2) | Hyperfiltration (n=51) |
| Age (years) \*\*\* | | 49.5 (9.1)a | 56.3 (10.3) | 66.5 (12.0) | 38.7 (7.8)a |
| Ethnicity (%) \*\* | European | 376 (65.5%) | 82 (73.2%) | 2 (100%) | 21 (41.2%) |
| Latino/a | 88 (15.3%) | 16 (14.3%) | - | 9 (17.6%) |
| Other | 65 (11.3%) | 7 (6.2%) | - | 16 (31.4%) |
| South Asian | 45 (7.8%) | 7 (6.2%) | - | 5 (9.8%) |
| Sex (%) \*\*\* | Female | 421 (73.3%) | 31 (27.7%) | 1 (50%) | 50 (98%) |
| Male | 153 (26.7%) | 81 (72.3%) | 1 (50%) | 1 (2%) |
| BMI (kg/m2) | | 31.2 (6.3) | 30.3 (5.5) | 29.4 (3.0) | 31.6 (7.2) |
| Waist circumference(cm) | | 98.6 (15.5) | 102.3 (13.6) | 105.3 (24.4) | 96.5 (17.3) |
| Urinary VDBP (ng/mL) \*\*\* | | 80.4 (92.7)a | 75.5 (75)b | 1106.5 (1437.5)abc | 108.9 (105.8)c |
| Microalbumin:Creatinine \*\*\* | | 1.2 (3.6)a | 1.0 (2.8)b | 50.5 (69.9)abc | 1.7 (3.6)c |
| Urinary creatinine (mmol/L) \*\*\* | | 11.4 (6.2)a | 14.2 (6.5)ab | 10.3 (1.3) | 10.4 (6.6)b |
| Urinary albumin (mg/L) \*\*\* | | 10.2 (17.9)a | 10.0 (10.8)b | 870.0 (1216.2)abc | 11.0 (12.7)c |
| Serum creatinine (μmol/L) \*\*\* | | 67.8 (9.5)a | 90.3 (7.5)a | 112.5 (10.6)a | 51.1 (8.5)a |
| Serum 25(OH)D (nmol/L) \*\*\* | | 54.7 (23.1)a | 63.6 (19.4)ab | 41.8 (45.0) | 46.6 (24.1)b |
| Diastolic blood pressure (mmHg) \* | | 80.2 (10.2) | 80.9 (9.6) | 66.5 (4.2) | 77.1 (12.5) |
| Mean arterial pressure (mmHg) \*\* | | 95.5 (11.3)a | 97.4 (10.4)b | 88.2 (0.4) | 91.0 (13.6)ab |
| Systolic blood pressure (mmHg) \*\*\* | | 125.9 (15.9)ab | 130.4 (14.2)ac | 131.8 (9.5) | 118.6 (17.4)bc |
| Parathyroid Hormone (pmol/L) \*\* | | 4.6 (1.7)a | 4.6 (1.5)b | 8.7 (4.6)abc | 4.6 (1.8)c |
| Serum ALT (U/L) \*\* | | 31.3 (16.6)a | 37.3 (20.5)ab | 33.0 (17.0) | 27.3 (15.5)b |
| Blood glucose (mmol/L) | Fasting \* | 5.1 (0.9)a | 5.3 (1.1)a | 4.7 (1.6) | 5.0 (0.8) |
| 2h OGTT | 6.6 (2.9) | 6.6 (3.1) | 5.5 (1.4) | 6.4 (2.7) |
| Diabetic Status | Diabetes | 69 (12%) | 16 (14.3%) | - | 5 (9.8%) |
| Normal | 479 (83.4%) | 86 (76.8%) | 2 (100%) | 44 (86.3%) |
| Prediabetes | 26 (4.5%) | 10 (8.9%) | - | 2 (3.9%) |

Continuous values are reported as mean (standard deviation) and discrete variables are reported as n (proportion). Significance for continuous variables were tested using analysis of variance (ANOVA) with Tukey’s HSD for pairwise comparisons. Significance for discrete variables were examined using chi-squared test of independence. Hemolysed samples were removed from analysis (n=2). \**p* < 0.05, \*\**p* < 0.01, \*\**p* < 0.001.

TABLE 2: Subject characteristic according to estimated GFR categories across all visits.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | Normal (n=1432) | Mild (n=336) | Moderate (n=16) | Hyperfiltration (n=94) |
| Age (years) \*\*\* | | 52.4 (9.3)a | 60.3 (10.3)a | 66.6 (7.7)a | 40.5 (7.9)a |
| Ethnicity \*\*\* | European | 994 (69.4%) | 258 (76.8%) | 11 (68.8%) | 39 (41.5%) |
| Latino/a | 179 (12.5%) | 37 (11%) | 1 (6.2%) | 13 (13.8%) |
| Other | 145 (10.1%) | 22 (6.5%) | 3 (18.8%) | 31 (33%) |
| South Asian | 114 (8%) | 19 (5.7%) | 1 (6.2%) | 11 (11.7%) |
| Sex \*\*\* | Female | 1085 (75.8%) | 125 (37.2%) | 7 (43.8%) | 91 (96.8%) |
| Male | 347 (24.2%) | 211 (62.8%) | 9 (56.2%) | 3 (3.2%) |
| BMI \* | | 31.2 (6.5)a | 30.4 (5.1)ab | 29.9 (4.6) | 32.5 (7.4)b |
| Waist Circumference (cm) \*\* | | 99.2 (15.6)a | 102.5 (13.1)a | 104.1 (12.3) | 98.4 (17.4) |
| Estimated GFR (ml/min/1.73m^2) \*\*\* | | 105.4 (8.6)a | 80.7 (6.9)a | 55.1 (7.1)a | 132.2 (8.0)a |
| Microalbumin:Creatinine \*\*\* | | 1.7 (7.6)a | 1.3 (2.7)b | 10.6 (31.4)ab | 3.8 (16.1) |
| Urinary VDBP (ng/mL) | | 80.8 (469.9) | 73.7 (149.7) | 175.0 (521.3) | 80.3 (130.1) |
| Urinary Creatinine (mmol/L) | | 11.3 (6.2) | 13.7 (9.4) | 17.6 (25.2) | 10.4 (8.5) |
| Urinary Microalbumin (mg/L) \*\*\* | | 11.9 (44.7)a | 11.4 (22.7)b | 113.7 (431.0)abc | 12.8 (21.9)c |
| Urinary Creatinine (μmol/L) \*\*\* | | 66.8 (9.5)ab | 89.4 (8.8)ac | 119.9 (20.4)bd | 50.0 (9.3)cd |
| Serum 25(OH)D (nmol/L) \*\*\* | | 64.1 (27.4)ab | 73.0 (23.1)ac | 65.6 (23.2)b | 51.1 (23.8)c |
| Diastolic Blood Pressure (mmHg) \* | | 80.1 (10.0)a | 79.7 (9.5) | 79.5 (8.3) | 77.1 (11.5)a |
| Mean Arterial Pressure (mmHg) \*\*\* | | 95.4 (10.9)a | 96.5 (10.4)b | 98.0 (7.4) | 91.0 (12.4)ab |
| Systolic Blood Pressure (mmHg) \*\*\* | | 125.9 (15.3)ab | 130.2 (14.9)ac | 135.1 (10.0)d | 118.7 (16.2)bcd |
| Parathyroid Hormone (pmol/L) | | 4.7 (1.8) | 4.8 (1.7) | 6.2 (2.9) | 4.9 (1.8) |
| Serum ALT (U/L) \*\*\* | | 28.7 (15.8)a | 34.5 (39.7)a | 35.8 (30.7) | 31.6 (32.3) |
| Blood Glucose (mmol/L) | Fasting \* | 5.4 (1.1)a | 5.5 (1.0)a | 5.3 (0.7) | 5.3 (1.8) |
| 2h OGTT | 6.6 (2.5) | 6.6 (2.7) | 6.7 (1.8) | 6.6 (2.3) |
| Diabetic Status \* | Diabetes | 221 (15.8%) | 70 (21.5%) | 3 (18.8%) | 9 (9.7%) |
| Normal | 981 (70.1%) | 202 (62%) | 12 (75%) | 70 (75.3%) |
| Prediabetes | 198 (14.1%) | 54 (16.6%) | 1 (6.2%) | 14 (15.1%) |

Continuous values are reported as mean (standard deviation) and discrete variables are reported as n (proportion). Significance for continuous variables were tested using analysis of variance (ANOVA) with Tukey’s HSD for pairwise comparisons. Significance for discrete variables were examined using chi-squared test of independence. Hemolysed samples were removed from analysis (n=2). \**p* < 0.05, \*\**p* < 0.01, \*\**p* < 0.001.

## Moderate to Severe eGFR

### Cross-sectional at Baseline

At baseline, there were 2 people who had estimated glomerular filtration rate (eGFR) of less than 60 ml/min/1.73m^2. These individuals are classified as having moderate kidney dysfunction according to the National Kidney Foundation. Upon taking a closer look at these individuals, their eGFR values are only slightly below the 60 ml/min/1.73m^2 cut-off. These two subjects had missing values for both 3-year and 6-year visits.

|  |  |
| --- | --- |
| SID | Baseline |
| 2075 | 57.1 |
| 2266 | 59.5 |

### Prospective

At the 3-year follow-up visit, there were eight subjects who had eGFR less than 60 ml/min/1.73m^2. This number decreased to six at the 6-year follow-up. The lowest eGFR was 35.4 ml/min. There were two subjects with eGFR of <45 ml/min/1.73m^2, which is classified as moderate to severe kidney dysfunction. Unfortunately, no subjects have eGFR values across all time-points, making progression of the disease difficult to analyze. There were two subjects with eGFR measurements at the 3 year and 6-year time points. Their eGFR either did not change much (58.3ml/min at 3-year and 58.8ml/min at 6 year) or decreased (59.6ml/min at 3-year and 54.7ml/min at 6-year).

Below is a table of subjects who had eGFR < 60 ml/min across all time points.

|  |  |  |
| --- | --- | --- |
| SID | VN | eGFR |
| 1214 | 6 | 58.96812 |
| **1240** | **3** | **58.25326** |
| **1240** | **6** | **58.84230** |
| 1271 | 3 | 59.84679 |
| 1294 | 3 | 59.95090 |
| **1295** | **3** | **59.59465** |
| **1295** | **6** | **54.65959** |
| 1319 | 6 | 55.10143 |
| 1359 | 6 | 54.68440 |
| 1508 | 6 | 40.54094 |
| 1559 | 3 | 53.26737 |
| 2075 | 1 | 57.08151 |
| 2080 | 3 | 59.59465 |
| 2088 | 3 | 56.05548 |
| 2266 | 1 | 59.53124 |
| 3115 | 3 | 35.41933 |

The two subjects with eGFR across multiple time points are emphasized in bold.

Only two subjects had eGFR < 50, so a more detailed analysis was conducted.

SID 3115 had a much lower eGFR compared to others, so I took a more detailed look at his/her eGFR across different time points. It may be that there was a problem with serum creatinine, as the eGFR is in the healthy range at baseline and 6-year.

|  |  |  |  |
| --- | --- | --- | --- |
| SID | VN | eGFR | Creatinine |
| 3115 | 1 | 102.66156 | 65 |
| 3115 | 3 | 35.41933 | 175 |
| 3115 | 6 | 99.69693 | 63 |

Another subject (SID 1508) also had relatively low eGFR. Based on their trend, it appears that their kidney filtration deteriorated as time passed. However, they had normal MCR and were not diabetic. His/her urinary VDBP dropped drastically at visit 3, even though other parameters (e.g. eGFR, diabetic status, MCR) that we thought were associated with UDBP did not change much. At visit 6, UDBP increased to around 90 ng/mL again.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| SID | VN | eGFR | UDBP | DM status | MCR status |
| 1508 | 1 | 73.65681 | 90.20 | NGT | Normal |
| 1508 | 3 | 73.85099 | 2.62 | NGT | NA |
| 1508 | 6 | 40.54094 | 89.40 | NGT | Normal |