**Supplementary Table I**. Algorithm performance analysis based on Dice coefficient for the two additional datasets originating from two sites(MCA: Mayo Clinic Arizona, CC: Cleveland Clinic). The statistics reported are mean±SD and range [min/max].

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Category | Right Cortex | Left Cortex | Right Medulla | Left Medulla |
| MCA+CC  *n=1226* | 0.93±0.03  [0.75/0.97] | 0.93±0.02  [0.82/0.97] | 0.88±0.05  [0.55/0.95] | 0.88±0.06  [0.56/0.95] |
| MCA  *n=830* | 0.92±0.03  [0.79/0.97] | 0.93±0.02  [0.81/0.97] | 0.89±0.04  [0.67/0.94] | 0.89±0.04  [0.56/0.95] |
| CC  *n=*396 | 0.93±0.02  [0.75/0.97] | 0.93±0.02  [0.82/0.97] | 0.85±0.06  [0.55/0.95] | 0.84±0.06  [0.71/0.95] |

**Supplementary Table II.** Spearman’s correlation coefficients between clinical characteristic and cortical and medullary volumes obtained by manual or AI-based approaches from the test set at Mayo Clinic Minnesota

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **N=386 kidney donors** | **Cortical volume** | | | | |  | **Medullary volume** | | | | |
|  | Manual | | Automated | |  |  | Manual | | Automated | |  |
| **Characteristic** | rs | P value | rs | P value | P value |  | rs | P value | rs | P value | P value |
| Age, years | **-0.302** | **<0.001** | **-0.327** | **<0.001** | **0.01** |  | 0.043 | 0.40 | 0.072 | 0.16 | .17 |
| Male | **0.489** | **<0.001** | **0.475** | **<0.001** | 0.16 |  | **0.191** | **<0.001** | **0.230** | **<0.001** | .06 |
| Donor’s height, cm | **0.533** | **<0.001** | **0.525** | **<0.001** | 0.41 |  | **0.342** | **<0.001** | **0.380** | **<0.001** | .05 |
| BMI, kg/m2 | **0.292** | **<0.001** | **0.272** | **<0.001** | 0.07 |  | **0.135** | **0.008** | **0.177** | **0.0005** | **.04** |
| Measured GFR (ml/min)\* | **0.724** | **<0.001** | **0.739** | **<0.001** | 0.06 |  | **0.423** | **<0.001** | **0.447** | **<0.001** | .21 |
| Measured GFR (ml/min/1.73m2)\* | **0.456** | **<0.001** | **0.487** | **<0.001** | **0.002** |  | **0.254** | **<0.001** | **0.243** | **<0.001** | .60 |
| Estimated GFR (ml/min/1.73m2) ¥ | **0.375** | **<0.001** | **0.397** | **<0.001** | **0.04** |  | 0.077 | 0.13 | 0.062 | 0.23 | .48 |
| Family history of ESRD† | **0.134** | **0.03** | **0.145** | **0.02** | 0.42 |  | 0.093 | 0.14 | 0.078 | 0.21 | .47 |
| Hypertension | -0.056 | 0.27 | -0.070 | 0.17 | 0.22 |  | 0.051 | 0.32 | 0.062 | 0.23 | .60 |
| Uric acid, mg/dl | **0.319** | **<0.001** | **0.292** | **<0.001** | **0.01** |  | 0.059 | 0.25 | **0.102** | **0.05** | **.04** |
| 24hr Albumin‡ | **0.212** | **<0.001** | **0.211** | **<0.001** | 0.93 |  | 0.050 | 0.35 | 0.092 | 0.08 | .05 |
| Glomerular volume\*\* | **0.313** | **<0.001** | **0.313** | **<0.001** | 0.99 |  | -0.126 | 0.05 | -0.120 | 0.07 | .84 |
| Mean tubular area\*\* | **0.200** | **0.002** | **0.226** | **<0.001** | 0.07 |  | 0.081 | 0.22 | 0.039 | 0.55 | .16 |
| % Globally sclerotic glomeruli\*\* | **-0.132** | **0.04** | **-0.137** | **0.04** | 0.73 |  | -0.077 | 0.24 | -0.102 | 0.12 | .40 |

\*Measured GFR available in 377 donors

¥ Estimated GFR available in 384 donors

†Family history of ESRD available in 262 donors

‡24hr Albumin available in 357 donors

\*\*Biopsy measures available in 233 kidney donors

**Supplementary Table III**. Spearman’s correlation coefficients between clinical characteristic and cortical and medullary volumes obtained by manual or AI-based approaches from the test set at Mayo Clinic Arizona.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **N=830 kidney donors** | **Cortical volume** | | | | |  | **Medullary volume** | | | | |
|  | Manual | | Automated | |  |  | Manual | | Automated | |  |
| **Characteristic** | rs | P value | rs | P value | P value |  | rs | P value | rs | P value | P value |
| Age, years | **-0.213** | **<0.0001** | **-0.233** | **<0.0001** | 0.12 |  | 0.009 | 0.79 | 0.043 | 0.22 | 0.13 |
| Male | **0.548** | **<0.0001** | **0.542** | **<0.0001** | 0.57 |  | **0.195** | **<0.0001** | **0.217** | **<0.0001** | 0.32 |
| Donor’s height, cm | **0.484** | **<0.0001** | **0.480** | **<0.0001** | 0.72 |  | **0.286** | **<0.0001** | **0.306** | **<0.0001** | 0.35 |
| BMI, kg/m2 | **0.485** | **<0.0001** | **0.423** | **<0.0001** | **< 0.001** |  | **0.129** | **0.0002** | **0.259** | **<0.0001** | **< 0.001** |
| Estimated GFR (ml/min/1.73m2) ¥ | **0.265** | **<0.0001** | **0.290** | **<0.0001** | **0.04** |  | **0.072** | **0.04** | -0.009 | 0.80 | **0.005** |
| Family history of ESRD† | **0.157** | **<0.0001** | **0.135** | **0.02** | 0.08 |  | 0.018 | 0.63 | **0.091** | **0.01** | **0.001** |
| Hypertension | -0.036 | 0.30 | -0.049 | 0.16 | 0.30 |  | -0.002 | 0.96 | 0.024 | 0.49 | 0.33 |
| Uric acid, mg/dl ⱡ | **0.365** | **<0.0001** | **0.371** | **<0.0001** | 0.61 |  | 0.043 | 0.22 | 0.053 | 0.13 | 0.66 |
| 24hr Albumin‡ | 0.051 | 0.32 | 0.09 | 0.45 | **0.03** |  | **0.110** | **0.03** | **0.105** | **0.04** | 0.88 |
| Glomerular volume\*\* | **0.207** | **<0.0001** | **0.169** | **0.0002** | **0.02** |  | -0.053 | 0.24 | 0.018 | 0.70 | 0.24 |
| Mean tubular area\*\* | 0.061 | 0.18 | 0.033 | 0.47 | 0.09 |  | -0.008 | 0.85 | 0.032 | 0.49 | 0.42 |
| % Globally sclerotic glomeruli\*\* | **-0.090** | **0.05** | **-0.108** | **0.02** | 0.27 |  | 0.022 | 0.64 | 0.018 | 0.70 | 0.89 |

¥ Estimated GFR available in 827 donors

†Family history of ESRD available in 728 donors

ⱡUric acid available in 820 donors

‡24hr Albumin available in 390 donors

\*\*Biopsy measures available in 486 kidney donors

**Supplementary Table IV**. Spearman’s correlation coefficients between clinical characteristic and cortical and medullary volumes obtained by manual or AI-based approaches from the test set at Cleveland Clinic.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **N=396 kidney donors** | **Cortical volume** | | | | |  | **Medullary volume** | | | | |
|  | Manual | | Automated | |  |  | Manual | | Automated | |  |
| **Characteristic** | rs | P value | rs | P value | P value |  | rs | P value | rs | P value | P value |
| Age, years | **-0.145** | **0.004** | **-0.153** | **<0.0001** | 0.69 |  | 0.056 | 0.27 | **0.135** | **0.007** | **0.03** |
| Male | **0.531** | **<0.0001** | **0.533** | **<0.0001** | 0.91 |  | **0.193** | **0.0001** | **0.115** | **0.02** | **0.03** |
| Donor’s height, cm | **0.570** | **<0.0001** | **0.577** | **<0.0001** | 0.67 |  | **0.317** | **<0.0001** | **0.249** | **<0.0001** | 0.05 |
| BMI, kg/m2 | **0.450** | **<0.0001** | **0.428** | **<0.0001** | 0.22 |  | **0.182** | **0.0003** | **0.193** | **0.0001** | 0.76 |
| Measured GFR (ml/min)\* | **0.534** | **<0.0001** | **0.540** | **<0.0001** | 0.72 |  | **0.384** | **<0.0001** | **0.334** | **<0.0001** | 0.14 |
| Measured GFR (ml/min/1.73m2)\* | **0.138** | **0.006** | **0.148** | **0.003** | 0.62 |  | **0.194** | **0.0001** | **0.167** | **0.0009** | .46 |
| Estimated GFR (ml/min/1.73m2) ¥ | **0.197** | **<0.0001** | **0.180** | **<0.0001** | 0.39 |  | 0.031 | 0.55 | 0.002 | 0.98 | 0.43 |
| Family history of ESRD† | 0.010 | 0.86 | 0.001 | 0.98 | 0.67 |  | -0.028 | 0.60 | -0.038 | 0.48 | 0.80 |
| Hypertension | -0.016 | 0.75 | 0.008 | 0.88 | 0.23 |  | 0.041 | 0.42 | 0.018 | 0.72 | 0.53 |
| Uric acid, mg/dl ⱡ | **0.380** | **<0.0001** | **0.377** | **<0.0001** | 0.88 |  | -0.029 | 0.58 | -0.031 | 0.56 | 0.96 |
| Glomerular volume\*\* | **0.294** | **<0.0001** | **0.261** | **<0.0001** | 0.11 |  | -0.047 | 0.39 | -0.020 | 0.71 | 0.49 |
| Mean tubular area\*\* | **0.127** | **0.02** | 0.103 | 0.06 | 0.26 |  | -0.042 | 0.43 | 0.010 | 0.85 | 0.18 |
| % Globally sclerotic glomeruli\*\* | -0.018 | 0.73 | -0.012 | 0.83 | 0.78 |  | 0.052 | 0.34 | 0.033 | 0.54 | 0.63 |

\*Measured GFR available in 391 donors

¥ Estimated GFR available in 393 donors

†Family history of ESRD available in 349 donors

ⱡUric acid available in 375 donors

\*\*Biopsy measures available in 347 kidney donors