**SUPPLEMENTAL DATA**

**Circulating Plasma Biomarkers in Biopsy-Confirmed Kidney Disease**

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**Supplemental Methods**

*Olink assay*

Quality control metrics included: Coefficients of variation (CV) <10% from blind split replicates; standard deviation (SD) of internal Olink controls <0.2, and incubation or detection control which deviated < +/- 0.3 from the median value of all samples on the plate. As an additional quality control, we included multiple plasma aliquots from two patients, one with high and one with low eGFR, which were spread randomly in dummy labeled tubes across the shipment boxes. The mean CVs were 5.5 (+/- 4.3) and 4.9 (+/- 4.6), respectively, for the 225 biomarkers.

*Adjudication of histopathologic outcomes*

The adjudication of histopathologic lesions was performed by two kidney pathologists between 2014 and 2017. We limited statistical analyses on histopathologic lesions to participants with adjudicated histopathology by both kidney pathologists (n=411, 75%) except for analyses of global or segmental glomerulosclerosis since they were taken from the biopsy report (n=549). There was a greater percentage of individuals with diabetic nephropathy and advanced glomerulosclerosis among those with fully adjudicated histopathology measures (n=411) but no differences in other clinical characteristics. Of the 13 histopathologic lesions adjudicated, all were scored during study sessions except for grades of global or segmental glomerulosclerosis, which were taken from the biopsy report, because they were each calculated as a percentage of the total number of glomeruli. The weighted kappa statistic (95% CI) from 26 randomly selected biopsies for repeat review months after the initial scoring were 0.92 (0.77 – 1.00) for endocapillary glomerular inflammation, 1.00 (1.00 – 1.00) for cellular crescents, 0.72 (0.56 – 0.89) for fibrinoid necrosis, 0.65 (0.02 – 1.00) for fibrocellular crescents, 0.54 (0.12 – 0.69) for mesangial expansion, 0.67 (0.45 – 0.89) for ATI, 0.46 (0.16–0.76) for inflammation in the non-fibrosed interstitium, 0.52 (0.27 – 0.78) for inflammation in the fibrosed interstitium, 0.72 (0.52 – 0.93) for IFTA, 0.64 (0.41 – 0.87) for arterial sclerosis, and 0.66 (0.44 – 0.87) for arteriolar sclerosis.1 The weighted kappa statistics for almost all histopathologic lesions suggested good agreement for repeat review after the initial scoring but were lower for mesangial expansion and inflammation in the non-fibrosed interstitium.

**Supplemental Table 1.** Histopathologic scoring system for light microscopy

|  |  |
| --- | --- |
| **Histologic Feature\*** | **Scoring** |
| Mesangial Matrix Expansion | 0 (none), 1 (mild,), 2 (moderate), 3 (severe) |
| Global Glomerulosclerosis | 0 (≤10%), 1 (11-25%), 2 (26-50%), 3 (>50%) |
| Segmental Glomerulosclerosis | 0 (≤10%), 1 (11-25%), 2 (26-50%), 3 (>50%) |
| Endocapillary Glomerular Inflammation | 0 (≤10%), 1 (11-25%), 2 (26-50%), 3 (>50%) |
| Extracapillary Cellular Crescents | 0 (≤10%), 1 (11-25%), 2 (26-50%), 3 (>50%) |
| Focal Glomerular Necrosis | 0 (≤10%), 1 (11-25%), 2 (26-50%), 3 (>50%) |
| Fibrocellular Crescents | 0 (≤10%), 1 (11-25%), 2 (26-50%), 3 (>50%) |
| Interstitial Fibrosis and Tubular Atrophy | 0 (≤10%), 1 (11-25%), 2 (26-50%), 3 (>50%) |
| Inflammation, Non-Fibrosed Interstitium | 0 (≤10%), 1 (11-25%), 2 (26-50%), 3 (>50%) |
| Inflammation, Fibrosed Interstitium | 0 (≤10%), 1 (11-25%), 2 (26-50%), 3 (>50%) |
| Acute Tubular Injury | 0 (none), 1 (mild,), 2 (moderate), 3 (severe) |
| Arterial Sclerosis | 0 (none), 1 (mild,), 2 (moderate), 3 (severe) |
| Arteriolar Sclerosis | 0 (none), 1 (mild,), 2 (moderate), 3 (severe) |

Percentages were calculated by assessing affected areas over total cortical volume or glomeruli affected. For statistical analyses in this study, mesangial expansion, segmental glomerulosclerosis, focal glomerular necrosis, fibrocellular and extracapillary cellular crescents, endocapillary inflammation, and inflammation in the fibrosed and non-fibrosed interstitium were dichotomized as score 0 versus 1/2/3. Acute tubular injury, global glomerulosclerosis, interstitial fibrosis/tubular atrophy, and arterial and arteriolar sclerosis were dichotomized as score 0/1 versus 2/3.

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# **Supplemental Table 2.** Associations of plasma biomarkers with kidney disease progression.

|  |  |  |
| --- | --- | --- |
| Biomarker | HR (95% CI) | P value |
| PGF | 5.4 (3.4, 8.7) | <0.001 |
| BAMBI | 3.0 (2.1, 4.2) | <0.001 |
| TNFRSF11A | 2.6 (1.9, 3.5) | <0.001 |
| TRAIL-R2 | 2.8 (2.0, 3.9) | <0.001 |
| CX3CL1 | 2.6 (1.9, 3.6) | <0.001 |
| FGF-23 | 1.7 (1.4, 2.0) | <0.001 |
| IL-15RA | 6.0 (3.2, 11.2) | <0.001 |
| PTK7 | 2.8 (1.9, 3.9) | <0.001 |
| CA12 | 2.8 (1.9, 4.2) | <0.001 |
| ADM | 3.4 (2.1, 5.6) | <0.001 |
| VEGFA | 3.7 (2.2, 6.1) | <0.001 |
| NUCB2 | 2.5 (1.7, 3.6) | <0.001 |
| CD40 | 2.8 (1.8, 4.2) | <0.001 |
| CSF-1 | 9.4 (3.7, 23.7) | 0.001 |
| SPON2 | 32.1 (7.5, 137.3) | 0.001 |
| KIM1 | 1.6 (1.3, 1.9) | 0.001 |
| IL-4RA | 2.1 (1.5, 3.0) | 0.002 |
| DCN | 3.9 (2.1, 7.0) | 0.002 |
| CLEC1A | 2.4 (1.6, 3.5) | 0.003 |
| VSIG2 | 2.0 (1.5, 2.7) | 0.003 |
| PAR-1 | 3.7 (2.0, 6.8) | 0.01 |
| TNFRSF9 | 1.7 (1.3, 2.2) | 0.01 |
| PD-L1 | 2.4 (1.6, 3.6) | 0.01 |
| TNFRSF10A | 2.3 (1.5, 3.4) | 0.01 |
| TM | 3.4 (1.9, 6.1) | 0.01 |
| CAPG | 1.8 (1.4, 2.4) | 0.02 |
| IL-10RB | 3.9 (2.0, 7.9) | 0.03 |
| ENAH | 2.2 (1.5, 3.4) | 0.03 |
| IL16 | 1.8 (1.3, 2.4) | 0.03 |
| TF | 2.6 (1.6, 4.4) | 0.05 |

Shown are significant associations after applying Bonferroni correction. Models are adjusted for age, sex, race, log(proteinuria), eGFR, and primary clinicopathologic diagnosis. HR; Hazard Ratio

**Supplemental Table 3.** Top-ranked pathways for plasma biomarkers associated with adverse clinical outcomes.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Top-ranked pathways for kidney disease progression** | | | | |
| Rank | Biomarkers | Pathway\* | p-value | FDR |
| 1 | IL-10RB, CSF-1, IL16 | Other Interleukin Signaling | 3.99e-05 | 0.007 |
| 2 | TF, TM, PAR-1 | Formation of Fibrin Clot (Clotting  Cascade) | 1.67e-04 | 0.007 |
| 3 | TNFRSF9, VEGF-A, FGF-23, IL-4RA, IL-10RB, CD40, CSF-1, IL16, TNFRSF11A, IL-15RA | Cytokine Signaling in Immune  system | 1.78e-04 | 0.007 |
| 4 | TRAIL-R2, TNFRSF10A | TRAIL signaling | 2.25e-04 | 0.007 |
| 5 | VEGF-A, PGF | VEGF ligand-receptor interactions | 2.25e-04 | 0.007 |
| **Top-ranked pathways for death** | | | | |
| Rank | Biomarkers | Pathway\* | p-value | FDR |
| 1 | CD40-L, IL-4RA, CD4, IL-18R1, IL6, SCF, IL-15RA, IL-27, Gal-9, IL-8, TNFRSF11A, OPG | Cytokine Signaling in Immune system | 2.04e-05 | 0.004 |
| 2 | IL-27, IL-4RA, CD4, Gal-9, IL-18R1, IL-8, IL6, IL-15RA | Signaling by Interleukins | 5.77e-05 | 0.006 |
| 3 | TRAIL-R2, TNFRSF10A | TRAIL signaling | 2.88e-04 | 0.017 |
| 4 | CTSL1, ACE2 | Attachment and Entry | 4.48e-04 | 0.017 |
| 5 | TRAIL-R2, TNFRSF10A | Regulation by c-FLIP | 5.40e-04 | 0.017 |

Biomarkers associated with kidney disease and progression and death (Figure 2, Supplemental Table 2 and 4) were submitted to Reactome for pathway analyses. \*Listed are the top five ranked pathways. TRAIL, TNF-related apoptosis-inducing ligand; VEGF, vascular endothelial growth factor; c-FLIP, FADD-like IL-1β-converting enzyme-inhibitory protein.

**Supplemental Table 4.** Associations of plasma biomarkers with death.

|  |  |  |
| --- | --- | --- |
| Biomarker | HR (95% CI) | P value |
| SCF | 0.4 (0.2, 0.5) | <0.001 |
| DSG4 | 0.5 (0.4, 0.6) | <0.001 |
| CA14 | 0.4 (0.3, 0.6) | 0.004 |
| PLXDC1 | 0.2 (0.1, 0.4) | 0.01 |
| ADAM-TS13 | 0.1 (0.0, 0.3) | 0.03 |
| TRAIL-R2 | 2.9 (2.0, 4.0) | <0.001 |
| CDCP1 | 2.4 (1.8, 3.3) | <0.001 |
| TNFRSF10A | 2.7 (1.9, 3.9) | <0.001 |
| PD-L1 | 2.4 (1.7, 3.3) | <0.001 |
| BNP | 1.3 (1.2, 1.5) | <0.001 |
| CTSL1 | 3.0 (2.0, 4.5) | <0.001 |
| PTK7 | 2.5 (1.8, 3.6) | <0.001 |
| IL-4RA | 2.3 (1.7, 3.3) | <0.001 |
| IL8 | 1.6 (1.3, 2.0) | <0.001 |
| ENTPD2 | 2.4 (1.7, 3.3) | <0.001 |
| THBS2 | 8.2 (3.5, 19.6) | <0.001 |
| ACE2 | 1.9 (1.5, 2.5) | 0.001 |
| STX8 | 2.2 (1.6, 3.1) | 0.001 |
| TOP2B | 1.6 (1.3, 1.9) | 0.001 |
| ENAH | 2.6 (1.7, 4.0) | 0.001 |
| IL6 | 1.5 (1.3, 1.8) | 0.001 |
| IL-27 | 3.0 (1.9, 5.0) | 0.002 |
| NOS3 | 1.6 (1.3, 1.9) | 0.002 |
| Gal-9 | 4.9 (2.4, 10.1) | 0.002 |
| ADM | 3.7 (2.0, 6.6) | 0.003 |
| OPG | 2.7 (1.7, 4.3) | 0.01 |
| IL-18R1 | 2.6 (1.7, 4.0) | 0.01 |
| TNFRSF11A | 1.9 (1.4, 2.6) | 0.01 |
| CD40 | 2.6 (1.6, 4.1) | 0.01 |
| AGRP | 2.3 (1.5, 3.4) | 0.01 |
| DCN | 3.2 (1.8, 5.7) | 0.01 |
| PGF | 2.8 (1.7, 4.6) | 0.02 |
| PRELP | 9.5 (3.1, 29.7) | 0.02 |
| CD4 | 2.9 (1.7, 4.8) | 0.02 |
| IL-15RA | 3.4 (1.8, 6.5) | 0.03 |

Shown are significant associations after applying Bonferroni correction. Models are adjusted for age, sex, race, log(proteinuria), eGFR, and primary clinicopathologic diagnosis. HR; Hazard Ratio.

**Supplemental Table 5.** Abbreviations and list of all plasma protein biomarkers included in the analyses.

|  |  |  |  |
| --- | --- | --- | --- |
| **Abbreviation** | **Biomarker** | **Uniprot ID** | **Panel** |
| ACE2 | Angiotensin-converting enzyme 2 (ACE2) | Q9BYF1 | CARDIOVASCULAR |
| ADA | Adenosine Deaminase (ADA) | P00813 | INFLAMMATION |
| ADAM-TS13 | A disintegrin and metalloproteinase with thrombospondin motifs 13 (ADAM-TS13) | Q76LX8 | CARDIOVASCULAR |
| ADGRG1 | Adhesion G-protein coupled receptor G1 (ADGRG1) | Q9Y653 | ORGAN DAMAGE |
| ADM | ADM (ADM) | P35318 | CARDIOVASCULAR |
| AGRP | Agouti-related protein (AGRP) | O00253 | CARDIOVASCULAR |
| AIFM1 | Apoptosis-inducing factor 1, mitochondrial (AIFM1) | O95831 | ORGAN DAMAGE |
| ALDH3A1 | Aldehyde dehydrogenase, dimeric NADP-preferring (ALDH3A1) | P30838 | ORGAN DAMAGE |
| AMBP | Protein AMBP (AMBP) | P02760 | CARDIOVASCULAR |
| AMN | Protein amnionless (AMN) | Q9BXJ7 | ORGAN DAMAGE |
| ANG-1 | Angiopoietin-1 (ANGPT1) | Q15389 | CARDIOVASCULAR |
| ATP6AP2 | Renin receptor (ATP6AP2) | O75787 | ORGAN DAMAGE |
| AXIN1 | Axin-1 (AXIN1) | O15169 | INFLAMMATION |
| BAMBI | BMP and activin membrane-bound inhibitor homolog (BAMBI) | Q13145 | ORGAN DAMAGE |
| BANK1 | B-cell scaffold protein with ankyrin repeats (BANK1) | Q8NDB2 | ORGAN DAMAGE |
| Beta-NGF | Beta-nerve growth factor (Beta-NGF) | P01138 | INFLAMMATION |
| BMP-6 | Bone morphogenetic protein 6 (BMP-6) | P22004 | CARDIOVASCULAR |
| BNP | Natriuretic peptides B (BNP) | P16860 | CARDIOVASCULAR |
| BOC | Brother of CDO (Protein BOC) | Q9BWV1 | CARDIOVASCULAR |
| BTC | Probetacellulin (BTC) | P35070 | ORGAN DAMAGE |
| CA12 | Carbonic anhydrase 12 (CA12) | O43570 | ORGAN DAMAGE |
| CA14 | Carbonic anhydrase 14 (CA14) | Q9ULX7 | ORGAN DAMAGE |
| CA5A | Carbonic anhydrase 5A, mitochondrial (CA5A) | P35218 | CARDIOVASCULAR |
| CALCA | Calcitonin (CALCA) | P01258 | ORGAN DAMAGE |
| CALR | Calreticulin (CALR) | P27797 | ORGAN DAMAGE |
| CAPG | Macrophage-capping protein (CAPG) | P40121 | ORGAN DAMAGE |
| CASP-8 | Caspase-8 (CASP-8 ) | Q14790 | INFLAMMATION |
| CCL11 | Eotaxin (CCL11) | P51671 | INFLAMMATION |
| CCL17 | C-C motif chemokine 17 (CCL17) | Q92583 | CARDIOVASCULAR |
| CCL19 | C-C motif chemokine 19 (CCL19) | Q99731 | INFLAMMATION |
| CCL20 | C-C motif chemokine 20 (CCL20) | P78556 | INFLAMMATION |
| CCL23 | C-C motif chemokine 23 (CCL23) | P55773 | INFLAMMATION |
| CCL25 | C-C motif chemokine 25 (CCL25) | O15444 | INFLAMMATION |
| CCL28 | C-C motif chemokine 28 (CCL28) | Q9NRJ3 | INFLAMMATION |
| CCL3 | C-C motif chemokine 3 (CCL3) | P10147 | INFLAMMATION |
| CCL4 | C-C motif chemokine 4 (CCL4 ) | P13236 | INFLAMMATION |
| CD244 | Natural killer cell receptor 2B4 (CD244) | Q9BZW8 | INFLAMMATION |
| CD4 | T-cell surface glycoprotein CD4 (CD4) | P01730 | CARDIOVASCULAR |
| CD40 | CD40L receptor (CD40) | P25942 | INFLAMMATION |
| CD40-L | CD40 ligand (CD40-L) | P29965 | CARDIOVASCULAR |
| CD5 | T-cell surface glycoprotein CD5 (CD5) | P06127 | INFLAMMATION |
| CD6 | T-cell differentiation antigen CD6 (CD6) | P30203 | INFLAMMATION |
| CD84 | SLAM family member 5 (CD84) | Q9UIB8 | CARDIOVASCULAR |
| CD8A | T-cell surface glycoprotein CD8 alpha chain (CD8A) | P01732 | INFLAMMATION |
| CDCP1 | CUB domain-containing protein 1 (CDCP1) | Q9H5V8 | INFLAMMATION |
| CEACAM8 | Carcinoembryonic antigenrelated cell adhesion molecule 8 (CEACAM8) | P31997 | CARDIOVASCULAR |
| CLEC1A | C-type lectin domain family 1 member A (CLEC1A) | Q8NC01 | ORGAN DAMAGE |
| CNTN2 | Contactin-2 (CNTN2) | Q02246 | ORGAN DAMAGE |
| CRH | Corticoliberin (CRH) | P06850 | ORGAN DAMAGE |
| CSF-1 | Macrophage colony-stimulating factor 1 (CSF-1) | P09603 | INFLAMMATION |
| CST5 | Cystatin D (CST5) | P28325 | INFLAMMATION |
| CTRC | Chymotrypsin C (CTRC) | Q99895 | CARDIOVASCULAR |
| CTSL1 | Cathepsin L1 (CTSL1) | P07711 | CARDIOVASCULAR |
| CX3CL1 | Fractalkine (CX3CL1 ) | P78423 | INFLAMMATION |
| CXCL1 | C-X-C motif chemokine 1 (CXCL1) | P09341 | INFLAMMATION |
| CXCL10 | C-X-C motif chemokine 10 (CXCL10 ) | P02778 | INFLAMMATION |
| CXCL11 | C-X-C motif chemokine 11 (CXCL11) | O14625 | INFLAMMATION |
| CXCL5 | C-X-C motif chemokine 5 (CXCL5 ) | P42830 | INFLAMMATION |
| CXCL6 | C-X-C motif chemokine 6 (CXCL6) | P80162 | INFLAMMATION |
| CXCL9 | C-X-C motif chemokine 9 (CXCL9 ) | Q07325 | INFLAMMATION |
| DCN | Decorin (DCN) | P07585 | CARDIOVASCULAR |
| DECR1 | 2,4-dienoyl-CoA reductase, mitochondrial (DECR1) | Q16698 | CARDIOVASCULAR |
| Dkk-1 | Dickkopf-related protein 1 (Dkk-1) | O94907 | CARDIOVASCULAR |
| DNER | Delta and Notch-like epidermal growth factor-related receptor (DNER) | Q8NFT8 | INFLAMMATION |
| DPP6 | Dipeptidyl aminopeptidase-like protein 6 (DPP6) | P42658 | ORGAN DAMAGE |
| DSG4 | Desmoglein-4 (DSG4) | Q86SJ6 | ORGAN DAMAGE |
| EGFL7 | Epidermal growth factor-like protein 7 (EGFL7) | Q9UHF1 | ORGAN DAMAGE |
| EN-RAGE | Protein S100-A12 (EN-RAGE ) | P80511 | INFLAMMATION |
| ENAH | Protein enabled homolog (ENAH) | Q8N8S7 | ORGAN DAMAGE |
| ENTPD2 | Ectonucleoside triphosphate diphosphohydrolase 2 (ENTPD2) | Q9Y5L3 | ORGAN DAMAGE |
| ENTPD6 | Ectonucleoside triphosphate diphosphohydrolase 6 (ENTPD6) | O75354 | ORGAN DAMAGE |
| EPO | Erythropoietin (EPO) | P01588 | ORGAN DAMAGE |
| FABP2 | Fatty acid-binding protein, intestinal (FABP2) | P12104 | CARDIOVASCULAR |
| FABP9 | Fatty acid-binding protein 9 (FABP9) | Q0Z7S8 | ORGAN DAMAGE |
| FGF-19 | Fibroblast growth factor 19 (FGF-19) | O95750 | INFLAMMATION |
| FGF-21 | Fibroblast growth factor 21 (FGF-21) | Q9NSA1 | CARDIOVASCULAR |
| FGF-23 | Fibroblast growth factor 23 (FGF-23) | Q9GZV9 | CARDIOVASCULAR |
| FGF-5 | Fibroblast growth factor 5 (FGF-5) | P12034 | INFLAMMATION |
| FGR | Tyrosine-protein kinase Fgr (FGR) | P09769 | ORGAN DAMAGE |
| Flt3L | Fms-related tyrosine kinase 3 ligand (Flt3L) | P49771 | INFLAMMATION |
| FOSB | Protein fosB (FOSB) | P53539 | ORGAN DAMAGE |
| FOXO1 | Forkhead box protein O1 (FOXO1) | Q12778 | ORGAN DAMAGE |
| FS | Follistatin (FS) | P19883 | CARDIOVASCULAR |
| Gal-9 | Galectin-9 (Gal-9) | O00182 | CARDIOVASCULAR |
| GALNT10 | Polypeptide N-acetylgalactosaminyltransferase 10 (GALNT10) | Q86SR1 | ORGAN DAMAGE |
| GDF-2 | Growth/differentiation factor 2 (GDF-2) | Q9UK05 | CARDIOVASCULAR |
| GDNF | Glial cell line-derived neurotrophic factor (GDNF) | P39905 | INFLAMMATION |
| GH | Growth hormone (GH) | P01241 | CARDIOVASCULAR |
| GIF | Gastric intrinsic factor (GIF) | P27352 | CARDIOVASCULAR |
| GLO1 | Lactoylglutathione lyase (GLO1) | Q04760 | CARDIOVASCULAR |
| GT | Gastrotropin (GT) | P51161 | CARDIOVASCULAR |
| HAOX1 | Hydroxyacid oxidase 1 (HAOX1) | Q9UJM8 | CARDIOVASCULAR |
| HB-EGF | Proheparin-binding EGF-like growth factor (HB-EGF) | Q99075 | CARDIOVASCULAR |
| HGF | Hepatocyte growth factor (HGF) | P14210 | INFLAMMATION |
| HO-1 | Heme oxygenase 1 (HO-1) | P09601 | CARDIOVASCULAR |
| hOSCAR | Osteoclast-associated immunoglobulin-like receptor (hOSCAR) | Q8IYS5 | CARDIOVASCULAR |
| HPGDS | Hematopoietic prostaglandin D synthase (HPGDS) | O60760 | ORGAN DAMAGE |
| HSP 27 | Heat shock 27 kDa protein (HSP 27) | P04792 | CARDIOVASCULAR |
| IDUA | Alpha-L-iduronidase (IDUA) | P35475 | CARDIOVASCULAR |
| IgG Fc Rec IIb | Low affinity immunoglobulin gamma Fc region receptor II-b (IgG Fc receptor II-b) | P31994 | CARDIOVASCULAR |
| IL-10RA | Interleukin-10 receptor subunit alpha (IL-10RA) | Q13651 | INFLAMMATION |
| IL-10RB | Interleukin-10 receptor subunit beta (IL-10RB) | Q08334 | INFLAMMATION |
| IL-12B | Interleukin-12 (IL-12) | P29460 | INFLAMMATION |
| IL-15RA | Interleukin-15 receptor subunit alpha (IL-15RA) | Q13261 | INFLAMMATION |
| IL-17A | Interleukin-17A (IL-17A) | Q16552 | INFLAMMATION |
| IL-17C | Interleukin-17C (IL-17C) | Q9P0M4 | INFLAMMATION |
| IL-17D | Interleukin-17D (IL-17D) | Q8TAD2 | CARDIOVASCULAR |
| IL-18R1 | Interleukin-18 receptor 1 (IL-18R1) | Q13478 | INFLAMMATION |
| IL-1ra | Interleukin-1 receptor antagonist protein (IL-1ra) | P18510 | CARDIOVASCULAR |
| IL-20RA | Interleukin-20 receptor subunit alpha (IL-20RA) | Q9UHF4 | INFLAMMATION |
| IL-27 | Interleukin-27 (IL-27) | Q8NEV9 | CARDIOVASCULAR |
| IL-2RB | Interleukin-2 receptor subunit beta (IL-2RB) | P14784 | INFLAMMATION |
| IL-4RA | Interleukin-4 receptor subunit alpha (IL-4RA) | P24394 | CARDIOVASCULAR |
| IL10 | Interleukin-10 (IL10) | P22301 | INFLAMMATION |
| IL16 | Pro-interleukin-16 (IL16) | Q14005 | CARDIOVASCULAR |
| IL18 | Interleukin-18 (IL-18) | Q14116 | INFLAMMATION |
| IL1RL2 | Interleukin-1 receptor-like 2 (IL1RL2) | Q9HB29 | CARDIOVASCULAR |
| IL6 | Interleukin-6 (IL6) | P05231 | INFLAMMATION |
| IL7 | Interleukin-7 (IL-7) | P13232 | INFLAMMATION |
| IL8 | Interleukin-8 (IL-8) | P10145 | INFLAMMATION |
| INPPL1 | Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 2 (INPPL1) | O15357 | ORGAN DAMAGE |
| ITGB1BP2 | Melusin (ITGB1BP2) | Q9UKP3 | CARDIOVASCULAR |
| KIM1 | Kidney Injury Molecule 1 (KIM1) | Q96D42 | ORGAN DAMAGE |
| KIR3DL1 | Killer cell immunoglobulin-like receptor 3DL1 (KIR3DL1) | P43629 | ORGAN DAMAGE |
| LAP TGF-beta-1 | Latency-associated peptide transforming growth factor beta-1 (LAP TGF-beta-1) | P01137 | INFLAMMATION |
| LAT2 | Linker for activation of T-cells family member 2 (LAT2) | Q9GZY6 | ORGAN DAMAGE |
| LEP | Leptin (LEP) | P41159 | CARDIOVASCULAR |
| LHB | Lutropin subunit beta (LHB) | P01229 | ORGAN DAMAGE |
| LIF-R | Leukemia inhibitory factor receptor (LIF-R) | P42702 | INFLAMMATION |
| LOX-1 | Lectin-like oxidized LDL receptor 1 (LOX-1) | P78380 | CARDIOVASCULAR |
| LPL | Lipoprotein lipase (LPL) | P06858 | CARDIOVASCULAR |
| LRP1 | Prolow-density lipoprotein receptor-related protein 1 (LRP1) | Q07954 | ORGAN DAMAGE |
| MAGED1 | Melanoma-associated antigen D1 (MAGED1) | Q9Y5V3 | ORGAN DAMAGE |
| MAP4K5 | Mitogen-activated protein kinase kinase kinase kinase 5 (MAP4K5) | Q9Y4K4 | ORGAN DAMAGE |
| MARCO | Macrophage receptor MARCO (MARCO) | Q9UEW3 | CARDIOVASCULAR |
| MCP-1 | Monocyte chemotactic protein 1 (MCP-1) | P13500 | INFLAMMATION |
| MCP-2 | Monocyte chemotactic protein 2 (MCP-2) | P80075 | INFLAMMATION |
| MCP-3 | Monocyte chemotactic protein 3 (MCP-3) | P80098 | INFLAMMATION |
| MCP-4 | Monocyte chemotactic protein 4 (MCP-4) | Q99616 | INFLAMMATION |
| MERTK | Tyrosine-protein kinase Mer (MERTK) | Q12866 | CARDIOVASCULAR |
| MMP-1 | Matrix metalloproteinase-1 (MMP-1) | P03956 | INFLAMMATION |
| MMP-10 | Matrix metalloproteinase-10 (MMP-10) | P09238 | INFLAMMATION |
| MMP12 | Matrix metalloproteinase-12 (MMP-12) | P39900 | CARDIOVASCULAR |
| MMP7 | Matrix metalloproteinase-7 (MMP-7) | P09237 | CARDIOVASCULAR |
| MVK | Mevalonate kinase (MVK) | Q03426 | ORGAN DAMAGE |
| NBN | Nibrin (NBN) | O60934 | ORGAN DAMAGE |
| NCF2 | Neutrophil cytosol factor 2 (NCF2) | P19878 | ORGAN DAMAGE |
| NEMO | NF-kappa-B essential modulator (NEMO) | Q9Y6K9 | CARDIOVASCULAR |
| NOS3 | Nitric oxide synthase, endothelial (NOS3) | P29474 | ORGAN DAMAGE |
| NPPC | C-type natriuretic peptide (NPPC) | P23582 | ORGAN DAMAGE |
| NT-3 | Neurotrophin-3 (NT-3) | P20783 | INFLAMMATION |
| NUCB2 | Nucleobindin-2 (NUCB2) | P80303 | ORGAN DAMAGE |
| OPG | Osteoprotegerin (OPG) | O00300 | INFLAMMATION |
| OSM | Oncostatin-M (OSM) | P13725 | INFLAMMATION |
| PAPPA | Pappalysin-1 (PAPPA) | Q13219 | CARDIOVASCULAR |
| PAR-1 | Proteinase-activated receptor 1 (PAR-1) | P25116 | CARDIOVASCULAR |
| PARP-1 | Poly (ADP-ribose) polymerase 1 (PARP-1) | P09874 | CARDIOVASCULAR |
| PD-L1 | Programmed cell death 1 ligand 1 (PD-L1) | Q9NZQ7 | INFLAMMATION |
| PD-L2 | Programmed cell death 1 ligand 2 (PD-L2) | Q9BQ51 | CARDIOVASCULAR |
| PDCD1 | Programmed cell death protein 1 (PDCD1) | Q15116 | ORGAN DAMAGE |
| PDGF subunit B | Platelet-derived growth factor subunit B (PDGF subunit B) | P01127 | CARDIOVASCULAR |
| PDGFC | Platelet-derived growth factor C (PDGFC) | Q9NRA1 | ORGAN DAMAGE |
| PGF | Placenta growth factor (PGF) | P49763 | ORGAN DAMAGE |
| PIgR | Polymeric immunoglobulin receptor (PIgR) | P01833 | CARDIOVASCULAR |
| PLIN1 | Perilipin-1 (PLIN1) | O60240 | ORGAN DAMAGE |
| PLXDC1 | Plexin domain-containing protein 1 (PLXDC1) | Q8IUK5 | ORGAN DAMAGE |
| PON2 | Serum paraoxonase/arylesterase 2 (PON2) | Q15165 | ORGAN DAMAGE |
| PRELP | Prolargin (PRELP) | P51888 | CARDIOVASCULAR |
| PRKAB1 | 5'-AMP-activated protein kinase subunit beta-1 (PRKAB1) | Q9Y478 | ORGAN DAMAGE |
| PRSS27 | Serine protease 27 (PRSS27) | Q9BQR3 | CARDIOVASCULAR |
| PRSS8 | Prostasin (PRSS8 ) | Q16651 | CARDIOVASCULAR |
| PSGL-1 | P-selectin glycoprotein ligand 1 (PSGL-1) | Q14242 | CARDIOVASCULAR |
| PTK7 | Inactive tyrosine-protein kinase 7 (PTK7) | Q13308 | ORGAN DAMAGE |
| PTN | Pleiotrophin (PTN) | P21246 | ORGAN DAMAGE |
| PTX3 | Pentraxin-related protein PTX3 (PTX3) | P26022 | CARDIOVASCULAR |
| PVALB | Parvalbumin alpha (PVALB) | P20472 | ORGAN DAMAGE |
| PXN | Paxillin (PXN) | P49023 | ORGAN DAMAGE |
| RAGE | Receptor for advanced glycosylation end products (RAGE) | Q15109 | CARDIOVASCULAR |
| RARRES1 | Retinoic acid receptor responder protein 1 (RARRES1) | P49788 | ORGAN DAMAGE |
| RASSF2 | Ras association domain-containing protein 2 (RASSF2) | P50749 | ORGAN DAMAGE |
| REN | Renin (REN) | P00797 | CARDIOVASCULAR |
| RRM2B | Ribonucleoside-diphosphate reductase subunit M2 B (RRM2B) | Q7LG56 | ORGAN DAMAGE |
| SCF/c-KIT ligand | Stem cell factor (SCF) | P21583 | INFLAMMATION |
| SERPINA12 | Serpin A12 (SERPINA12) | Q8IW75 | CARDIOVASCULAR |
| SERPINA9 | Serpin A9 (SERPINA9) | Q86WD7 | ORGAN DAMAGE |
| SIRT2 | SIR2-like protein 2 (SIRT2) | Q8IXJ6 | INFLAMMATION |
| SLAMF1 | Signaling lymphocytic activation molecule (SLAMF1) | Q13291 | INFLAMMATION |
| SLAMF7 | SLAM family member 7 (SLAMF7) | Q9NQ25 | CARDIOVASCULAR |
| SOD2 | Superoxide dismutase (Mn), mitochondrial (SOD2) | P04179 | CARDIOVASCULAR |
| SORT1 | Sortilin (SORT1) | Q99523 | CARDIOVASCULAR |
| SPON2 | Spondin-2 (SPON2) | Q9BUD6 | CARDIOVASCULAR |
| SRC | Proto-oncogene tyrosine-protein kinase Src (SRC) | P12931 | CARDIOVASCULAR |
| ST1A1 | Sulfotransferase 1A1 (ST1A1) | P50225 | INFLAMMATION |
| ST3GAL1 | CMP-N-acetylneuraminate-beta-galactosamide-alpha-2,3-sialyltransferase 1 (ST3GAL1) | Q11201 | ORGAN DAMAGE |
| STAMBP | STAM-binding protein (STAMPB) | O95630 | INFLAMMATION |
| STK4 | Serine/threonine-protein kinase 4 (STK4) | Q13043 | CARDIOVASCULAR |
| STX8 | Syntaxin-8 (STX8) | Q9UNK0 | ORGAN DAMAGE |
| TF/ F3 | Tissue factor (TF) | P13726 | CARDIOVASCULAR |
| TGF-alpha | Transforming growth factor alpha (TGF-alpha) | P01135 | INFLAMMATION |
| TGM2 | Protein-glutamine gamma-glutamyltransferase 2 (TGM2) | P21980 | CARDIOVASCULAR |
| THBS2 | Thrombospondin-2 (THBS2) | P35442 | CARDIOVASCULAR |
| THPO | Thrombopoietin (THPO) | P40225 | CARDIOVASCULAR |
| TIE2 | Angiopoietin-1 receptor (TIE2) | Q02763 | CARDIOVASCULAR |
| TIGAR | Fructose-2,6-bisphosphatase TIGAR (TIGAR) | Q9NQ88 | ORGAN DAMAGE |
| TM | Thrombomodulin TM | P07204 | CARDIOVASCULAR |
| TMPRSS15 | Enteropeptidase (TMPRSS15) | P98073 | ORGAN DAMAGE |
| TNFB | TNF-beta (TNFB) | P01374 | INFLAMMATION |
| TNFRSF10A | Tumor necrosis factor receptor superfamily member 10A (TNFRSF10A) | O00220 | CARDIOVASCULAR |
| TNFRSF11A | Tumor necrosis factor receptor superfamily member 11A (TNFRSF11A) | Q9Y6Q6 | CARDIOVASCULAR |
| TNFRSF13B | Tumor necrosis factor receptor superfamily member 13B (TNFRSF13B) | O14836 | CARDIOVASCULAR |
| TNFRSF9 | Tumor necrosis factor receptor superfamily member 9 (TNFRSF9) | Q07011 | INFLAMMATION |
| TNFSF14 | Tumor necrosis factor ligand superfamily member 14 (TNFSF14 ) | O43557 | INFLAMMATION |
| TNNI3 | Troponin I, cardiac muscle (TNNI3) | P19429 | ORGAN DAMAGE |
| TOP2B | DNA topoisomerase 2-beta (TOP2B) | Q02880 | ORGAN DAMAGE |
| TRAIL/TNFSF10 | TNF-related apoptosis-inducing ligand (TRAIL) | P50591 | INFLAMMATION |
| TRAIL-R2/ TNFRSF10B | TNF-related apoptosis-inducing ligand receptor 2 (TRAIL-R2) | O14763 | CARDIOVASCULAR |
| TRANCE | TNF-related activation-induced cytokine (TRANCE) | O14788 | INFLAMMATION |
| TWEAK | Tumor necrosis factor (Ligand) superfamily, member 12 (TWEAK) | O43508 | INFLAMMATION |
| uPA | Urokinase-type plasminogen activator (uPA) | P00749 | INFLAMMATION |
| VEGFA | Vascular endothelial growth factor A (VEGF-A) | P15692 | INFLAMMATION |
| VEGFD | Vascular endothelial growth factor D (VEGFD) | O43915 | CARDIOVASCULAR |
| VSIG2 | V-set and immunoglobulin domain-containing protein 2 (VSIG2) | Q96IQ7 | CARDIOVASCULAR |
| XCL1 | Lymphotactin (XCL1) | P47992 | CARDIOVASCULAR |
| YES1 | Tyrosine-protein kinase Yes (YES1) | P07947 | ORGAN DAMAGE |
| 4E-BP1 | Eukaryotic translation initiation factor 4E-binding protein 1 (4E-BP1) | Q13541 | INFLAMMATION |

**References cited**

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