

# **Glycerol-3-phosphate is a FGF23 regulator derived from the injured kidney**

## **Supplemental Material**

Supplemental Figure 1: G-3-P effect on FGF23 is specific and unidirectional

Supplemental Figure 2: Correlations between total renal venous LPA and FGF23 and between LPA 18:1 and total LPA

Supplemental Figure 3: GPAT2 mediates the effect of G-3-P on LPA and FGF23 in primary osteoblasts

Supplemental Figure 4: LPA cooperates with 1,25(OH)<sub>2</sub>D in cultured osteocytes

Supplemental Figure 5: Glycolytic intermediates, LPA, and nonspecific LPAR inhibition in modeled AKI

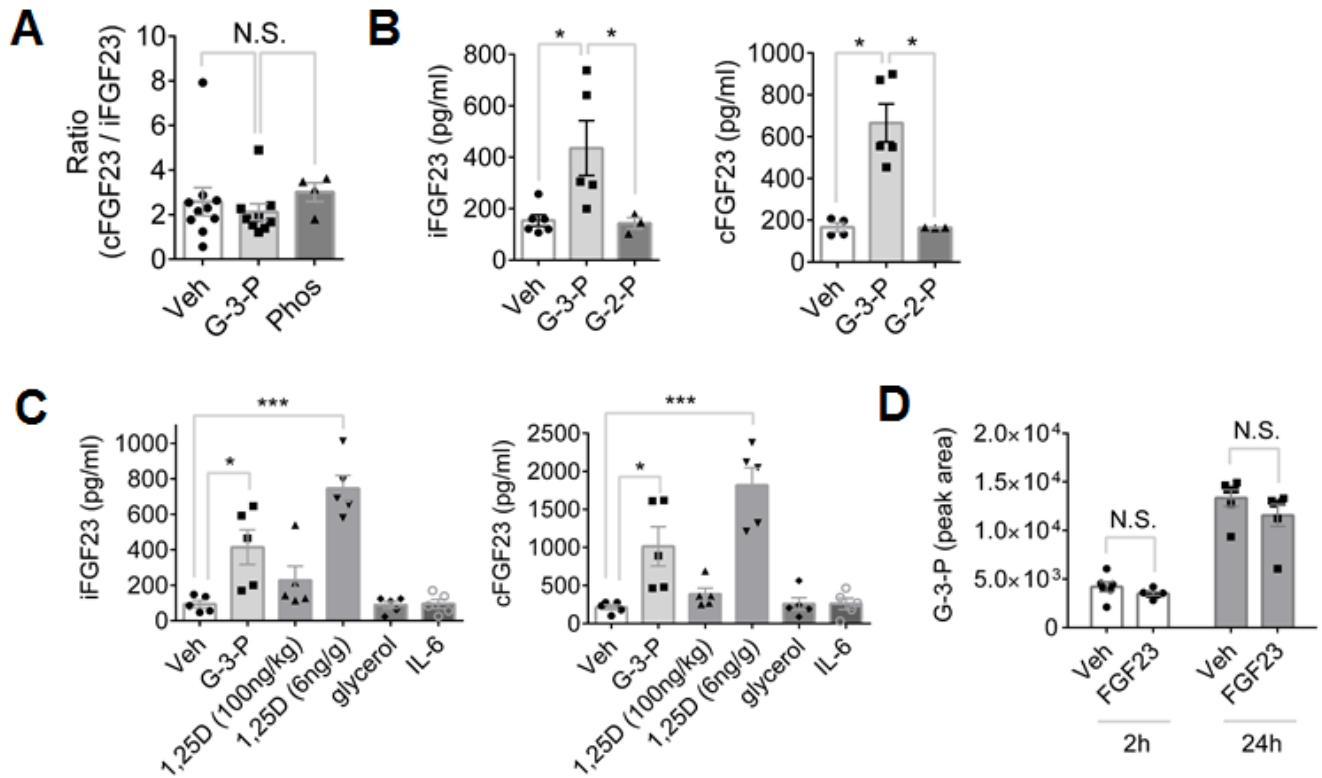
Supplemental Figure 6: Post-operative G-3-P correlates with subsequent cFGF23 elevation

Supplemental Table 1: Correlations ( $r^2$ ) between all venous metabolites (known) and arterial iFGF23

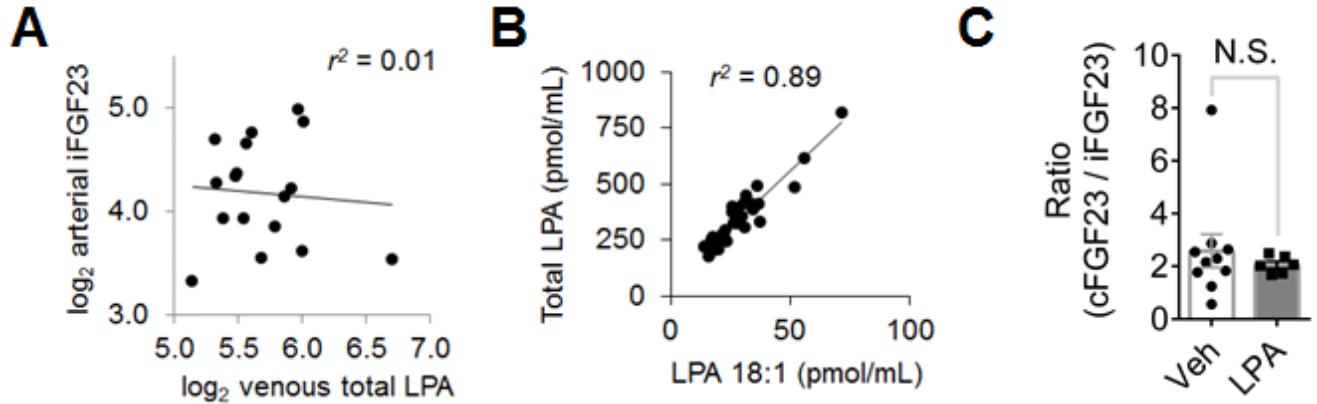
Supplemental Table 2: Correlations ( $r^2$ ) between all venous proteins and arterial iFGF23

Supplemental Table 3: Correlations ( $r^2$ ) between G-3-P, iFGF23, phosphate, klotho, eGFR

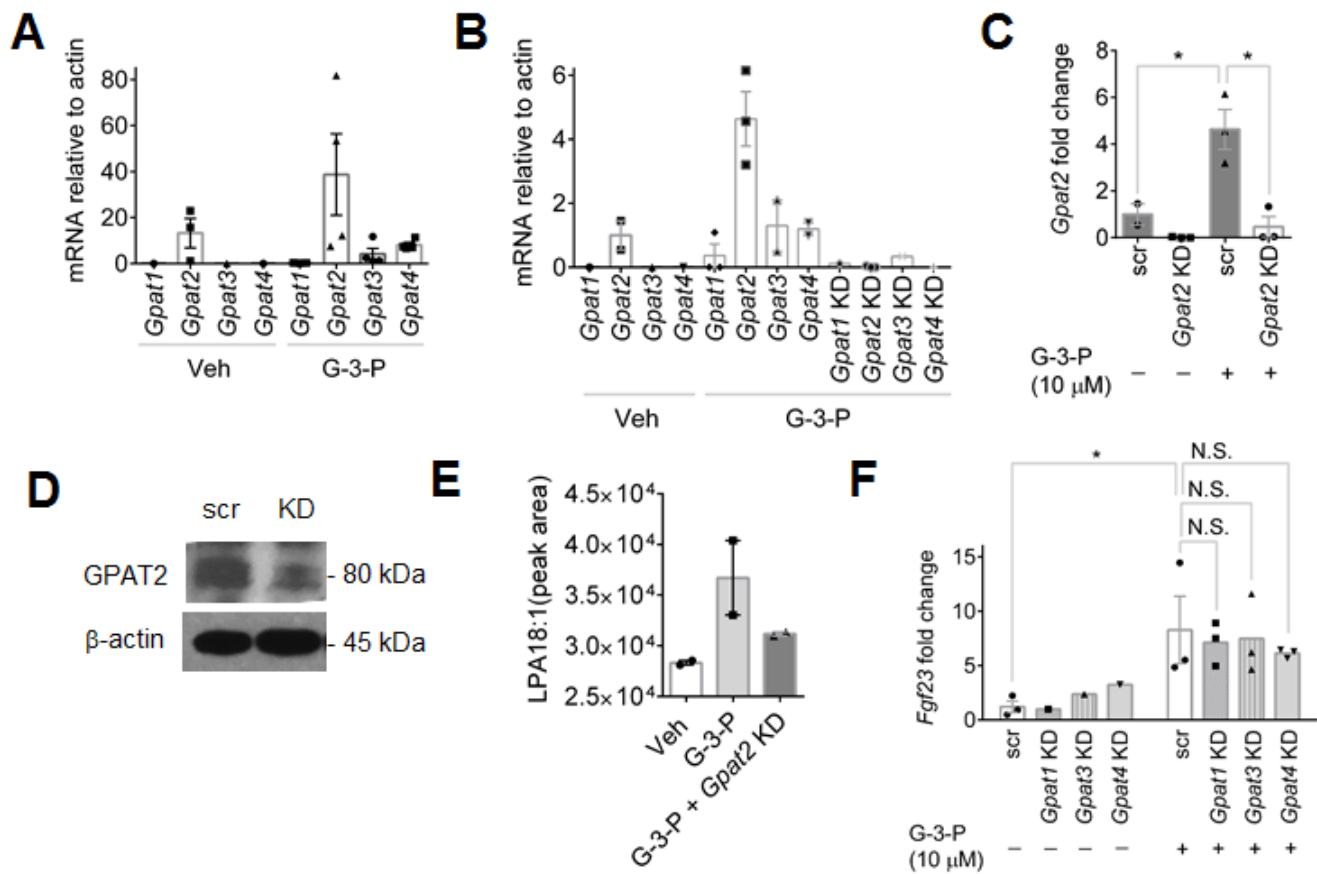
Supplemental Table 4: Oligonucleotide sequences



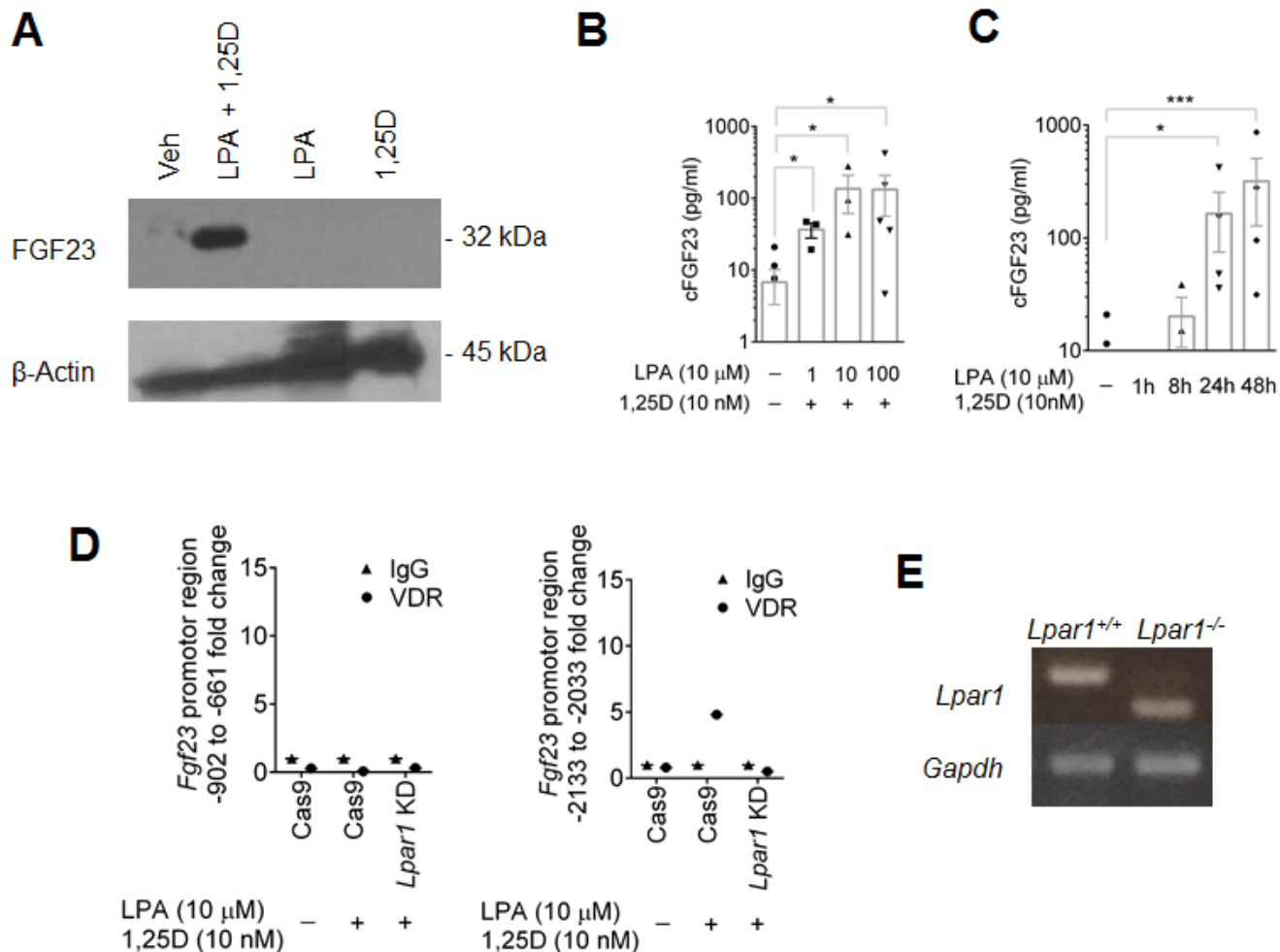
**Supplemental Figure 1. G-3-P effect on FGF23 is specific and unidirectional.** (A) Ratio of cFGF23 / iFGF23 levels after i.p. injection of G-3-P, sodium phosphate, or vehicle ( $n = 4-10$  per group). (B) Plasma iFGF23 and cFGF23 levels after i.p. injection of G-3-P, glycerol-2-phosphate (G-2-P) or vehicle ( $n = 3-6$  per group). (C) Plasma iFGF23 and cFGF23 levels after i.p. injection of G-3-P, 1,25(OH)<sub>2</sub>D (1,25D) at 100 ng/kg or 6 ng/g, glycerol, IL-6 (1.3 μg/kg), or vehicle ( $n = 5$  per group). Injection doses 300 mg/kg unless otherwise specified. (D) G-3-P levels in cultured media from opossum kidney cells treated for 2 or 24 h with recombinant FGF23 (10 ng/mL) or vehicle ( $n = 3$  per group). One-way ANOVA followed by Tukey's multiple comparisons test (A-C) or two-sided Student's t-test (D), bars show means  $\pm$  s.e.m; \* $P < 0.05$ , \*\*\* $P < 0.0001$ .



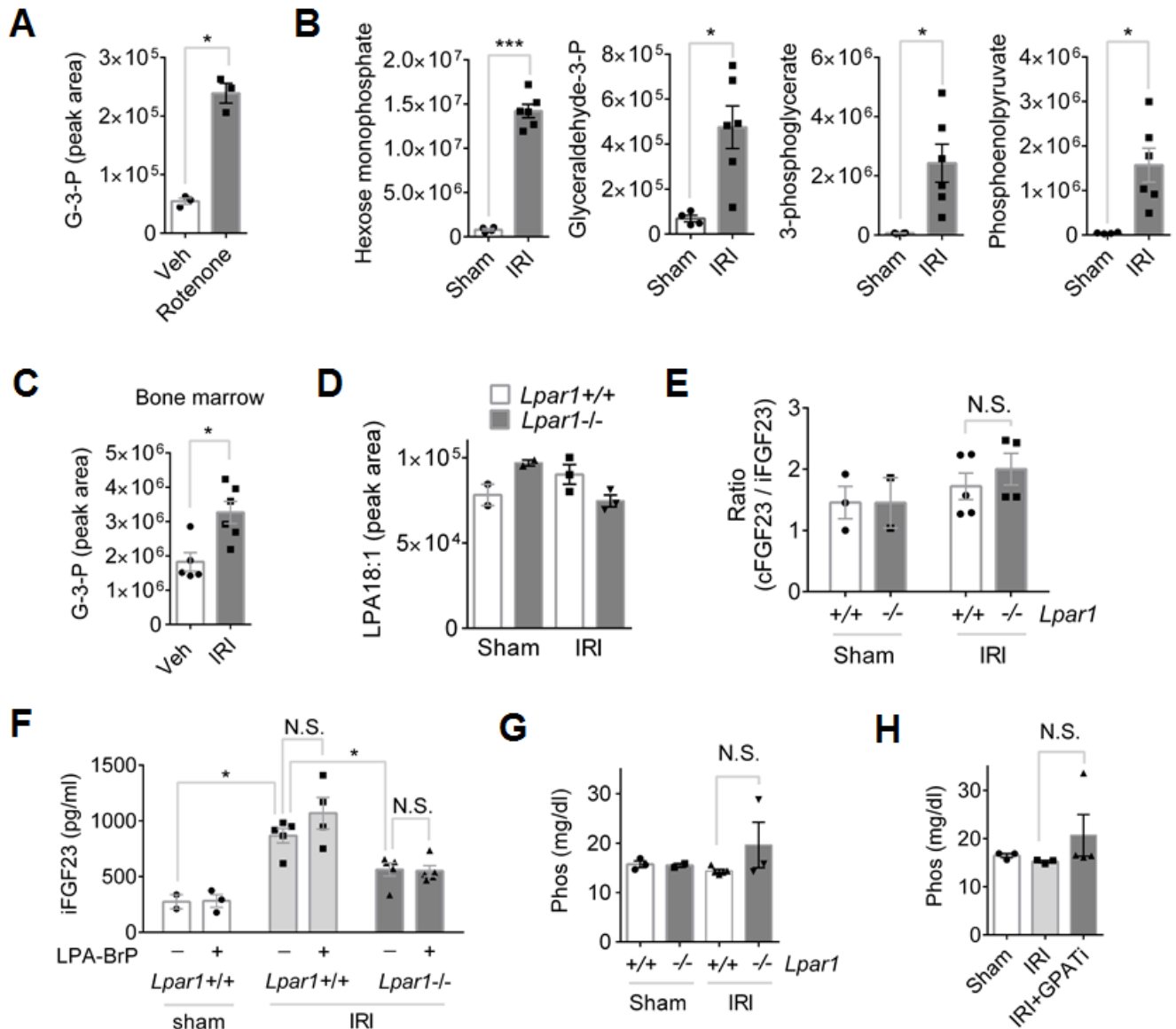
**Supplemental Figure 2. Correlations between total renal venous LPA and FGF23 and between LPA 18:1 and total LPA.** (A) Scatter plot showing correlation between total renal vein LPA and arterial iFGF23. (B) Correlation between LPA 18:1 and total LPA in renal arteriovenous samples. (C) Ratio of cFGF23 / iFGF23 levels after i.p. injection of LPA (50mg/kg) or vehicle ( $n = 6-10$  per group). Two-sided Student's t-test (C), bars show means  $\pm$  s.e.m.



**Supplemental Figure 3. GPAT2 mediates the effect of G-3-P on LPA and FGF23 in primary osteoblasts.** (A) Expression of *Gpat* isoforms in bone marrow from mice treated with G-3-P (300 mg/kg) or vehicle ( $n = 3-4$ ). (B) Expression of *Gpat* isoforms in primary osteoblasts treated with G-3-P (10  $\mu$ M) or vehicle ( $n = 2-3$  per group). (C,D) *Gpat2* mRNA levels (C) and GPAT2 immunoblot (D, representative gel from one of two independent experiments) of primary osteoblasts treated with *Gpat2* or scrambled (scr) shRNA; qPCR performed on cells treated with G-3-P (10  $\mu$ M) or vehicle ( $n = 3$  per group). (E) LPA 18:1 levels in primary osteoblasts treated with G-3-P (10  $\mu$ M), with or without *Gpat2* knockdown ( $n = 2$  per group). (F) *Fgf23* mRNA levels in primary osteoblasts treated with *Gpat1*, *Gpat3*, *Gpat4*, or scr shRNA, with or without G-3-P (10  $\mu$ M) ( $n = 1-3$  per group). Two-way ANOVA followed by Tukey's multiple comparisons test (C, F), bars show means  $\pm$  s.e.m; \* $P < 0.05$ .

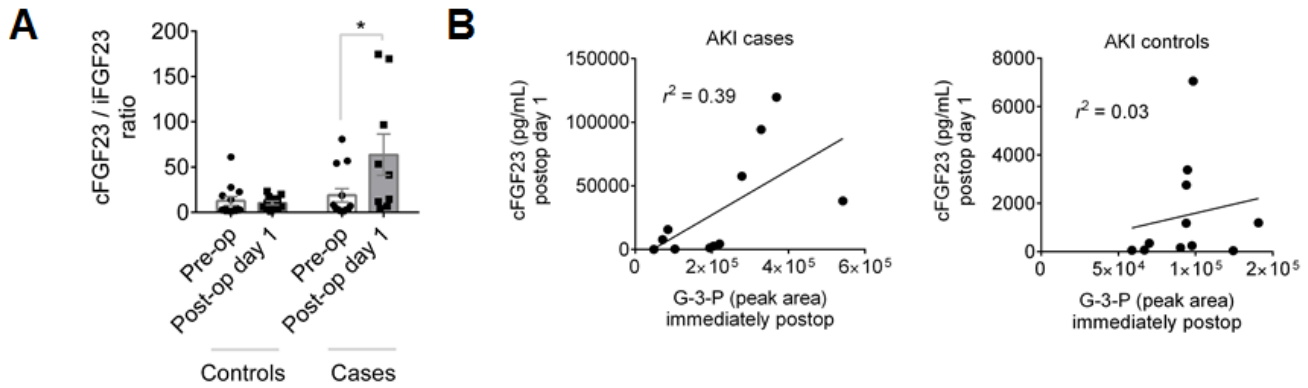


**Supplemental Figure 4. LPA cooperates with 1,25(OH)<sub>2</sub>D in cultured osteocytes.** (A-C) FGF23 immunoblot (A, representative gel from one of two independent experiments) and cFGF23 levels measured by ELISA in lysates from Ocy454 cells treated with increasing concentrations of LPA 18:1 (B) or with LPA 18:1 over time (C) ( $n = 2-5$  per group). One-way ANOVA followed by Tukey's multiple comparisons test (B,C), bars show means  $\pm$  s.e.m;  $*P < 0.05$ ,  $***P < 0.0001$ . (D) Chromatin immunoprecipitation of control regions of *Fgf23* promoter following LPA 18:1 and 1,25(OH)<sub>2</sub>D treatment in WT and *Lpar1* deficient cells. (E) PCR assay detecting inheritance of wild-type *Lpar1* (348 bp) and deletion mutation (227 bp).



**Supplemental Figure 5. Glycolytic intermediates, LPA, and nonspecific LPAR inhibition in modeled AKI.**

(A) G-3-P levels in cultured media from renal epithelial cells (IMCD) treated for 24 h with rotenone ( $n = 3$  per group). (B) Plasma hexose monophosphate, glyceraldehyde-3-phosphate, 3-phosphoglycerate and phosphoenolpyruvate levels 4 h after IRI or sham surgery ( $n = 3-6$  per group). (C) Bone marrow G-3-P levels 4 h after IRI or sham surgery ( $n = 5-6$  per group). (D) Plasma LPA 18:1 levels 4 hrs after IRI in *Lpar1*<sup>-/-</sup> mice and *Lpar1*<sup>+/+</sup> littermates ( $n = 2-3$  per group). (E) Ratio of cFGF23 / iFGF23 levels in *Lpar1*<sup>-/-</sup> mice and *Lpar1*<sup>+/+</sup> littermates subjected to IRI ( $n = 2-6$  per group). (F) Plasma iFGF23 levels in *Lpar1*<sup>-/-</sup> mice and *Lpar1*<sup>+/+</sup> littermates subjected to IRI, with or without the non-specific LPAR antagonist LPA-bromophosphonate (LPA-BrP);  $n = 2-5$  per group. (G,H) Blood phosphate in *Lpar1*<sup>-/-</sup> mice and *Lpar1*<sup>+/+</sup> littermates subjected to IRI (G) and in C57Bl/6J mice subjected to IRI with or without FSG67 (H),  $n = 3-4$  per group. Two-sided Student's t-test (A-C), two-way ANOVA followed by Tukey's multiple comparisons test (D-G), or one-way ANOVA followed by Tukey's multiple comparison test (H), bars show means  $\pm$  s.e.m; \* $P < 0.05$ , \*\*\* $P < 0.0001$ .



**Supplemental Figure 6. Post-operative G-3-P correlates with subsequent cFGF23 elevation.** (A) Ratio of cFGF23 / iFGF23 levels before and after cardiac surgery in AKI cases and controls ( $n = 13$  each group). Two-way ANOVA followed by Tukey's multiple comparisons test, bars show means  $\pm$  s.e.m;  $*P < 0.05$ . (B) Scatter plot of immediately post-operative plasma G-3-P levels and cFGF23 levels 24 hours after surgery among AKI cases (left) and controls (right).

**Supplemental Table 1.** Correlations ( $r^2$ ) between all venous metabolites (known) and arterial iFGF23

<b>Metabolite</b>	<b><math>r^2</math></b>
glycerol-3-phosphate	0.76
carnitine	0.56
ornithine	0.44
C3 carnitine	0.42
C10:2 carnitine	0.40
C5 carnitine	0.40
2/3-phosphoglycerate	0.39
arachidonic acid	0.39
7-methylxanthine	0.38
palmitoleic acid	0.37
myristoleate	0.35
N-alpha-acetylgarginine	0.34
N6-acetyllysine	0.34
4-pyridoxate	0.34
C3-DC-CH3 carnitine	0.33
pipecolic acid	0.32
C6 carnitine	0.31
taurine	0.31
citrate	0.31
adrenic acid	0.30
4-hydroxy-3-methylacetophenone	0.30
C4 carnitine	0.30
butyrylcarnitine	0.30
phosphocholine	0.29
N-acetylleucine	0.29
oleic acid	0.29
oleoyl glycine	0.28
hypoxanthine	0.28
niacinamide	0.28
creatinine	0.27
adenosine	0.26
5-HETE	0.25
C18:1 SM	0.24
indolelactate	0.23
C12 carnitine	0.23
C5:1 carnitine	0.23
homocitrulline	0.22
12-HETE	0.22
DMGV	0.22
C7 carnitine	0.22
xanthurenate	0.22
homocystine	0.21
C5-DC carnitine	0.21
suberate	0.21
alanine	0.21
docosatrienoic acid	0.20
uridine	0.20
C3-DC carnitine	0.20
docosapentaenoic acid	0.19
C18:2 SM	0.19
C10 carnitine	0.19



pseudouridine	0.18
C8 carnitine	0.18
C14:0 LPC	0.18
N4-acetylcytidine	0.17
cytosine	0.17
uracil	0.17
pyridoxamine	0.16
3-methylhistidine	0.16
C34:3 PE plasmalogen	0.16
beta-alanine	0.16
phenylalanine	0.16
C36:3 PE plasmalogen	0.16
7-methylguanine	0.16
C18:0 SM	0.16
glucuronate	0.15
serine	0.15
C36:4 PE	0.15
taurocholic acid	0.15
C9 carnitine	0.15
choline	0.15
15-HETE	0.15
lysine	0.15
dimethylglycine	0.15
citrulline	0.15
piperine	0.14
ectoine	0.14
acetyl glycine	0.14
4-hydroxyhippurate	0.14
tryptophan	0.14
thymine	0.14
glutamate	0.14
methionine	0.14
C38:6 PE	0.14
sebacate	0.13
butyrobetaine	0.13
acetylcholine	0.13
caffeine	0.13
NMMA	0.13
5-acetylamino-6-amino-3-methyluracil	0.13
xanthine	0.13
N-acetyltryptophan	0.13
2-aminooctanoate	0.13
hydroxyproline	0.12
5-aminolevulinic acid	0.12
alpha-glycerophosphocholine	0.12
kynurenic acid	0.12
homogentisate	0.12
quinolinate	0.12
taurochenodeoxycholic acid	0.12
1-methylguanine	0.12
allantoin	0.12
taurodeoxycholic acid	0.11
4-hydroxymandelate	0.11

betaine	0.11
3-methyladipate-pimelate	0.11
C16:0 LPC_B	0.11
guanine	0.11
2-aminoadipate	0.10
inositol	0.10
N6,N6,N6-trimethyllysine	0.10
alpha-ketoglutarate	0.10
methylmalonate	0.10
C36:2 PS plasmalogen	0.10
sphingosine	0.10
C38:4 PE	0.10
N1-methyl-2-pyridone-5-carboxamide	0.10
cortisol	0.10
aconitate	0.10
C18:3 LPC	0.09
pyroglutamic acid	0.09
N-acetylorithine	0.09
palmitic acid	0.09
guanidinoacetic acid	0.09
xanthine	0.09
phenylacetylglutamine	0.09
3-hydroxyanthranilic acid	0.09
mevalonic acid	0.09
valine	0.09
kynurenine	0.09
xanthosine	0.08
glutamine	0.08
6,8-dihydroxypurine	0.08
4-acetamidobutanoate	0.08
C22:6 LPE	0.08
indole-3-propionate	0.08
proline betaine	0.08
N-methylproline	0.08
homovanillate	0.07
C-glycosyltryptophan	0.07
isoleucine	0.07
pentose monophosphate	0.07
ribothymidine	0.07
S-methyl-L-cysteine-S-oxide	0.07
C38:6 PE plasmalogen	0.07
hydroxyphenylacetate	0.07
C38:6 PC plasmalogen	0.07
creatine	0.07
C40:6 PE	0.07
C20:1 LPE	0.07
glycocholic acid	0.06
indoleacetic acid	0.06
SDMA	0.06
C18:0 LPC	0.06
docosahexaenoic acid	0.06
glycodeoxycholic acid	0.06
1,7-dimethyluric acid	0.06

urobilinogen	0.06
sorbitol	0.05
GABA	0.05
N-acetylputrescine	0.05
linoleic acid	0.05
linoleoyl ethanolamide	0.05
leucine	0.05
C4-OH carnitine	0.05
C18:1 LPC plasmalogen_B	0.05
proline	0.05
pantothenol	0.05
glycocholate	0.05
N-acetylalanine	0.05
C16 carnitine	0.05
histidine	0.05
C16:1 SM	0.05
histamine	0.05
1-methylhistamine	0.04
serotonin	0.04
C14 carnitine	0.04
C20:4 LPE	0.04
C38:5 PE plasmalogen	0.04
C26 carnitine	0.04
pantothenate	0.04
inosine	0.04
C36:5 PE plasmalogen	0.04
stearic acid	0.04
C16:0 ceramide (d18:1)	0.04
C18:1 LPC plasmalogen_A	0.04
C16:0 SM	0.04
urocanic acid	0.04
C36:3 PS plasmalogen	0.03
cotinine	0.03
C20:0 LPE	0.03
C18:2 LPE	0.03
C2 carnitine	0.03
orotate	0.03
hypotaurine	0.03
C18:1 LPE	0.03
C20:5 LPC	0.03
cinnamoylglycine	0.03
C18:1 carnitine	0.03
myristic acid	0.03
deoxycholic acid	0.03
methylimidazoleacetic acid	0.03
N-carbamoyl-beta-alanine	0.03
C18:2 carnitine	0.03
5-hydroxymethy-4-methyluracil	0.03
glycodeoxycholate/glycochenodeoxycholate	0.03
2-hydroxyglutarate	0.03
fumarate/maleate	0.03
putrescine	0.02
glycine	0.02

adipate	0.02
C34:2 PE plasmalogen	0.02
C30:0 PC	0.02
8.11.14-Eicosatrienoic acid	0.02
thiamine	0.02
C36:5 PC plasmalogen	0.02
C16:0 LPE	0.02
C18:2 carnitine	0.02
trimethylamine-N-oxide	0.02
C34:2 PE	0.02
homoarginine	0.02
aminoisobutyric acid	0.02
C16:1 LPC plasmalogen	0.02
isocitrate	0.02
C12:1 carnitine	0.01
C24:1 ceramide (d18:1)	0.01
C18:1-OH carnitine	0.01
C34:2 PC-B	0.01
C32:2 PC	0.01
glycochenodeoxycholic acid	0.01
chenodeoxycholate/deoxycholate	0.01
1-methylnicotinamide	0.01
1-methyladenosine	0.01
cyclohexylamine	0.01
2-aminoheptanoic acid	0.01
C38:7 PC plasmalogen	0.01
salicylurate	0.01
eicosapentaenoic acid	0.01
asparagine	0.01
C18:0 LPE	0.01
acetaminophen	0.01
glycolithocholic acid	0.01
sphingosine 1-Phosphate	0.01
methionine sulfoxide	0.01
gamma-Linolenic acid	0.01
C14:2 carnitine	0.01
sucrose	0.01
C18 carnitine	0.01
N-acetylaspartic acid	0.01
C20 carnitine	0.01
lactose	0.01
C34:2 DAG	0.01
ADP	0.01
cholic acid	0.01
acetyl-galactosamine	0.01
N1-acetylspermidine	0.00
cortisone	0.00
C20:4 LPC	0.00
sarcosine	0.00
tyrosine	0.00
imidazole propionate	0.00
C16:1 LPC	0.00
11-HETE	0.00

C14:0 SM	0.00
taurohyodeoxycholic acid/tauroursodeoxycholic acid	0.00
C38:7 PE plasmalogen	0.00
C22:6 LPC	0.00
C40:7 PE plasmalogen	0.00
hippurate	0.00
thyroxine	0.00
fructose/glucose/galactose	0.00
C18:1 LPC_A	0.00
gentisate	0.00
C34:1 DAG	0.00
C20:0 SM	0.00
C22:5 LPC	0.00
C34:1 DAG	0.00
biliverdin	0.00
chenodeoxycholic acid	0.00
glycoursodeoxycholic acid	0.00
ADMA	0.00
threonine	0.00
C34:3 PC plasmalogen	0.00
malate	0.00
hydroxycotinine	0.00
1-methylguanosine	0.00
glycodeoxycholate/glycochenodeoxycholate	0.00
urate	0.00
hypoxanthine	0.00
arginine	0.00
urate	0.00
bilirubin	0.00
21-deoxycortisol	0.00
C34:3 PC	0.00
C14:1 carnitine	0.00
3-hydroxybenzoate	0.00
C34:0 PE	0.00
trigonelline	0.00
succinate	0.00
N-lauroylglycine	0.00
C36:2 PE	0.00

**Supplemental Table 2.** Correlations ( $r^2$ ) between all venous proteins and arterial iFGF23

<b>Protein</b>	<b>Protein full name</b>	<b><math>r^2</math></b>
Catalase	Catalase	0.71
Prostatic binding protein	Phosphatidylethanolamine-binding protein 1	0.68
Peroxiredoxin-1	Peroxiredoxin-1	0.65
HCE004333	HCE004333	0.64
ULBP-3	NKG2D ligand 3	0.63
IL-20 Ra	Interleukin-20 receptor subunit alpha	0.63
PA2G4	Proliferation-associated protein 2G4	0.62
Myokinase, human	Adenylate kinase isoenzyme 1	0.61
Rab GDP dissociation inhibitor beta	Rab GDP dissociation inhibitor beta	0.60
Carbonic anhydrase I	Carbonic anhydrase 1	0.60
IGFBP-5	Insulin-like growth factor-binding protein 5	0.58
UBE2N	Ubiquitin-conjugating enzyme E2 N	0.58
AREG	Amphiregulin	0.58
Triosephosphate isomerase	Triosephosphate isomerase	0.57
WNK3	Serine/threonine-protein kinase WNK3	0.57
SNAA	Alpha-soluble NSF attachment protein	0.56
MMP-7	Matrilysin	0.56
Transketolase	Transketolase	0.56
BAD	Bcl2-associated agonist of cell death	0.55
UCRP	Ubiquitin-like protein ISG15	0.54
IL-2 sRg	Cytokine receptor common subunit gamma	0.54
Cadherin-6	Cadherin-6	0.53
Peroxiredoxin-6	Peroxiredoxin-6	0.53
Ubiquitin+1	Ubiquitin+1, truncated mutation for UbB	0.53
FLRT1	Leucine-rich repeat transmembrane protein FLRT1	0.53
S100A6	Protein S100-A6	0.52
DAPK2	Death-associated protein kinase 2	0.51
Vasoactive Intestinal Peptide	Vasoactive Intestinal Peptide	0.50
SKP1	S-phase kinase-associated protein 1	0.50
PSA6	Proteasome subunit alpha type-6	0.50
SE6L2	Seizure 6-like protein 2	0.50
FGF-16	Fibroblast growth factor 16	0.50
NUDC3	NudC domain-containing protein 3	0.49
IL-3 Ra	Interleukin-3 receptor subunit alpha	0.49
JAM-C	Junctional adhesion molecule C	0.48
MDHC	Malate dehydrogenase, cytoplasmic	0.48
HINT1	Histidine triad nucleotide-binding protein 1	0.47
CYTD	Cystatin-D	0.47
MEPE	Matrix extracellular phosphoglycoprotein	0.46
IDE	Insulin-degrading enzyme	0.46
MRCKB	Serine/threonine-protein kinase MRCK beta	0.46
HCE000342	HCE000342	0.46
HDAC8	Histone deacetylase 8	0.45
BCL2-like 1 protein	Bcl-2-like protein 1	0.45
Albumin	Serum albumin	0.44
BRF-1	Transcription factor IIIB 90 kDa subunit	0.43
SPTA2	Spectrin alpha chain, non-erythrocytic 1	0.43
AMPK a1b1g1	AMP Kinase (alpha1beta1gamma1)	0.42
Hemoglobin	Hemoglobin	0.42
Protein disulfide isomerase A3	Protein disulfide-isomerase A3	0.41
AGR2	Anterior gradient protein 2 homolog	0.41

TSLP	Thymic stromal lymphopoietin	0.41
eIF-5A-1	Eukaryotic translation initiation factor 5A-1	0.41
ARI3A	AT-rich interactive domain-containing protein 3A	0.41
HXK1	Hexokinase-1	0.41
RANK	Tumor necrosis factor receptor superfamily member 11A	0.41
Calpain I	Calpain I	0.41
UBC9	SUMO-conjugating enzyme UBC9	0.41
PAPP-A	Pappalysin-1	0.41
DRG-1	Vacuolar protein sorting-associated protein VTA1 homolog	0.40
CEBPB	CCAAT/enhancer-binding protein beta	0.40
AIF1	Allograft inflammatory factor 1	0.39
HDGR2	Hepatoma-derived growth factor-related protein 2	0.39
Galectin-4	Galectin-4	0.39
HMG1	Non-histone chromosomal protein HMG-14	0.39
Soggy-1	Dickkopf-like protein 1	0.39
MK01	Mitogen-activated protein kinase 1	0.39
Cathepsin S	Cathepsin S	0.38
KPCI	Protein kinase C iota type	0.38
PolyUbiquitin K48	PolyUbiquitin K48-linked	0.38
ROBO3	Roundabout homolog 3	0.37
TIG2	Retinoic acid receptor responder protein 2	0.37
Cytidylate kinase	UMP-CMP kinase	0.37
MIA	Melanoma-derived growth regulatory protein	0.37
HCE000414	HCE000414	0.36
Cripto	Teratocarcinoma-derived growth factor 1	0.36
FST	Follistatin	0.36
ARMEL	Cerebral dopamine neurotrophic factor	0.36
MCP-1	C-C motif chemokine 2	0.36
IGFBP-4	Insulin-like growth factor-binding protein 4	0.36
CYTN	Cystatin-SN	0.36
3HAO	3-hydroxyanthranilate 3,4-dioxygenase	0.35
Clusterin	Clusterin	0.35
GI24	Platelet receptor Gi24	0.35
C34 gp41 HIV Fragment	gp41 C34 peptide, HIV	0.35
C3d	Complement C3d fragment	0.35
OLR1	Oxidized low-density lipoprotein receptor 1	0.35
CPNE1	Copine-1	0.35
PSA2	Proteasome subunit alpha type-2	0.34
KREM2	Kremen protein 2	0.34
14-3-3 protein beta/alpha	14-3-3 protein beta/alpha	0.34
a-Synuclein	Alpha-synuclein	0.34
IFN-lambda 1	Interferon lambda-1	0.34
RSK-like protein kinase	Ribosomal protein S6 kinase alpha-5	0.34
SUMO3	Small ubiquitin-related modifier 3	0.34
CFC1	Cryptic protein	0.34
Flt-3	Receptor-type tyrosine-protein kinase FLT3	0.34
PIGR	Polymeric immunoglobulin receptor	0.34
GPC2	Glypican-2	0.34
Somatostatin-28	Somatostatin-28	0.33
IL-1F8	Interleukin-36 beta	0.33
14-3-3 protein theta	14-3-3 protein theta	0.33
TSLP R	Cytokine receptor-like factor 2	0.33
HCE003183	HCE003183	0.33

Cyclophilin A	Peptidyl-prolyl cis-trans isomerase A	0.33
SLPI	Antileukoproteinase	0.33
MMEL2	Membrane metallo-endopeptidase-like 1	0.33
TNF-a	Tumor necrosis factor	0.32
EPHA3	Ephrin type-A receptor 3	0.32
SPHK2	Sphingosine kinase 2	0.32
Ephrin-A3	Ephrin-A3	0.32
Sialoadhesin	Sialoadhesin	0.32
HSP70 protein 8	Heat shock cognate 71 kDa protein	0.32
ING1	Inhibitor of growth protein 1	0.32
Nucleoside diphosphate kinase A	Nucleoside diphosphate kinase A	0.32
CDC37	Hsp90 co-chaperone Cdc37	0.32
Stress-induced-phosphoprotein 1	Stress-induced-phosphoprotein 1	0.32
Renin	Renin	0.31
NAGK	N-acetyl-D-glucosamine kinase	0.31
GFAP	Glial fibrillary acidic protein	0.31
OBCAM	Opioid-binding protein/cell adhesion molecule	0.31
ADAMTS-5	A disintegrin and metalloproteinase with thrombospondin motifs 5	0.31
FGF-6	Fibroblast growth factor 6	0.31
Granzyme B	Granzyme B	0.30
GCKR	Glucokinase regulatory protein	0.30
hnRNP A/B	Heterogeneous nuclear ribonucleoprotein A/B	0.30
RSPO2	R-spondin-2	0.30
CD40 ligand, soluble	CD40 ligand	0.29
DLC8	Dynein light chain 1, cytoplasmic	0.29
DPP2	Dipeptidyl peptidase 2	0.29
CD22	B-cell receptor CD22	0.29
PDE3A	cGMP-inhibited 3',5'-cyclic phosphodiesterase A	0.29
HCE004152	HCE004152	0.29
PSME1	Proteasome activator complex subunit 1	0.29
Azurocidin	Azurocidin	0.29
Marapsin	Serine protease 27	0.29
Calcineurin B a	Calcineurin subunit B type 1	0.29
CAMK1D	Calcium/calmodulin-dependent protein kinase type 1D	0.29
K-ras	GTPase KRas	0.29
LG3BP	Galectin-3-binding protein	0.29
Ubiquitin	Ubiquitin	0.29
CYTT	Cystatin-SA	0.28
ATS15	A disintegrin and metalloproteinase with thrombospondin motifs 15	0.28
BMP-7	Bone morphogenetic protein 7	0.28
Kallistatin	Kallistatin	0.28
STAT1	Signal transducer and activator of transcription 1-alpha/beta	0.28
Caspase-2	Caspase-2	0.28
Plasmin	Plasmin	0.28
IL-10 Ra	Interleukin-10 receptor subunit alpha	0.28
IL-11	Interleukin-11	0.28
40S ribosomal protein SA	40S ribosomal protein SA	0.28
GPDA	Glycerol-3-phosphate dehydrogenase [NAD(+)], cytoplasmic	0.28
CgA	Chromogranin-A	0.28
IDS	Iduronate 2-sulfatase	0.28
IL-18 Rb	Interleukin-18 receptor accessory protein	0.28
ETHE1	Persulfide dioxygenase ETHE1, mitochondrial	0.28
JNK2	Mitogen-activated protein kinase 9	0.27



Nectin-like protein 1	Cell adhesion molecule 3	0.27
IL-3	Interleukin-3	0.27
Moesin	Moesin	0.27
Survivin	Baculoviral IAP repeat-containing protein 5	0.27
Thymidine kinase	Thymidine kinase, cytosolic	0.27
Aflatoxin B1 aldehyde reductase	Aflatoxin B1 aldehyde reductase member 2	0.27
SMAD3	Mothers against decapentaplegic homolog 3	0.27
IL-12 Rb1	Interleukin-12 receptor subunit beta-1	0.27
Cystatin C	Cystatin-C	0.27
LEG9	Galectin-9	0.27
MIP-1a	C-C motif chemokine 3	0.27
FGFR-3	Fibroblast growth factor receptor 3	0.27
Carbonic Anhydrase X	Carbonic anhydrase-related protein 10	0.27
JAM-B	Junctional adhesion molecule B	0.26
Angiogenin	Angiogenin	0.26
DRAK2	Serine/threonine-protein kinase 17B	0.26
RBP	Retinol-binding protein 4	0.26
UB2L3	Ubiquitin-conjugating enzyme E2 L3	0.26
Bcl-2	Apoptosis regulator Bcl-2	0.26
FGF9	Fibroblast growth factor 9	0.26
LGMN	Legumain	0.26
BCAR3	Breast cancer anti-estrogen resistance protein 3	0.26
FAM3B	Protein FAM3B	0.26
GV	Calcium-dependent phospholipase A2	0.26
BGN	Biglycan	0.26
CD226	CD226 antigen	0.26
Angiopoietin-4	Angiopoietin-4	0.26
ERK-1	Mitogen-activated protein kinase 3	0.26
CLC7A	C-type lectin domain family 7 member A	0.26
Macrophage scavenger receptor	Macrophage scavenger receptor types I and II	0.25
Lectin, mannose-binding 2	Vesicular integral-membrane protein VIP36	0.25
a2-HS-Glycoprotein	Alpha-2-HS-glycoprotein	0.25
Adrenomedullin	Adrenomedullin	0.25
DYRK3	Dual specificity tyrosine-phosphorylation-regulated kinase 3	0.25
Alpha enolase	Alpha-enolase	0.25
Nogo Receptor	Reticulon-4 receptor	0.25
MMP-16	Matrix metalloproteinase-16	0.25
GAPDH, liver	Glyceraldehyde-3-phosphate dehydrogenase	0.24
PSD7	26S proteasome non-ATPase regulatory subunit 7	0.24
IL-4	Interleukin-4	0.24
GHC2	Mitochondrial glutamate carrier 2	0.24
ABL2	Abelson tyrosine-protein kinase 2	0.24
Carbonic anhydrase 6	Carbonic anhydrase 6	0.24
HCE001796	HCE001796	0.24
PIANP	PILR alpha-associated neural protein	0.24
HXK2	Hexokinase-2	0.24
BMPRI1A	Bone morphogenetic protein receptor type-1A	0.24
annexin I	Annexin A1	0.24
SOST	Sclerostin	0.24
CONA1	Collagen alpha-1(XXIII) chain	0.24
STAT6	Signal transducer and activator of transcription 6	0.24
eIF-5	Eukaryotic translation initiation factor 5	0.24
Eotaxin	Eotaxin	0.23

iC3b	Complement C3b, inactivated	0.23
SOD	Superoxide dismutase [Cu-Zn]	0.23
RAN	GTP-binding nuclear protein Ran	0.23
PDE11	Dual 3',5'-cyclic-AMP and -GMP phosphodiesterase 11A	0.23
Collectin Kidney 1	Collectin-11	0.23
ARP19	cAMP-regulated phosphoprotein 19	0.23
sCD4	T-cell surface glycoprotein CD4	0.23
PGCB	Brevican core protein	0.23
IMDH2	Inosine-5'-monophosphate dehydrogenase 2	0.23
Chymase	Chymase	0.23
GOT1	Aspartate aminotransferase, cytoplasmic	0.23
IL-12	Interleukin-12	0.23
Dynactin subunit 2	Dynactin subunit 2	0.22
C1q	Complement C1q subcomponent	0.22
SH21A	SH2 domain-containing protein 1A	0.22
4-1BB ligand	Tumor necrosis factor ligand superfamily member 9	0.22
Cystatin M	Cystatin-M	0.22
6-Phosphogluconate dehydrogenase	6-phosphogluconate dehydrogenase, decarboxylating	0.22
VEGF-D	Vascular endothelial growth factor D	0.22
phosphoglycerate kinase 1	Phosphoglycerate kinase 1	0.22
HCC-4	C-C motif chemokine 16	0.22
17-beta-HSD 1	Estradiol 17-beta-dehydrogenase 1	0.22
CK-BB	Creatine kinase B-type	0.22
IL-2	Interleukin-2	0.22
ABL1	Tyrosine-protein kinase ABL1	0.22
SET	Protein SET	0.21
IFNA7	Interferon alpha-7	0.21
TFF3	Trefoil factor 3	0.21
IF4A3	Eukaryotic initiation factor 4A-III	0.21
DnaJ homolog	Mitochondrial import inner membrane translocase subunit TIM14	0.21
Kallikrein 4	Kallikrein-4	0.21
PUR8	Adenylosuccinate lyase	0.21
KEAP1	Kelch-like ECH-associated protein 1	0.21
TBK1	Serine/threonine-protein kinase TBK1	0.21
BID	BH3-interacting domain death agonist	0.21
S100A12	Protein S100-A12	0.20
MAPKAPK3	MAP kinase-activated protein kinase 3	0.20
CD27	CD27 antigen	0.20
ALK-1	Serine/threonine-protein kinase receptor R3	0.20
AIP	AH receptor-interacting protein	0.20
MBL	Mannose-binding protein C	0.20
CTACK	C-C motif chemokine 27	0.20
GRB2-related adapter protein 2	GRB2-related adapter protein 2	0.20
p27Kip1	Cyclin-dependent kinase inhibitor 1B	0.20
ADAM12	Disintegrin and metalloproteinase domain-containing protein 12	0.20
CaMKK alpha	Calcium/calmodulin-dependent protein kinase 1	0.20
ATS1	A disintegrin and metalloproteinase with thrombospondin motifs 1	0.20
CSK21	Casein kinase II subunit alpha	0.20
Proteinase-3	Myeloblastin	0.20
HSP 70	Heat shock 70 kDa protein 1A	0.20
RPS6KA3	Ribosomal protein S6 kinase alpha-3	0.20
Elafin	Elafin	0.20
hnRNP A2/B1	Heterogeneous nuclear ribonucleoproteins A2/B1	0.20

HGFA	Hepatocyte growth factor activator	0.20
Activated Protein C	Activated Protein C	0.20
NovH	Protein NOV homolog	0.20
HEMK2	HemK methyltransferase family member 2	0.20
calreticulin	Calreticulin	0.19
LY86	Lymphocyte antigen 86	0.19
SLAF5	SLAM family member 5	0.19
kallikrein 14	Kallikrein-14	0.19
IL-1F7	Interleukin-37	0.19
c-Jun	Transcription factor AP-1	0.19
GP114	Adhesion G-protein coupled receptor G5	0.19
DHH	Desert hedgehog protein N-product	0.19
TMA	Thyroid peroxidase	0.19
HIV-2 Rev	Protein Rev_HV2BE	0.19
JAML1	Junctional adhesion molecule-like	0.19
BASI	Basigin	0.19
ENTP3	Ectonucleoside triphosphate diphosphohydrolase 3	0.19
HMGR	3-hydroxy-3-methylglutaryl-coenzyme A reductase	0.19
GREM1	Gremlin-1	0.19
PIAS4	E3 SUMO-protein ligase PIAS4	0.19
Adiponectin	Adiponectin	0.19
IGFBP-6	Insulin-like growth factor-binding protein 6	0.19
FGF-4	Fibroblast growth factor 4	0.18
Lactoferrin	Lactotransferrin	0.18
Mcl-1	Induced myeloid leukemia cell differentiation protein Mcl-1	0.18
Activin A	Inhibin beta A chain	0.18
VEGF sR3	Vascular endothelial growth factor receptor 3	0.18
ADAM 9	Disintegrin and metalloproteinase domain-containing protein 9	0.18
Neurotrophin-5	Neurotrophin-4	0.18
Stanniocalcin-1	Stanniocalcin-1	0.18
Granzyme H	Granzyme H	0.18
GA733-1 protein	Tumor-associated calcium signal transducer 2	0.18
FCGR1	High affinity immunoglobulin gamma Fc receptor I	0.18
TACI	Tumor necrosis factor receptor superfamily member 13B	0.18
sRANKL	Tumor necrosis factor ligand superfamily member 11	0.18
SECTM1	Secreted and transmembrane protein 1	0.18
BOC	Brother of CDO	0.18
Mammaglobin 2	Mammaglobin-B	0.18
IMDH1	Inosine-5'-monophosphate dehydrogenase 1	0.18
IL-8	Interleukin-8	0.18
Kallikrein 7	Kallikrein-7	0.18
Apo A-I	Apolipoprotein A-I	0.18
Topoisomerase I	DNA topoisomerase 1	0.18
Semaphorin-6A	Semaphorin-6A	0.18
NRP1	Neuropilin-1	0.18
IRF1	Interferon regulatory factor 1	0.18
Elastase	Neutrophil elastase	0.18
VAV	Proto-oncogene vav	0.18
M2-PK	Pyruvate kinase PKM	0.18
CDK2/cyclin A	Cyclin-dependent kinase 2:Cyclin-A2 complex	0.18
TEC	Tyrosine-protein kinase Tec	0.18
HSP 90a/b	Heat shock protein HSP 90-alpha/beta	0.18
HMG-1	High mobility group protein B1	0.17

Galectin-2	Galectin-2	0.17
SLIK1	SLIT and NTRK-like protein 1	0.17
HSP 40	DnaJ homolog subfamily B member 1	0.17
Semaphorin 3A	Semaphorin-3A	0.17
STX1a	Syntaxin-1A	0.17
MP2K2	Dual specificity mitogen-activated protein kinase 2	0.17
PTHrP	Parathyroid hormone-related protein	0.17
TCTP	Translationally-controlled tumor protein	0.17
GDF-9	Growth/differentiation factor 9	0.17
ICOS	Inducible T-cell costimulator	0.17
PAK7	Serine/threonine-protein kinase PAK 7	0.17
Calcineurin	Calcineurin	0.17
ER	Estrogen receptor	0.17
PIK3CA/PIK3R1	PIK3CA/PIK3R1	0.17
G-CSF-R	Granulocyte colony-stimulating factor receptor	0.17
CD109	CD109 antigen	0.17
ARSB	Arylsulfatase B	0.17
TRAIL R4	Tumor necrosis factor receptor superfamily member 10D	0.17
FGF-17	Fibroblast growth factor 17	0.17
bFGF	Fibroblast growth factor 2	0.17
DBNL	Drebrin-like protein	0.17
TRY3	Trypsin-3	0.17
EPO-R	Erythropoietin receptor	0.17
sICAM-3	Intercellular adhesion molecule 3	0.17
CNTN2	Contactin-2	0.17
FABPE	Fatty acid-binding protein, epidermal	0.17
FGF-8B	Fibroblast growth factor 8 isoform B	0.17
RXFP1	Relaxin receptor 1	0.17
Protein disulfide-isomerase	Protein disulfide-isomerase	0.16
PACAP-27	Pituitary adenylate cyclase-activating polypeptide 27	0.16
EphA5	Ephrin type-A receptor 5	0.16
b-Endorphin	Beta-endorphin	0.16
PKC-D	Protein kinase C delta type	0.16
SEM6B	Semaphorin-6B	0.16
uPA	Urokinase-type plasminogen activator	0.16
3HIDH	3-hydroxyisobutyrate dehydrogenase, mitochondrial	0.16
GSK-3 alpha/beta	Glycogen synthase kinase-3 alpha/beta	0.16
IL24	Interleukin-24	0.16
sE-Selectin	E-selectin	0.16
Ephrin-A4	Ephrin-A4	0.16
PKC-G	Protein kinase C gamma type	0.16
HGH	Somatotropin	0.16
a2-Antiplasmin	Alpha-2-antiplasmin	0.16
MFRP	Membrane frizzled-related protein	0.16
IFN-a/b R1	Interferon alpha/beta receptor 1	0.16
ADAMTS-4	A disintegrin and metalloproteinase with thrombospondin motifs 4	0.16
c-Myc	Myc proto-oncogene protein	0.15
EPHAA	Ephrin type-A receptor 10	0.15
4EBP2	Eukaryotic translation initiation factor 4E-binding protein 2	0.15
Apo E	Apolipoprotein E	0.15
sLRP1	Low-density lipoprotein receptor-related protein 1, soluble	0.15
MAPK14	Mitogen-activated protein kinase 14	0.15
YKL-40	Chitinase-3-like protein 1	0.15

NR1D1	Nuclear receptor subfamily 1 group D member 1	0.15
HPLN1	Hyaluronan and proteoglycan link protein 1	0.15
Osteopontin	Osteopontin	0.15
EP15R	Epidermal growth factor receptor substrate 15-like 1	0.15
Afamin	Afamin	0.15
MSP R	Macrophage-stimulating protein receptor	0.15
RELT	Tumor necrosis factor receptor superfamily member 19L	0.15
P-Selectin	P-selectin	0.15
LIMP II	Lysosome membrane protein 2	0.15
ACTH	Corticotropin	0.15
Cofilin-1	Cofilin-1	0.15
FGF-12	Fibroblast growth factor 12	0.15
NANOG	Homeobox protein NANOG	0.15
transcription factor MLR1, isoform CRA_b	Ligand-dependent nuclear receptor corepressor-like protein	0.15
S100A4	Protein S100-A4	0.15
CD59	CD59 glycoprotein	0.14
Glucocorticoid receptor	Glucocorticoid receptor	0.14
TLR4:MD-2 complex	Toll-like receptor 4:Lymphocyte antigen 96 complex	0.14
TWEAKR	Tumor necrosis factor receptor superfamily member 12A	0.14
Fucosyltransferase 3	Galactoside 3(4)-L-fucosyltransferase	0.14
PLPP	Pyridoxal phosphate phosphatase	0.14
FCN2	Ficolin-2	0.14
Carbonic anhydrase VII	Carbonic anhydrase 7	0.14
SP-D	Pulmonary surfactant-associated protein D	0.14
sICAM-5	Intercellular adhesion molecule 5	0.14
Cathepsin G	Cathepsin G	0.14
FLRT3	Leucine-rich repeat transmembrane protein FLRT3	0.14
Eotaxin-3	C-C motif chemokine 26	0.14
TNR4	Tumor necrosis factor receptor superfamily member 4	0.14
MMP-12	Macrophage metalloelastase	0.14
HB-EGF	Heparin-binding EGF-like growth factor	0.14
RNase H1	Ribonuclease H1	0.14
eIF-4H	Eukaryotic translation initiation factor 4H	0.14
BMP-14	Growth/differentiation factor 5	0.14
LY9	T-lymphocyte surface antigen Ly-9	0.14
IFN10	Interferon alpha-10	0.14
SLAF7	SLAM family member 7	0.14
PAFAH beta subunit	Platelet-activating factor acetylhydrolase IB subunit beta	0.14
IL-16	Interleukin-16	0.14
PGRP-S	Peptidoglycan recognition protein 1	0.13
CSRP3	Cysteine and glycine-rich protein 3	0.13
Prothrombin	Prothrombin	0.13
FCG2B	Low affinity immunoglobulin gamma Fc region receptor II-b	0.13
CDK1/cyclin B	Cyclin-dependent kinase 1:G2/mitotic-specific cyclin-B1 complex	0.13
CBG	Corticosteroid-binding globulin	0.13
HO-2	Heme oxygenase 2	0.13
PIM1	Serine/threonine-protein kinase pim-1	0.13
Histone H1.2	Histone H1.2	0.13
RANTES	C-C motif chemokine 5	0.13
HIF-1a	Hypoxia-inducible factor 1-alpha	0.13
Protein C	Vitamin K-dependent protein C	0.13
CAMK2B	Calcium/calmodulin-dependent protein kinase type II subunit beta	0.13
MATK	Megakaryocyte-associated tyrosine-protein kinase	0.13

CTGF	Connective tissue growth factor	0.13
CD83	CD83 antigen	0.13
PKC-Z	Protein kinase C zeta type	0.13
KIF23	Kinesin-like protein KIF23	0.13
BMPER	BMP-binding endothelial regulator protein	0.13
DEAD-box protein 19B	ATP-dependent RNA helicase DDX19B	0.13
Cathepsin B	Cathepsin B	0.13
CAD15	Cadherin-15	0.13
Cytochrome P450 3A4	Cytochrome P450 3A4	0.13
PCI	Plasma serine protease inhibitor	0.13
Thrombin	Thrombin	0.13
PPIB	Peptidyl-prolyl cis-trans isomerase B	0.13
IGF-I	Insulin-like growth factor I	0.13
IFN-lambda 2	Interferon lambda-2	0.13
KI2L4	Killer cell immunoglobulin-like receptor 2DL4	0.13
Coagulation Factor X	Coagulation Factor X	0.13
alpha-1-antichymotrypsin complex	Alpha-1-antichymotrypsin complex	0.12
CATE	Cathepsin E	0.12
PDK1	[Pyruvate dehydrogenase (acetyl-transferring)] kinase isozyme 1, mitochondrial	0.12
NACA	Nascent polypeptide-associated complex subunit alpha	0.12
UBP25	Ubiquitin carboxyl-terminal hydrolase 25	0.12
BARK1	beta-adrenergic receptor kinase 1	0.12
b2-Microglobulin	Beta-2-microglobulin	0.12
PACAP-38	Pituitary adenylate cyclase-activating polypeptide 38	0.12
LDH-H 1	L-lactate dehydrogenase B chain	0.12
MIP-3b	C-C motif chemokine 19	0.12
NG36	Histone-lysine N-methyltransferase EHMT2	0.12
Angiotensinogen	Angiotensinogen	0.12
MIP-5	C-C motif chemokine 15	0.12
SPINT2	Kunitz-type protease inhibitor 2	0.12
VEGF121	Vascular endothelial growth factor A, isoform 121	0.12
PTP-1C	Tyrosine-protein phosphatase non-receptor type 6	0.12
PDGF-AA	Platelet-derived growth factor subunit A	0.12
AK1A1	Alcohol dehydrogenase [NADP(+)]	0.12
PECAM-1	Platelet endothelial cell adhesion molecule	0.12
RS3	40S ribosomal protein S3	0.12
FCRL3	Fc receptor-like protein 3	0.12
VEGF-C	Vascular endothelial growth factor C	0.12
ARG11	Arginase-1	0.12
NCAM-L1	Neural cell adhesion molecule L1	0.12
NEUREGULIN-1	Neuregulin-1	0.11
Endoglin	Endoglin	0.11
ghrelin	Appetite-regulating hormone	0.11
IL-17E	Interleukin-25	0.11
IGFBP-7	Insulin-like growth factor-binding protein 7	0.11
Thrombopoietin Receptor	Thrombopoietin Receptor	0.11
EF-1-beta	Elongation factor 1-beta	0.11
MP2K4	Dual specificity mitogen-activated protein kinase 4	0.11
H31	Histone H3.1	0.11
AN32B	Acidic leucine-rich nuclear phosphoprotein 32 family member B	0.11
STAT3	Signal transducer and activator of transcription 3	0.11
PSA	Prostate-specific antigen	0.11
HCE004331	HCE004331	0.11

GPVI	Platelet glycoprotein VI	0.11
LRRK2	Leucine-rich repeat serine/threonine-protein kinase 2	0.11
Factor D	Complement factor D	0.11
CD97	CD97 antigen	0.11
MAPK5	MAP kinase-activated protein kinase 5	0.11
NKp44	Natural cytotoxicity triggering receptor 2	0.11
ON	SPARC	0.11
TS	Thymidylate synthase	0.11
Apo E3	Apolipoprotein E (isoform E3)	0.11
LIN7B	Protein lin-7 homolog B	0.11
FGFR-2	Fibroblast growth factor receptor 2	0.11
NKp46	Natural cytotoxicity triggering receptor 1	0.11
PPIE	Peptidyl-prolyl cis-trans isomerase E	0.10
TGF-b2	Transforming growth factor beta-2	0.10
CHKB	Choline/ethanolamine kinase	0.10
CXCL16, soluble	C-X-C motif chemokine 16	0.10
SREC-II	Scavenger receptor class F member 2	0.10
HSP 90b	Heat shock protein HSP 90-beta	0.10
SHP-2	Tyrosine-protein phosphatase non-receptor type 11	0.10
MP2K3	Dual specificity mitogen-activated protein kinase 3	0.10
CAMK2D	Calcium/calmodulin-dependent protein kinase type II subunit delta	0.10
QORL1	Quinone oxidoreductase-like protein 1	0.10
BSSP4	Brain-specific serine protease 4	0.10
Thrombospondin-1	Thrombospondin-1	0.10
41	Protein 4.1	0.10
MK12	Mitogen-activated protein kinase 12	0.10
vWF	von Willebrand factor	0.10
ENPP7	Ectonucleotide pyrophosphatase/phosphodiesterase family member 7	0.10
HCE003300	HCE003300	0.10
Angiopoietin-1	Angiopoietin-1	0.10
FLRT2	Leucine-rich repeat transmembrane protein FLRT2	0.10
EMR2	Adhesion G protein-coupled receptor E2	0.10
Phosphoglycerate mutase 1	Phosphoglycerate mutase 1	0.10
TrkA	High affinity nerve growth factor receptor	0.10
GX	Group 10 secretory phospholipase A2	0.10
MMP-17	Matrix metalloproteinase-17	0.10
CYTF	Cystatin-F	0.10
KI3S1	Killer cell immunoglobulin-like receptor 3DS1	0.10
Properdin	Properdin	0.10
ATS13	A disintegrin and metalloproteinase with thrombospondin motifs 13	0.10
HCK	Tyrosine-protein kinase HCK	0.10
PKB a/b/g	RAC-alpha/beta/gamma serine/threonine-protein kinase	0.10
PDE1A	Calcium/calmodulin-dependent 3',5'-cyclic nucleotide phosphodiesterase 1A	0.10
sTie-2	Angiopoietin-1 receptor, soluble	0.10
carbonic anhydrase II	Carbonic anhydrase 2	0.10
p53	Cellular tumor antigen p53	0.10
ENTP5	Ectonucleoside triphosphate diphosphohydrolase 5	0.10
ILT-2	Leukocyte immunoglobulin-like receptor subfamily B member 1	0.10
Kininogen, HMW	Kininogen-1	0.10
TSG-6	Tumor necrosis factor-inducible gene 6 protein	0.10
Protease nexin I	Glia-derived nexin	0.10
IgM	Immunoglobulin M	0.10

ANGL4	Angiopoietin-related protein 4	0.10
FGFR4	Fibroblast growth factor receptor 4	0.09
NAP-2	Neutrophil-activating peptide 2	0.09
IL-1a	Interleukin-1 alpha	0.09
Lymphotactin	Lymphotactin	0.09
IL-4 sR	Interleukin-4 receptor subunit alpha	0.09
COLEC12	Collectin-12	0.09
SNP25	Synaptosomal-associated protein 25	0.09
IL-1 sRI	Interleukin-1 receptor type 1	0.09
IL-17 RD	Interleukin-17 receptor D	0.09
MO2R1	Cell surface glycoprotein CD200 receptor 1	0.09
MIC-1	Growth/differentiation factor 15	0.09
CO8A1	Collagen alpha-1(VIII) chain	0.09
NKG2D	NKG2-D type II integral membrane protein	0.09
C6	Complement component C6	0.09
MUC1	Mucin-1	0.09
DKK1	Dickkopf-related protein 1	0.09
NRX1B	Neurexin-1-beta	0.09
RGM-C	Hemojuvelin	0.09
Nectin-like protein 2	Cell adhesion molecule 1	0.09
Growth hormone receptor	Growth hormone receptor	0.09
DRR1	Protein FAM107A	0.09
TrkC	NT-3 growth factor receptor	0.09
MCP-4	C-C motif chemokine 13	0.09
IL-22	Interleukin-22	0.09
EFNB1	Ephrin-B1	0.09
EphA1	Ephrin type-A receptor 1	0.09
CRTAM	Cytotoxic and regulatory T-cell molecule	0.09
Insulin	Insulin	0.09
SHC1	SHC-transforming protein 1	0.09
SHBG	Sex hormone-binding globulin	0.09
RUXF	Small nuclear ribonucleoprotein F	0.09
Myoglobin	Myoglobin	0.09
RAC1	Ras-related C3 botulinum toxin substrate 1	0.09
ANGL3	Angiopoietin-related protein 3	0.09
GIB	Phospholipase A2	0.08
G-CSF	Granulocyte colony-stimulating factor	0.08
CD47	Leukocyte surface antigen CD47	0.08
BTC	Betacellulin	0.08
Sonic Hedgehog	Sonic hedgehog protein	0.08
SCGF-alpha	Stem cell growth factor-alpha	0.08
SIG14	Sialic acid-binding Ig-like lectin 14	0.08
FGR	Tyrosine-protein kinase Fgr	0.08
ERP29	Endoplasmic reticulum resident protein 29	0.08
EphB4	Ephrin type-B receptor 4	0.08
EFNB2	Ephrin-B2	0.08
Angiopoietin-2	Angiopoietin-2	0.08
C1r	Complement C1r subcomponent	0.08
EDAR	Tumor necrosis factor receptor superfamily member EDAR	0.08
TCPTP	Tyrosine-protein phosphatase non-receptor type 2	0.08
CRK	Adapter molecule crk	0.08
RAP	alpha-2-macroglobulin receptor-associated protein	0.08
HCE003167	HCE003167	0.08



PHI	Glucose-6-phosphate isomerase	0.08
ENA-78	C-X-C motif chemokine 5	0.08
MMP-14	Matrix metalloproteinase-14	0.08
BGH3	Transforming growth factor-beta-induced protein ig-h3	0.08
Cystatin-S	Cystatin-S	0.08
RGMB	RGM domain family member B	0.08
AMPM2	Methionine aminopeptidase 2	0.08
Glutamate carboxypeptidase	Cytosolic non-specific dipeptidase	0.08
PSMA	Glutamate carboxypeptidase 2	0.08
LIF sR	Leukemia inhibitory factor receptor	0.08
b-ECGF	Fibroblast growth factor 1	0.08
MICB	MHC class I polypeptide-related sequence B	0.08
IL-1Ra	Interleukin-1 receptor antagonist protein	0.08
P-Cadherin	Cadherin-3	0.08
suPAR	Urokinase plasminogen activator surface receptor	0.08
Apo E2	Apolipoprotein E (isoform E2)	0.08
BMX	Cytoplasmic tyrosine-protein kinase BMX	0.07
MATN3	Matrilin-3	0.07
CNDP1	Beta-Ala-His dipeptidase	0.07
SGTA	Small glutamine-rich tetratricopeptide repeat-containing protein alpha	0.07
SCGF-beta	Stem Cell Growth Factor-beta	0.07
CTAP-III	Connective tissue-activating peptide III	0.07
PTK6	Protein-tyrosine kinase 6	0.07
Apo E4	Apolipoprotein E (isoform E4)	0.07
NET4	Netrin-4	0.07
NCAM-120	Neural cell adhesion molecule 1, 120 kDa isoform	0.07
FSTL1	Follistatin-related protein 1	0.07
IFN-g R1	Interferon gamma receptor 1	0.07
SEM5A	Semaphorin-5A	0.07
NCC27	Chloride intracellular channel protein 1	0.07
HCE000104	HCE000104	0.07
kallikrein 13	Kallikrein-13	0.07
Dtk	Tyrosine-protein kinase receptor TYRO3	0.07
SBDS	Ribosome maturation protein SBDS	0.07
LAG-1	C-C motif chemokine 4-like	0.07
Caspase-10	Caspase-10	0.07
HCC-1	C-C motif chemokine 14	0.07
Neurotrophin-3	Neurotrophin-3	0.07
Fractalkine/CX3CL-1	Fractalkine	0.07
LDLR	Low-density lipoprotein receptor	0.07
FCN1	Ficolin-1	0.07
SLIK5	SLIT and NTRK-like protein 5	0.07
HRG	Histidine-rich glycoprotein	0.07
HCE004359	HCE004359	0.07
S100A7	Protein S100-A7	0.07
FTCD	Formimidoyltransferase-cyclodeaminase	0.07
GNS	N-acetylglucosamine-6-sulfatase	0.07
DERM	Dermatopontin	0.07
6Ckine	C-C motif chemokine 21	0.07
ERBB4	Receptor tyrosine-protein kinase erbB-4	0.07
Cardiotrophin-1	Cardiotrophin-1	0.07
Fas, soluble	Tumor necrosis factor receptor superfamily member 6	0.07
Ephrin-A2	Ephrin-A2	0.07

TAJ	Tumor necrosis factor receptor superfamily member 19	0.07
CD63	CD63 antigen	0.07
CREL1	Cysteine-rich with EGF-like domain protein 1	0.07
XEDAR	Tumor necrosis factor receptor superfamily member 27	0.07
amyloid precursor protein	Amyloid beta A4 protein	0.07
Tenascin	Tenascin	0.07
ASAH1	N-acylethanolamine-hydrolyzing acid amidase	0.06
DC-SIGN	CD209 antigen	0.06
IL-20	Interleukin-20	0.06
URB	Coiled-coil domain-containing protein 80	0.06
CK2-A2:B	Casein kinase II 2-alpha':2-beta heterotetramer	0.06
TIMD3	Hepatitis A virus cellular receptor 2	0.06
RAC3	Ras-related C3 botulinum toxin substrate 3	0.06
Thyroglobulin	Thyroglobulin	0.06
Myostatin	Growth/differentiation factor 8	0.06
TIMP-3	Metalloproteinase inhibitor 3	0.06
Testican-1	Testican-1	0.06
FGF-5	Fibroblast growth factor 5	0.06
GDF-11/8	Growth/differentiation factor 11/8	0.06
Notch 1	Neurogenic locus notch homolog protein 1	0.06
Cyclophilin F	Peptidyl-prolyl cis-trans isomerase F, mitochondrial	0.06
EGF	Epidermal growth factor	0.06
STRATIFIN	14-3-3 protein sigma	0.06
ISLR2	Immunoglobulin superfamily containing leucine-rich repeat protein 2	0.06
IL-1 R4	Interleukin-1 receptor-like 1	0.06
Thyroxine-Binding Globulin	Thyroxine-binding globulin	0.06
CD70	CD70 antigen	0.06
MIP-3a	C-C motif chemokine 20	0.06
BMP RII	Bone morphogenetic protein receptor type-2	0.06
IL-2 sRa	Interleukin-2 receptor subunit alpha	0.06
TBP	TATA-box-binding protein	0.06
C9	Complement component C9	0.06
PPAC	Low molecular weight phosphotyrosine protein phosphatase	0.06
PKB beta	RAC-beta serine/threonine-protein kinase	0.06
TXD12	Thioredoxin domain-containing protein 12	0.06
DUS3	Dual specificity protein phosphatase 3	0.06
Carbonic anhydrase III	Carbonic anhydrase 3	0.06
GFRa-3	GDNF family receptor alpha-3	0.06
DLL4	Delta-like protein 4	0.06
Persephin	Persephin	0.06
FN1.4	Fibronectin Fragment 4	0.06
Cadherin E	Cadherin-1	0.06
sRAGE	Advanced glycosylation end product-specific receptor, soluble	0.06
XPNPEP1	Xaa-Pro aminopeptidase 1	0.06
AMPK a2b2g1	AMP Kinase (alpha2beta2gamma1)	0.06
METAP1	Methionine aminopeptidase 1	0.06
CK2-A1:B	Casein kinase II 2-alpha:2-beta heterotetramer	0.06
TAFI	Carboxypeptidase B2	0.06
SMAD2	Mothers against decapentaplegic homolog 2	0.06
IDUA	Alpha-L-iduronidase	0.06
14-3-3	14-3-3 protein family	0.06
VEGF sR2	Vascular endothelial growth factor receptor 2	0.06
Ferritin	Ferritin	0.06

Aggrecan	Aggrecan core protein	0.06
Activin AB	Inhibin beta A chain:Inhibin beta B chain heterodimer	0.06
CLC4K	C-type lectin domain family 4 member K	0.06
BPI	Bactericidal permeability-increasing protein	0.05
C5a	C5a anaphylatoxin	0.05
Siglec-6	Sialic acid-binding Ig-like lectin 6	0.05
Livin B	Baculoviral IAP repeat-containing protein 7 Isoform beta	0.05
GCP-2	C-X-C motif chemokine 6	0.05
Cathepsin V	Cathepsin L2	0.05
Endothelin-converting enzyme 1	Endothelin-converting enzyme 1	0.05
BAFF Receptor	Tumor necrosis factor receptor superfamily member 13C	0.05
GAS1	Growth arrest-specific protein 1	0.05
KIRR3	Kin of IRRE-like protein 3	0.05
IL-17B R	Interleukin-17 receptor B	0.05
PEX5	Peroxisomal targeting signal 1 receptor	0.05
RSPO4	R-spondin-4	0.05
CLM6	CMRF35-like molecule 6	0.05
FN1.3	Fibronectin Fragment 3	0.05
WFKN1	WAP, kazal, immunoglobulin, kunitz and NTR domain-containing protein 1	0.05
Gelsolin	Gelsolin	0.05
MASP3	Mannan-binding lectin serine protease 1	0.05
Endocan	Endothelial cell-specific molecule 1	0.05
ANP	Atrial natriuretic factor	0.05
PDGF-BB	Platelet-derived growth factor subunit B	0.05
ASM3A	Acid sphingomyelinase-like phosphodiesterase 3a	0.05
protein Z inhibitor	Protein Z-dependent protease inhibitor	0.05
discoidin domain receptor 1	Epithelial discoidin domain-containing receptor 1	0.05
FCG2A	Low affinity immunoglobulin gamma Fc region receptor II-a	0.05
CATZ	Cathepsin Z	0.05
Sorting nexin 4	Sorting nexin-4	0.05
PGM1	Phosphoglucomutase-1	0.05
Plasminogen	Plasminogen	0.05
MMP-2	72 kDa type IV collagenase	0.05
C4	Complement C4	0.05
Kallikrein 11	Kallikrein-11	0.05
IL-1 R AcP	Interleukin-1 Receptor accessory protein	0.05
HVEM	Tumor necrosis factor receptor superfamily member 14	0.05
RASA1	Ras GTPase-activating protein 1	0.05
RGMA	Repulsive guidance molecule A	0.05
LKHA4	Leukotriene A-4 hydrolase	0.05
MOZ	Histone acetyltransferase KAT6A	0.05
IFN-b	Interferon beta	0.05
MATN2	Matrilin-2	0.05
a1-Antitrypsin	Alpha-1-antitrypsin	0.05
CKAP2	Cytoskeleton-associated protein 2	0.05
CAPG	Macrophage-capping protein	0.05
GDNF	Glial cell line-derived neurotrophic factor	0.05
LEAP-1	Hepcidin	0.05
cIAP-2	Baculoviral IAP repeat-containing protein 3	0.05
Coagulation Factor IXab	Coagulation factor IXab	0.05
PAK3	Serine/threonine-protein kinase PAK 3	0.05
Eotaxin-2	C-C motif chemokine 24	0.05
IL-18 Ra	Interleukin-18 receptor 1	0.04

PDPK1	3-phosphoinositide-dependent protein kinase 1	0.04
TPSB2	Tryptase beta-2	0.04
BST1	ADP-ribosyl cyclase/cyclic ADP-ribose hydrolase 2	0.04
PF-4	Platelet factor 4	0.04
Apo B	Apolipoprotein B	0.04
SOD3	Extracellular superoxide dismutase [Cu-Zn]	0.04
B7	T-lymphocyte activation antigen CD80	0.04
Periostin	Periostin	0.04
ASGR1	Asialoglycoprotein receptor 1	0.04
IL-1b	Interleukin-1 beta	0.04
GRB2 adapter protein	Growth factor receptor-bound protein 2	0.04
IL-5	Interleukin-5	0.04
C4b	Complement C4b	0.04
TLR4	Toll-like receptor 4	0.04
Prekallikrein	Plasma kallikrein	0.04
Discoidin domain receptor 2	Discoidin domain-containing receptor 2	0.04
CBPE	Carboxypeptidase E	0.04
annexin VI	Annexin A6	0.04
BAFF	Tumor necrosis factor ligand superfamily member 13B	0.04
Cathepsin H	Cathepsin H	0.04
CBX5	Chromobox protein homolog 5	0.04
Hemopexin	Hemopexin	0.04
Apo D	Apolipoprotein D	0.04
IGFBP-1	Insulin-like growth factor-binding protein 1	0.04
IL-1 sRII	Interleukin-1 receptor type 2	0.04
IL-5 Ra	Interleukin-5 receptor subunit alpha	0.04
GDF2	Growth/differentiation factor 2	0.04
CAMK1	Calcium/calmodulin-dependent protein kinase type 1	0.04
BMP-6	Bone morphogenetic protein 6	0.04
Galectin-8	Galectin-8	0.04
MEK1	Dual specificity mitogen-activated protein kinase 1	0.04
FGF-10	Fibroblast growth factor 10	0.04
Fibrinogen	Fibrinogen	0.04
RS7	40S ribosomal protein S7	0.04
CHST6	Carbohydrate sulfotransferase 6	0.04
MSP	Hepatocyte growth factor-like protein	0.04
IL22RA1	Interleukin-22 receptor subunit alpha-1	0.04
IFN-g	Interferon gamma	0.04
NEGR1	Neuronal growth regulator 1	0.04
BMP-1	Bone morphogenetic protein 1	0.04
LRIG3	Leucine-rich repeats and immunoglobulin-like domains protein 3	0.04
ST4S6	Carbohydrate sulfotransferase 15	0.04
WISP-3	WNT1-inducible-signaling pathway protein 3	0.04
PCNA	Proliferating cell nuclear antigen	0.04
ART	Agouti-related protein	0.04
EG-VEGF	Prokineticin-1	0.04
sL-Selectin	L-Selectin	0.04
IgE	Immunoglobulin E	0.04
Aurora kinase A	Aurora kinase A	0.04
HGF	Hepatocyte growth factor	0.04
OSM	Oncostatin-M	0.04
Ku70	X-ray repair cross-complementing protein 6	0.03
Tropomyosin 2	Tropomyosin beta chain	0.03

HNRPQ	Heterogeneous nuclear ribonucleoprotein Q	0.03
PGP9.5	Ubiquitin carboxyl-terminal hydrolase isozyme L1	0.03
Apo L1	Apolipoprotein L1	0.03
Arylsulfatase A	Arylsulfatase A	0.03
UFM1	Ubiquitin-fold modifier 1	0.03
TGF-b1	Transforming growth factor beta-1	0.03
aldolase A	Fructose-bisphosphate aldolase A	0.03
PSP	Lithostathine-1-alpha	0.03
OPG	Tumor necrosis factor receptor superfamily member 11B	0.03
FABPL	Fatty acid-binding protein, liver	0.03
Epo	Erythropoietin	0.03
DKK3	Dickkopf-related protein 3	0.03
SMAC	Diablo homolog, mitochondrial	0.03
HAI-1	Kunitz-type protease inhibitor 1	0.03
FCG3B	Low affinity immunoglobulin gamma Fc region receptor III-B	0.03
Troponin I, skeletal, fast twitch	Troponin I, fast skeletal muscle	0.03
PolyUbiquitin K63	PolyUbiquitin K63-linked	0.03
NID2	Nidogen-2	0.03
B7-2	T-lymphocyte activation antigen CD86	0.03
EGFRvIII	Epidermal growth factor receptor variant III	0.03
CRIS3	Cysteine-rich secretory protein 3	0.03
Prolactin Receptor	Prolactin receptor	0.03
Trefoil factor 2	Trefoil factor 2	0.03
CD39	Ectonucleoside triphosphate diphosphohydrolase 1	0.03
annexin II	Annexin A2	0.03
Annexin V	Annexin A5	0.03
calgranulin B	Protein S100-A9	0.03
Ficolin-3	Ficolin-3	0.03
NSE	Gamma-enolase	0.03
FGF-18	Fibroblast growth factor 18	0.03
SPARCL1	SPARC-like protein 1	0.03
PCSK7	Proprotein convertase subtilisin/kexin type 7	0.03
IP-10	C-X-C motif chemokine 10	0.03
Epithelial cell kinase	Ephrin type-A receptor 2	0.03
JAK2	Tyrosine-protein kinase JAK2	0.03
PSA1	Proteasome subunit alpha type-1	0.03
NMT1	Glycylpeptide N-tetradecanoyltransferase 1	0.03
Notch-3	Neurogenic locus notch homolog protein 3	0.03
TLR2	Toll-like receptor 2	0.03
Lymphotoxin a2/b1	Lymphotoxin alpha2:beta1	0.03
TrkB	BDNF/NT-3 growth factors receptor	0.03
KPCT	Protein kinase C theta type	0.03
SCF sR	Mast/stem cell growth factor receptor Kit	0.03
CSF-1	Macrophage colony-stimulating factor 1	0.03
TNFSF18	Tumor necrosis factor ligand superfamily member 18	0.03
CDK8/cyclin C	Cyclin-dependent kinase 8:Cyclin-C complex	0.03
SLAF6	SLAM family member 6	0.03
JAG2	Protein jagged-2	0.03
Mn SOD	Superoxide dismutase [Mn], mitochondrial	0.03
FGF-8A	Fibroblast growth factor 8 isoform A	0.03
HPV E7 Type18	Protein E7_HP18	0.03
LCMT1	Leucine carboxyl methyltransferase 1	0.03
Bone proteoglycan II	Decorin	0.03

ALT	Alanine aminotransferase 1	0.03
Glucagon	Glucagon	0.03
I-TAC	C-X-C motif chemokine 11	0.03
HTRA2	Serine protease HTRA2, mitochondrial	0.03
PYY	Peptide YY	0.03
GPNMB	Transmembrane glycoprotein NMB	0.03
STAB2	Stabilin-2	0.03
Peroxiredoxin-5	Peroxiredoxin-5, mitochondrial	0.03
H2B2E	Histone H2B type 2-E	0.03
IGF-I sR	Insulin-like growth factor 1 receptor	0.03
Coactosin-like protein	Coactosin-like protein	0.03
Kallikrein 6	Kallikrein-6	0.03
MFGM	Lactadherin	0.03
Tpo	Thrombopoietin	0.03
IL-17 sR	Interleukin-17 receptor A	0.03
SHPS1	Tyrosine-protein phosphatase non-receptor type substrate 1	0.03
TF	Tissue Factor	0.03
NRX3B	Neurexin-3-beta	0.03
TIMP-2	Metalloproteinase inhibitor 2	0.02
BLC	C-X-C motif chemokine 13	0.02
Corticotropin-lipotropin	Pro-opiomelanocortin	0.02
OCAD1	OCIA domain-containing protein 1	0.02
FGF7	Fibroblast growth factor 7	0.02
Chitotriosidase-1	Chitotriosidase-1	0.02
OX40 Ligand	Tumor necrosis factor ligand superfamily member 4	0.02
FCAR	Immunoglobulin alpha Fc receptor	0.02
Factor H	Complement factor H	0.02
IL-7 Ra	Interleukin-7 receptor subunit alpha	0.02
FUT5	Alpha-(1,3)-fucosyltransferase 5	0.02
PESC	Pescadillo homolog	0.02
TIMP-1	Metalloproteinase inhibitor 1	0.02
SDF-1	Stromal cell-derived factor 1	0.02
PSME3	Proteasome activator complex subunit 3	0.02
ASAH2	Neutral ceramidase	0.02
Testican-2	Testican-2	0.02
UB2G2	Ubiquitin-conjugating enzyme E2 G2	0.02
Cathepsin D	Cathepsin D	0.02
Coagulation Factor V	Coagulation Factor V	0.02
Olfactomedin-4	Olfactomedin-4	0.02
C8	Complement component C8	0.02
ZNRF3	E3 ubiquitin-protein ligase ZNRF3	0.02
COX-2	Prostaglandin G/H synthase 2	0.02
Transgelin-2	Transgelin-2	0.02
MMP-10	Stromelysin-2	0.02
IF4G2	Eukaryotic translation initiation factor 4 gamma 2	0.02
LRP1B	Low-density lipoprotein receptor-related protein 1B	0.02
Fibronectin	Fibronectin	0.02
hnRNP K	Heterogeneous nuclear ribonucleoprotein K	0.02
CDON	Cell adhesion molecule-related/down-regulated by oncogenes	0.02
Carbonic anhydrase XIII	Carbonic anhydrase 13	0.02
GRN	Granulins	0.02
Gro-b/g	Gro-beta/gamma	0.02
Galectin-3	Galectin-3	0.02

KLRF1	Killer cell lectin-like receptor subfamily F member 1	0.02
14-3-3E	14-3-3 protein epsilon	0.02
Trypsin	Trypsin-1	0.02
Cadherin-2	Cadherin-2	0.02
contactin-1	Contactin-1	0.02
CD23	Low affinity immunoglobulin epsilon Fc receptor	0.02
WFKN2	WAP, Kazal, immunoglobulin, Kunitz and NTR domain-containing protein 2	0.02
GIIE	Group IIE secretory phospholipase A2	0.02
FSH	Follicle stimulating hormone	0.02
Hat1	Histone acetyltransferase type B catalytic subunit	0.02
IL-17F	Interleukin-17F	0.02
Glypican 3	Glypican-3	0.02
SMOC1	SPARC-related modular calcium-binding protein 1	0.02
RAD51	DNA repair protein RAD51 homolog 1	0.02
Caspase-3	Caspase-3	0.02
FGF-19	Fibroblast growth factor 19	0.02
Coagulation Factor IX	Coagulation factor IX	0.02
OAS1	2'-5'-oligoadenylate synthase 1	0.02
Integrin aVb5	Integrin alpha-V: beta-5 complex	0.02
ERBB3	Receptor tyrosine-protein kinase erbB-3	0.02
NRG4	Neuregulin-4	0.02
DSCAM	Down syndrome cell adhesion molecule	0.02
PCSK9	Proprotein convertase subtilisin/kexin type 9	0.02
XTP3A	dCTP pyrophosphatase 1	0.02
H2A3	Histone H2A type 3	0.02
Mesothelin	Mesothelin	0.02
TRAIL R1	Tumor necrosis factor receptor superfamily member 10A	0.02
REG4	Regenerating islet-derived protein 4	0.02
IL-17 RC	Interleukin-17 receptor C	0.02
IL-10	Interleukin-10	0.02
Apoptosis regulator Bcl-W	Bcl-2-like protein 2	0.02
ITI heavy chain H4	Inter-alpha-trypsin inhibitor heavy chain H4	0.02
tPA	Tissue-type plasminogen activator	0.02
MK13	Mitogen-activated protein kinase 13	0.02
GDF-11	Growth/differentiation factor 11	0.02
Lipocalin 2	Neutrophil gelatinase-associated lipocalin	0.02
IgG	Immunoglobulin G	0.02
GP1BA	Platelet glycoprotein Ib alpha chain	0.02
Endostatin	Endostatin	0.02
PAI-1	Plasminogen activator inhibitor 1	0.02
HCE000483	HCE000483	0.02
Gro-a	Growth-regulated alpha protein	0.02
IL-1 sR9	X-linked interleukin-1 receptor accessory protein-like 2	0.02
14-3-3 protein zeta/delta	14-3-3 protein zeta/delta	0.02
MAPK2	MAP kinase-activated protein kinase 2	0.02
PDE9A	High affinity cGMP-specific 3',5'-cyclic phosphodiesterase 9A	0.02
UNC5H3	Netrin receptor UNC5C	0.02
Nidogen	Nidogen-1	0.02
STK16	Serine/threonine-protein kinase 16	0.02
ECM1	Extracellular matrix protein 1	0.02
MK11	Mitogen-activated protein kinase 11	0.02
EMAP-2	Endothelial monocyte-activating polypeptide 2	0.02
M-CSF R	Macrophage colony-stimulating factor 1 receptor	0.02

PLK-1	Serine/threonine-protein kinase PLK1	0.02
CLC1B	C-type lectin domain family 1 member B	0.02
Fas ligand, soluble	Tumor necrosis factor ligand superfamily member 6, soluble form	0.02
Activin RIB	Activin receptor type-1B	0.02
RBM39	RNA-binding protein 39	0.02
Myeloperoxidase	Myeloperoxidase	0.02
LYN	Tyrosine-protein kinase Lyn	0.02
Keratin 18	Keratin, type I cytoskeletal 18	0.02
SAP	Serum amyloid P-component	0.02
CD36 ANTIGEN	Platelet glycoprotein 4	0.02
AFP	alpha-Fetoprotein	0.02
MIF	Macrophage migration inhibitory factor	0.02
ANK2	Ankyrin-2	0.02
MICA	MHC class I polypeptide-related sequence A	0.02
kallikrein 8	Kallikrein-8	0.01
LYPD3	Ly6/PLAUR domain-containing protein 3	0.01
Tropomyosin 1 alpha chain	Tropomyosin alpha-1 chain	0.01
FAM107B	Protein FAM107B	0.01
C7	Complement component C7	0.01
Angiostatin	Angiostatin	0.01
PTP-1B	Tyrosine-protein phosphatase non-receptor type 1	0.01
MMP-1	Interstitial collagenase	0.01
IL-17B	Interleukin-17B	0.01
OX2G	OX-2 membrane glycoprotein	0.01
sICAM-2	Intercellular adhesion molecule 2	0.01
CSK	Tyrosine-protein kinase CSK	0.01
BCMA	Tumor necrosis factor receptor superfamily member 17	0.01
CNTF	Ciliary neurotrophic factor	0.01
C5b, 6 Complex	Complement C5b-C6 complex	0.01
MK08	Mitogen-activated protein kinase 8	0.01
GM-CSF	Granulocyte-macrophage colony-stimulating factor	0.01
DSC3	Desmocollin-3	0.01
Integrin a1b1	Integrin alpha-I: beta-1 complex	0.01
WISP-1	WNT1-inducible-signaling pathway protein 1	0.01
B7-H2	ICOS ligand	0.01
BCAM	Basal Cell Adhesion Molecule	0.01
PRL	Prolactin	0.01
PKC-B-II	Protein kinase C beta type (splice variant beta-II)	0.01
Cyclin B1	G2/mitotic-specific cyclin-B1	0.01
IGFBP-3	Insulin-like growth factor-binding protein 3	0.01
granzyme A	Granzyme A	0.01
FGF-20	Fibroblast growth factor 20	0.01
CD30 Ligand	Tumor necrosis factor ligand superfamily member 8	0.01
Siglec-9	Sialic acid-binding Ig-like lectin 9	0.01
NDP kinase B	Nucleoside diphosphate kinase B	0.01
Semaphorin 3E	Semaphorin-3E	0.01
Antithrombin III	Antithrombin-III	0.01
MMP-9	Matrix metalloproteinase-9	0.01
HPV E7 Type 16	Protein E7_HPV16	0.01
CHK1	Serine/threonine-protein kinase Chk1	0.01
LAG-3	Lymphocyte activation gene 3 protein	0.01
Ephrin-B3	Ephrin-B3	0.01
sTie-1	Tyrosine-protein kinase receptor Tie-1, soluble	0.01



GFRa-1	GDNF family receptor alpha-1	0.01
MDC	C-C motif chemokine 22	0.01
IL-19	Interleukin-19	0.01
tau	Microtubule-associated protein tau	0.01
EDA	Ectodysplasin-A, secreted form	0.01
pTEN	Phosphatidylinositol 3,4,5-trisphosphate 3-phosphatase and dual-specificity protein phosphatase PTEN	0.01
Vitronectin	Vitronectin	0.01
kallikrein 5	Kallikrein-5	0.01
TYK2	Non-receptor tyrosine-protein kinase TYK2	0.01
D-dimer	D-dimer	0.01
LYVE1	Lymphatic vessel endothelial hyaluronic acid receptor 1	0.01
Granulysin	Granulysin	0.01
WNT7A	Protein Wnt-7a	0.01
gpIIbIIIa	Integrin alpha-IIb: beta-3 complex	0.01
sICAM-1	Intercellular adhesion molecule 1	0.01
NET1	Netrin-1	0.01
PARK7	Protein deglycase DJ-1	0.01
IL-18 BP $\alpha$	Interleukin-18-binding protein	0.01
MED-1	Mediator of RNA polymerase II transcription subunit 1	0.01
PD-L2	Programmed cell death 1 ligand 2	0.01
IL-12 RB2	Interleukin-12 receptor subunit beta-2	0.01
Desmoglein-1	Desmoglein-1	0.01
ATP synthase beta chain	ATP synthase subunit beta, mitochondrial	0.01
Lymphotoxin $\alpha$ 1/b2	Lymphotoxin $\alpha$ 1: $\beta$ 2	0.01
CRDL1	Chordin-like protein 1	0.01
MMP-8	Neutrophil collagenase	0.01
DR6	Tumor necrosis factor receptor superfamily member 21	0.01
GPC6	Glypican-6	0.01
TARC	C-C motif chemokine 17	0.01
EPI	Epiregulin	0.01
PAK6	Serine/threonine-protein kinase PAK 6	0.01
NXP1	Neurexophilin-1	0.01
NCK1	Cytoplasmic protein NCK1	0.01
OMD	Osteomodulin	0.01
Osteocalcin	Osteocalcin	0.01
HSP 27	Heat shock protein beta-1	0.01
HCG	Human Chorionic Gonadotropin	0.01
AMGO2	Amphoterin-induced protein 2	0.01
PBEF	Nicotinamide phosphoribosyltransferase	0.01
FAM3D	Protein FAM3D	0.01
complement factor H-related 5	Complement factor H-related protein 5	0.01
VEGF	Vascular endothelial growth factor A	0.01
TFF1	Trefoil factor 1	0.01
Chk2	Serine/threonine-protein kinase Chk2	0.01
Nr-CAM	Neuronal cell adhesion molecule	0.01
ROR1	Tyrosine-protein kinase transmembrane receptor ROR1	0.01
LBP	Lipopolysaccharide-binding protein	0.01
NPS-PLA2	Phospholipase A2, membrane associated	0.01
IgD	Immunoglobulin D	0.01
VCAM-1	Vascular cell adhesion protein 1	0.01
$\alpha$ 1-Antichymotrypsin	Alpha-1-antichymotrypsin	0.01
TSP4	Thrombospondin-4	0.01
Cadherin-5	Cadherin-5	0.01

DAN	Neuroblastoma suppressor of tumorigenicity 1	0.01
C3a	C3a anaphylatoxin	0.01
LPPL	Galectin-10	0.01
Protein S	Vitamin K-dependent protein S	0.01
DLRB1	Dynein light chain roadblock-type 1	0.01
kallikrein 12	Kallikrein-12	0.01
TGM3	Protein-glutamine gamma-glutamyltransferase E	0.01
MCP-2	C-C motif chemokine 8	0.01
BMP10	Bone morphogenetic protein 10	0.01
CK-MM	Creatine kinase M-type	0.01
CD5L	CD5 antigen-like	0.01
CNTFR alpha	Ciliary neurotrophic factor receptor subunit alpha	0.01
MCP-3	C-C motif chemokine 7	0.01
IL-13 Ra1	Interleukin-13 receptor subunit alpha-1	0.01
Ck-b-8-1	Ck-beta-8-1	0.01
ALCAM	CD166 antigen	0.01
TECK	C-C motif chemokine 25	0.01
PLCG1	1-phosphatidylinositol 4,5-bisphosphate phosphodiesterase gamma-1	0.01
Cathepsin A	Lysosomal protective protein	0.01
IL-6 sRa	Interleukin-6 receptor subunit alpha	0.01
PFD5	Prefoldin subunit 5	0.01
Aminoacylase-1	Aminoacylase-1	0.01
Secretin	Secretin	0.01
a2-Macroglobulin	Alpha-2-macroglobulin	0.01
KYNU	Kynureninase	0.01
Lysozyme	Lysozyme C	0.01
AURKB	Aurora kinase B	0.01
MRC2	C-type mannose receptor 2	0.01
LRP8	Low-density lipoprotein receptor-related protein 8	0.01
CD244	Natural killer cell receptor 2B4	0.01
Layilin	Layilin	0.01
ERAB	3-hydroxyacyl-CoA dehydrogenase type-2	0.01
Siglec-7	Sialic acid-binding Ig-like lectin 7	0.01
H6ST1	Heparan-sulfate 6-O-sulfotransferase 1	0.01
MYPC1	Myosin-binding protein C, slow-type	0.01
Luteinizing hormone	Luteinizing hormone	0.01
IL-1F6	Interleukin-36 alpha	0.01
Spondin-1	Spondin-1	0.01
MPIF-1	C-C motif chemokine 23	0.00
Haptoglobin, Mixed Type	Haptoglobin	0.00
Contactin-5	Contactin-5	0.00
SORC2	VPS10 domain-containing receptor SorCS2	0.00
CHL1	Neural cell adhesion molecule L1-like protein	0.00
C2	Complement C2	0.00
Rb	Retinoblastoma-associated protein	0.00
Troponin I	Troponin I, cardiac muscle	0.00
C1-Esterase Inhibitor	Plasma protease C1 inhibitor	0.00
NLGNX	Neuroigin-4, X-linked	0.00
IL-10 Rb	Interleukin-10 receptor subunit beta	0.00
C1QBP	Complement component 1 Q subcomponent-binding protein, mitochondrial	0.00
CLF-1/CLC Complex	Cytokine receptor-like factor 1:Cardiotrophin-like cytokine factor 1 Complex	0.00

RS3A	40S ribosomal protein S3a	0.00
LCK	Tyrosine-protein kinase Lck	0.00
PK3CG	Phosphatidylinositol 4,5-bisphosphate 3-kinase catalytic subunit gamma isoform	0.00
SRCN1	Proto-oncogene tyrosine-protein kinase Src	0.00
Ephrin-A5	Ephrin-A5	0.00
PERL	Lactoperoxidase	0.00
ACE2	Angiotensin-converting enzyme 2	0.00
IL-23 R	Interleukin-23 receptor	0.00
b-NGF	beta-nerve growth factor	0.00
Lamin-B1	Lamin-B1	0.00
Carbonic anhydrase 9	Carbonic anhydrase 9	0.00
IL-15 Ra	Interleukin-15 receptor subunit alpha	0.00
PRKACA	cAMP-dependent protein kinase catalytic subunit alpha	0.00
RET	Proto-oncogene tyrosine-protein kinase receptor Ret	0.00
Fibrinogen g-chain dimer	Fibrinogen gamma chain	0.00
Siglec-3	Myeloid cell surface antigen CD33	0.00
Lymphotoxin b R	Tumor necrosis factor receptor superfamily member 3	0.00
TrATPase	Tartrate-resistant acid phosphatase type 5	0.00
paraoxonase 1	Serum paraoxonase/arylesterase 1	0.00
IR	Insulin receptor	0.00
KI3L2	Killer cell immunoglobulin-like receptor 3DL2	0.00
4-1BB	Tumor necrosis factor receptor superfamily member 9	0.00
TNF sR-II	Tumor necrosis factor receptor superfamily member 1B	0.00
Karyopherin-a2	Importin subunit alpha-1	0.00
Dkk-4	Dickkopf-related protein 4	0.00
PAFAH	Platelet-activating factor acetylhydrolase	0.00
PDE5A	cGMP-specific 3',5'-cyclic phosphodiesterase	0.00
CD48	CD48 antigen	0.00
TCCR	Interleukin-27 receptor subunit alpha	0.00
MIG	C-X-C motif chemokine 9	0.00
Noggin	Noggin	0.00
ULBP-1	NKG2D ligand 1	0.00
HHLA2	HERV-H LTR-associating protein 2	0.00
sLeptin R	Leptin receptor	0.00
Leptin	Leptin	0.00
Artemin	Artemin	0.00
resistin	Resistin	0.00
PLXB2	Plexin-B2	0.00
Histone H2A.z	Histone H2A.z	0.00
PLXC1	Plexin-C1	0.00
GITR	Tumor necrosis factor receptor superfamily member 18	0.00
ULBP-2	NKG2D ligand 2	0.00
IL-7	Interleukin-7	0.00
Cadherin-12	Cadherin-12	0.00
DC-SIGNR	C-type lectin domain family 4 member M	0.00
sFRP-3	Secreted frizzled-related protein 3	0.00
FGF23	Fibroblast growth factor 23	0.00
Trypsin 2	Trypsin-2	0.00
Glutathione S-transferase Pi	Glutathione S-transferase P	0.00
BFL1	Bcl-2-related protein A1	0.00
DLL1	Delta-like protein 1	0.00
Transferrin	Serotransferrin	0.00
B7-H1	Programmed cell death 1 ligand 1	0.00

UNC5H4	Netrin receptor UNC5D	0.00
Flt3 ligand	Fms-related tyrosine kinase 3 ligand	0.00
TNFSF15	Tumor necrosis factor ligand superfamily member 15	0.00
MMP-13	Collagenase 3	0.00
IL-1Rrp2	Interleukin-1 receptor-like 2	0.00
FETUB	Fetuin-B	0.00
Enterokinase	Enteropeptidase	0.00
CTLA-4	Cytotoxic T-lymphocyte protein 4	0.00
IMB1	Importin subunit beta-1	0.00
HPG-	15-hydroxyprostaglandin dehydrogenase [NAD(+)]	0.00
SARP-2	Secreted frizzled-related protein 1	0.00
ILT-4	Leukocyte immunoglobulin-like receptor subfamily B member 2	0.00
Coagulation Factor VII	Coagulation factor VII	0.00
MIS	Muellerian-inhibiting factor	0.00
WIF-1	Wnt inhibitory factor 1	0.00
C5	Complement C5	0.00
LRRT1	Leucine-rich repeat transmembrane neuronal protein 1	0.00
Coagulation Factor Xa	Coagulation factor Xa	0.00
CAMK2A	Calcium/calmodulin-dependent protein kinase type II subunit alpha	0.00
bFGF-R	Fibroblast growth factor receptor 1	0.00
AMNLS	Protein amnionless	0.00
SIRT2	NAD-dependent protein deacetylase sirtuin-2	0.00
GFRa-2	GDNF family receptor alpha-2	0.00
BCL6	B-cell lymphoma 6 protein	0.00
DSC2	Desmocollin-2	0.00
IL-27	Interleukin-27	0.00
BNP-32	Brain natriuretic peptide 32	0.00
UFC1	Ubiquitin-fold modifier-conjugating enzyme 1	0.00
IL-22BP	Interleukin-22 receptor subunit alpha-2	0.00
PARC	C-C motif chemokine 18	0.00
Contactin-4	Contactin-4	0.00
CRP	C-reactive protein	0.00
C3adesArg	C3a anaphylatoxin des Arginine	0.00
Laminin	Laminin	0.00
CHIP	E3 ubiquitin-protein ligase CHIP	0.00
SSRP1	FACT complex subunit SSRP1	0.00
EPHB2	Ephrin type-B receptor 2	0.00
TGF-b R II	TGF-beta receptor type-2	0.00
Galectin-7	Galectin-7	0.00
DcR3	Tumor necrosis factor receptor superfamily member 6B	0.00
NADPH-P450 Oxidoreductase	NADPH--cytochrome P450 reductase	0.00
PH	Pancreatic hormone	0.00
PTN	Pleiotrophin	0.00
C3	Complement C3	0.00
IL-9	Interleukin-9	0.00
IL-13	Interleukin-13	0.00
NOTC2	Neurogenic locus notch homolog protein 2	0.00
PDXK	Pyridoxal kinase	0.00
GPC5	Glypican-5	0.00
TNF-b	Lymphotoxin-alpha	0.00
IL-17D	Interleukin-17D	0.00
SEPR	Prolyl endopeptidase FAP	0.00
Heparin cofactor II	Heparin cofactor 2	0.00

Calpastatin	Calpastatin	0.00
TGF-b R III	Transforming growth factor beta receptor type 3	0.00
Factor B	Complement factor B	0.00
I-309	C-C motif chemokine 1	0.00
LD78-beta	C-C motif chemokine 3-like 1	0.00
INGR2	Interferon gamma receptor 2	0.00
LRRT3	Leucine-rich repeat transmembrane neuronal protein 3	0.00
Lumican	Lumican	0.00
Factor I	Complement factor I	0.00
TAK1-TAB1	Mitogen-activated protein kinase 7:TGF-beta-activated kinase 1 and MAP3K7-binding protein 1 fusion	0.00
ApoM	Apolipoprotein M	0.00
PEDF	Pigment epithelium-derived factor	0.00
TSP2	Thrombospondin-2	0.00
Esterase D	S-formylglutathione hydrolase	0.00
SREC-I	Scavenger receptor class F member 1	0.00
CK-MB	Creatine kinase M-type:Creatine kinase B-type heterodimer	0.00
Tropomyosin 4	Tropomyosin alpha-4 chain	0.00
PDGF-CC	Platelet-derived growth factor C	0.00
CD177	CD177 antigen	0.00
ROBO2	Roundabout homolog 2	0.00
IL-34	Interleukin-34	0.00
FABP	Fatty acid-binding protein, heart	0.00
FBLN3	EGF-containing fibulin-like extracellular matrix protein 1	0.00
Macrophage mannose receptor	Macrophage mannose receptor 1	0.00
BSP	Bone sialoprotein 2	0.00
DAF	Complement decay-accelerating factor	0.00
PDE4D	cAMP-specific 3',5'-cyclic phosphodiesterase 4D	0.00
PPID	Peptidyl-prolyl cis-trans isomerase D	0.00
MDM2	E3 ubiquitin-protein ligase Mdm2	0.00
LSAMP	Limbic system-associated membrane protein	0.00
C3b	Complement C3b	0.00
PTH	Parathyroid hormone	0.00
NSF1C	NSFL1 cofactor p47	0.00
GSTA3	Glutathione S-transferase A3	0.00
PDE7A	High affinity cAMP-specific 3',5'-cyclic phosphodiesterase 7A	0.00
C1QR1	Complement component C1q receptor	0.00
FYN	Tyrosine-protein kinase Fyn	0.00
YES	Tyrosine-protein kinase Yes	0.00
IL-6	Interleukin-6	0.00
CSH	Chorionic somatomammotropin hormone	0.00
CHST2	Carbohydrate sulfotransferase 2	0.00
PPase	Inorganic pyrophosphatase	0.00
FAK1	Focal adhesion kinase 1	0.00
ERBB1	Epidermal growth factor receptor	0.00
LTBP4	Latent-transforming growth factor beta-binding protein 4	0.00
Cytochrome c	Cytochrome c	0.00
Troponin T	Troponin T, cardiac muscle	0.00
COMM7	COMM domain-containing protein 7	0.00
sCD163	Scavenger receptor cysteine-rich type 1 protein M130	0.00
HSP 60	60 kDa heat shock protein, mitochondrial	0.00
TWEAK	Tumor necrosis factor ligand superfamily member 12	0.00
TGF-b3	Transforming growth factor beta-3	0.00
Met	Hepatocyte growth factor receptor	0.00

TRAIL R2	Tumor necrosis factor receptor superfamily member 10B	0.00
IgA	Immunoglobulin A	0.00
MMP-3	Stromelysin-1	0.00
MBD4	Methyl-CpG-binding domain protein 4	0.00
IGFBP-2	Insulin-like growth factor-binding protein 2	0.00
BDNF	Brain-derived neurotrophic factor	0.00
LIGHT	Tumor necrosis factor ligand superfamily member 14	0.00
CD30	Tumor necrosis factor receptor superfamily member 8	0.00
EphB6	Ephrin type-B receptor 6	0.00
FER	Tyrosine-protein kinase Fer	0.00
SAA	Serum amyloid A-1 protein	0.00
Midkine	Midkine	0.00
Gastrin-releasing peptide	Gastrin-releasing peptide	0.00
IGF-II receptor	Cation-independent mannose-6-phosphate receptor	0.00
cGMP-stimulated PDE	cGMP-dependent 3',5'-cyclic phosphodiesterase	0.00
RNF43	E3 ubiquitin-protein ligase RNF43	0.00
LYNB	Tyrosine-protein kinase Lyn, isoform B	0.00
PDGFRA	Platelet-derived growth factor receptor alpha	0.00
CCL28	C-C motif chemokine 28	0.00
BTK	Tyrosine-protein kinase BTK	0.00
Sphingosine kinase 1	Sphingosine kinase 1	0.00
Coagulation Factor XI	Coagulation Factor XI	0.00
ESAM	Endothelial cell-selective adhesion molecule	0.00
TFPI	Tissue factor pathway inhibitor	0.00
NKp30	Natural cytotoxicity triggering receptor 3	0.00
N-terminal pro-BNP	N-terminal pro-BNP	0.00
TNF sR-I	Tumor necrosis factor receptor superfamily member 1A	0.00
ZAP70	Tyrosine-protein kinase ZAP-70	0.00
ERBB2	Receptor tyrosine-protein kinase erbB-2	0.00
ATPO	ATP synthase subunit O, mitochondrial	0.00
PDGF Rb	Platelet-derived growth factor receptor beta	0.00
IL-23	Interleukin-23	0.00
dopa decarboxylase	Aromatic-L-amino-acid decarboxylase	0.00
PKC-A	Protein kinase C alpha type	0.00
TPSG1	Tryptase gamma	0.00
PIGF	Placenta growth factor	0.00
CDK5/p35	Cyclin-dependent kinase 5:Cyclin-dependent kinase 5 activator 1 complex	0.00
JAG1	Protein jagged-1	0.00
TSH	Thyroid Stimulating Hormone	0.00
gp130, soluble	Interleukin-6 receptor subunit beta	0.00
CD38	ADP-ribosyl cyclase/cyclic ADP-ribose hydrolase 1	0.00
ARTS1	Endoplasmic reticulum aminopeptidase 1	0.00
FSTL3	Follistatin-related protein 3	0.00
RSPO3	R-spondin-3	0.00
HIPK3	Homeodomain-interacting protein kinase 3	0.00
Carbonic Anhydrase IV	Carbonic anhydrase 4	0.00
IL-17	Interleukin-17A	0.00
CATC	Dipeptidyl peptidase 1	0.00
CATF	Cathepsin F	0.00
IFN-aA	Interferon alpha-2	0.00

**Supplemental Table 3.** Correlations ( $r^2$ ) between G-3-P, iFGF23, phosphate, klotho, eGFR

	<b>V G-3-P</b>	<b>A G-3-P</b>	<b>V iFGF23</b>	<b>A iFGF23</b>	<b>V PO4</b>	<b>A PO4</b>	<b>V Klotho</b>	<b>eGFR</b>
<b>V G-3-P</b>	1.00	0.87	0.63	0.76	0.58	0.40	0.01	0.10
<b>A G-3-P</b>		1.00	0.52	0.65	0.66	0.41	0.00	0.06
<b>V iFGF23</b>			1.00	0.80	0.22	0.15	0.06	0.43
<b>A iFGF23</b>				1.00	0.28	0.16	0.02	0.31
<b>V PO4</b>					1.00	0.70	0.06	0.00
<b>A PO4</b>						1.00	0.01	0.03
<b>V Klotho</b>							1.00	0.07
<b>eGFR</b>								1.00

V, venous; A, arterial; PO4, phosphate; eGFR, estimated glomerular filtration rate

Correlations were performed on  $\log_2$  transformed values for G-3-P, iFGF23, PO4, and eGFR

**Supplemental Table 4.** Oligonucleotide sequences

<b>sgRNA target sequences</b>		
<i>Lpar1</i> #1	TCTTTGGCTATGTTTCGCCAG	
<i>Lpar1</i> #2	GGAGACTGACTGTTAGCACG	
<i>Lpar4</i> #1	CTGATGGTACGCGATCGGAA	
<i>Lpar4</i> #2	CAATGTTGCAGGCTTGCGGA	
<i>Vdr</i> #1	TGGAGATTGCCGCATCACCA	
<i>Vdr</i> #2	AGCGTTGAAGTGGAAGCCCG	
<b>shRNA target sequences</b>		
<i>Gpat1</i>	GCGAGAGGCGTTATCAGAATGCTGCGGAA	
<i>Gpat2</i> #1	CAGCAGAGGAGTAACCACAATGGTCAAGA	
<i>Gpat2</i> #2	CCATTGCCTATGACCTGGTTCCAGATGCA	
<i>Gpat3</i>	GATCAGCTTGCTGATTATAGGAACTACAC	
<i>Gpat4</i>	GATGAAGTGACAAAGAGATTCTCGGCAGA	
<b>RT-qPCR</b>	<b>Forward Primer</b>	<b>Reverse Primer</b>
<i>Vdr</i>	GAATGTGCCTCGGATCTGTGG	ATGCGGCAATCTCCATTGAAG
<i>Fgf23</i>	ATGCTAGGGACCTGCCTTAGA	GGAGCCAAGCAATGGGGAA
<i>Cyp24a1</i>	GCTGATGACCGACGGTGAG	GTGCGGTACAGAGCTTCCAG
<i>B-actin</i>	GGCTGTATTCCCCTCCATCG	CCAGTTGGTAACAATGCCATGT
<i>Gapdh</i>	TAACATCAAATGGGGTGAGG	GGTTCACACCCATCACAAAC
<i>Lpar1</i>	AGCCATGAACGAACAACAGTG	CATGATGAACACGCAAACAGTG
<i>Lpar2</i>	TGCTACTACAACGAGACCATCG	ATGGCTGCAATAACCAGCAGA
<i>Lpar3</i>	CAAGCGCATGGACTTTTTCTAC	GAAATCCGCAGCAGCTAAGTT
<i>Lpar4</i>	AGTGCCTCCCTGTTTGTCTTC	GCCAGTGGCGATTAAAGTTGTAA
<i>Gpat1</i>	CTTGGCCGATGTAAACACACC	CTTCCGGCTCATAAGGCTCTC
<i>Gpat2</i>	AGCAGAGGAGTAACCACAATGG	GGGCGATACTTCCCAGGA
<i>Gpat3</i>	CGGATTATCCCTGGGTATCTCG	CGAAGTCCCTTCCCTCGAAGAC
<i>Gpat4</i>	AACCTCCTGGGTATCTCCCTG	CCGTTGGTGTAGGGCTTGT
<i>Fgf23<sup>flf</sup></i> / <i>Dmpl-cre+</i>	ATTGCCAGTTTAGTTCCCTG	GACGCTTCTGAAGTAC GACGCTTCTGAAGTAC
<b>ChIP qPCR</b>	<b>Forward Primer</b>	<b>Reverse Primer</b>
<i>Fgf23</i> PR1	TGGAAGTGGGGACAGGTCAA	AAGCCAGTGCTCCCATAAGT
<i>Fgf23</i> PR2	CCTCATCCAGACGAGGGAAAC	TGTTAGGTGGGAGCATGAGC
<i>Fgf23</i> PR3	GCTTCCTGCCCTCTGATTCC	TGTTAGGTGGGAGCATGAGC
<i>Fgf23</i> PR4	TGCCTTCCAATGGACTGTGTG	CTGCAGAAATTGCTCTGTGCAT
<i>Fgf23</i> PR5	TCGCAGCAATCAGGAGACTG	ACCAAGACAGGGCCTCACTA
<i>Fgf23</i> PR6	GACCCTTCCCATTGGTTTCCA	AGCCTGGTTATTTTTCTCTTGTGC
<i>Fgf23</i> PR7	AAACCCATCGGTGACTGCAT	ACCCTCTACTGAGGAGCTGT
<i>Fgf23</i> PR1 = promotor region -395 to -311		
<i>Fgf23</i> PR2 = promotor region -797 to -661		
<i>Fgf23</i> PR3 = promotor region -902 to -661		



*Fgf23* PR4 = promotor region -1103 to -978  
*Fgf23* PR5 = promotor region -1569 to -1486  
*Fgf23* PR6 = promotor region -2.133 to 2.033  
*Fgf23* PR7 = promotor region -3390 to -3291