Supplemental Figure Legends

Supplemental Figure 1. Assessment of commercially available MafA and MafB antisera. Nuclear extracts were prepared 48 hours after HeLa cells were transfected with vector alone (pcDNA3.1) or mouse (m) and human (h) MafA or MafB expression constructs. Note that MafA BL1225 and MafB BL1228 recognize the human protein in the immunoblots, whereas MafB BL658 and MafA BL1069 (data not shown) only essentially detect the mouse.

Supplemental Figure 2. Biphasic glucose-stimulated insulin secretion in human islets. Human islets (N=8) were pre-cultured in 5 mmol/l glucose for 72 hours and then subjected to perifusion with 5.6 mmol/l glucose (G5.6, basal level) and 16.7 mmol/l glucose (G16.7) for 33 minutes as depicted. Data is expressed as average ± S.E.

Supplemental Figure 3. Insulin secretion in subset of human and mouse islet preparations normalized to IEQs and islet insulin content. Islets were cultured for 72 hours (human, N=5) or 24-48 hours (C57BL/6J, N=6) prior to perifusion with 5.6 mmol/l (G5.6), 16.7 mmol/l (G16.7) glucose, or 16.7 mmol/l glucose + 100 μmol/l IBMX (G16.7 + IBMX). (a,b) Insulin secretion in human (a) and C57BL/6J mouse islets (b) normalized to 100 IEQs. (c,d) Insulin secretion in human (c) and C57BL/6J mouse islets (d) normalized to islet insulin content. Inserts in (b, d) show basal secretion by human and C57BL/6J islets. (e) Integrated insulin secretion (AUC) expressed as ng/100 IEQs (16.7mmol/l glucose - closed bar; 16.7 mmol/l glucose +100 μmol/l IBMX – open bar). (f) Integrated insulin secretion (AUC) expressed in as % content (16.7mmol/l glucose - closed bar; 16.7 mmol/l glucose +100 μmol/l IBMX – open bar). (g) Islet insulin content normalized per IEQ in human (closed circles) and C57BL/6J mouse islets (open triangles, $p<0.0003$).

Supplemental Figure 4. Regulation of islet-enriched gene expression in human and mouse islets by 11 and 16.7 mmol/l glucose. (a) Human islets (N=3) were cultured for 48 hours in 5 mmol/l glucose, and then in 5 (closed bar), 11 (open bar), or 16.7 mmol/l glucose (hatched bar) for an additional 96 hours [human n=3, (a)], 6 hours [FVB n=4, (b)] or 24 hours [FVB n=4, (c)]. (b,c) FVB mouse islets (N=4) were cultured for 24 hours and in 5 mmol/l glucose, and then in 5 (closed bar), 11 (open bar), or 16.7 mmol/l

glucose (hatched bar) for an additional 6 (b) or 24 hours (c). The normalized RT-PCR determined amount of mRNA from 11 and 16.7 mmol/l glucose cultured islets was expressed relative to 5 mmol/l glucose alone. Note that the expression level of many mouse islet gene products activated in (c) by 11 mmol/l glucose was lower in 16.7 mmol/l (e.g. *MafA*, *Pdx1*, *Glut2,* $p < 0.05$). *, $p < 0.05$; ** $p < 0.01$; ***, $p < 0.001$ compared with islets cultured in 5 mmol/l glucose;

Supplemental Figure 5. MafA and Pdx1 protein levels were regulated by glucose. FVB islets were first incubated for 24 hours after isolation in 5 mmol/l glucose and then in either 5 mmol/l (G5) or 11 mmol/l (G11) for an additional 24 hours. Expression of MafA, MafB, and Pdx1 proteins in the islet samples was determined by immunoblotting. Note that MafA and Pdx1 protein levels were induced in 11 mmol/l glucose-treated mouse islets.