

## Supplemental Figures

Figure S1. Assessment of A01 labeling in transplanted islets. (A) Quantification of labeling frequencies with A01 element from *ARX* locus in Donors 4 and 6 (data for CMV, GUTR, and GUTR2 reproduced from Figure 3 for comparison). (B) Immunostaining of A01-directed labeling in transplanted islets.

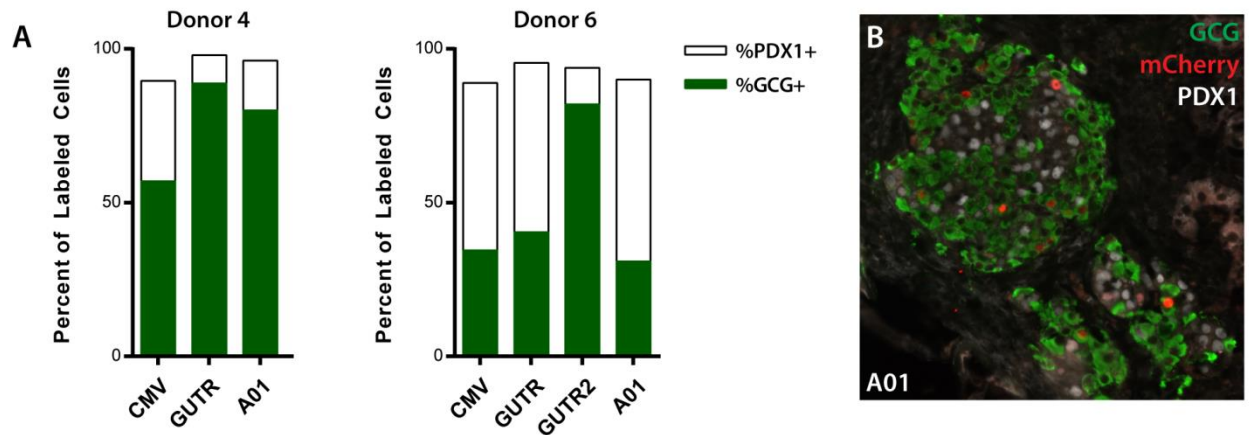
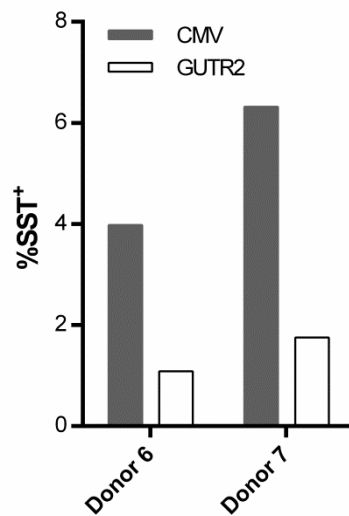


Figure S2. Labeling of  $SST^+$   $\delta$  cells by lenti-CMV-H2B:mCherry and lenti-GUTR2-H2B:mCherry constructs. Percentages refer to total  $mCherry^+$   $SST^+$  cells out of total  $mCherry^+$  cells.



## Supplemental Tables

**Table S1. Primer sequences for amplifying conserved regions**

Region	Primer 1	Primer 2
G01	ATAGTGACATCATGCGGTTGGTTA	GCTGACACTTGTCTCTGCACC
G02	ATTGCTCCATCCTTTCTGCCTGAA	GCTCTGCTGTCTGTCAGAACAC
G03	AAAAGTTCTGCCCCTAAAAATGAG	CTGGCCTGAGAGCTATTTTTAAAGG
G04	TTAACTCTGAAGAGCCACTTAACGA	TGAAACCCCGCCTCTACTAAAAATA
G05	AGTGGTTGATGAATACCAAGAGGAA	GGCATTCCCATTCTAGAAAATGAGG
G06	AAATACTTCTCCACCACTCTTCTC	TGCTGTAACAAATCACCACAACTT
G07	GGGTTCAAATTTTAGGCTGCTACTT	AATGGCTTGGACTCTTACTTTAGGT
G08	CAGGAGGCTGCAGAAGAATTTTTAA	AATACAAAAATTAGTTGGGCGTGGT
G09	AATAGAAACCCATACTCATCAGCA	GTCCAGGATATTAGGCTCTTAGGTG
GCG 3' UTR	CTATATCACTATTCAAGATCATCTTCACAA	TGGTAAAGAAGCTTGAAAATTTTATTTAATTGT
A01	GGTTAGATAGCGGGTTATAACGGAT	GAAGTTGGGTATTGGATTGTGACAA
A02	TCTGGCTAACCTGTCTGAAAATGTA	GAGAAGACTGAGGGAAAAGGAGTTG
A03	TCTCTCTCTCTCTCTGGCTTTTA	AATAGCATCCTCACTTGGGAAGATT
A04	TTGTGTAGCCAAATCTGTCTAGACA	AGCACTCTCTCACACACAAAGATAT
A05	CTACATATAAGGTGCATAGAGGGGG	TGTCTGAATGAAGGGGGTCTTAAAT
A06	TTGGAAACTGTTTGTGAAAGTCAA	AAGGGAGGAGACAGAATAAAGCAAT
GCG 5' UTR	GGTCTCTCACCCAATATAAGCATAGAA	CTTCTGGTAGTGTGCTGTAGAACA

**Table S2. Description of candidate regions**

Region	Size	Sequence Position*
G01	1.8 kb	-988 to +833
G02	3.7 kb	-473 to +3227
G03	1.3 kb	-15758 to -14433
G04	1.7 kb	-5991 to -4321
G05	1 kb	+5027 to +6067
G06	1.9 kb	+25089 to +27025
G07	1.4 kb	+51684 to +53111
G08	1 kb	+12093 to +13139
G09	1 kb	-7965 to -6915
GCG 3' UTR	0.5 kb	+9041 to +9530
A01	2.7 kb	-2557 to +124
A02	1 kb	+13970 to +14954
A03	0.9 kb	-2456 to -1549
A04	1.1 kb	+5835 to +6935
A05	1.6 kb	+15439 to +17086
A06	1.6 kb	+24467 to +26098
GCG 5' UTR	0.25 kb	-19 to +247

\* Nucleotide positions relative to transcription start site, sequence ID in methods

**Table S3. Efficiency of labeling of  $\alpha$  cells with Lenti-CMV-H2BmCherry**

Donor	% mCherry <sup>+</sup> $\alpha$ cells
Donor 3	34
Donor 5	28
Donor 7	32
Donor 8	11

**Table S4. In vitro specificity of candidate reporters for  $\alpha$  cells**

Region	Total mCherry <sup>+</sup> cells	% GCG <sup>+</sup>	%PDX1 <sup>+</sup>
CMV	411	19	59
RIP	536	3	99.6
rGcg	492	35	72
G01	83	29	69
G02	295	28	79
G03	2	0	100
G04	109	40	54
G05	304	36	57
G06	4	75	25
G07	46	7	100
G08	50	58	70
G09	10	80	30
GUTR	96	86	22
A01	313	45	69
A02	3	33	100
A03	3	33	100
A04	129	27	91
A05	0	0	0
A06	2	50	100

\*Percentages may add to more than 100% because of occasional coexpression of PDX1 and GCG during in vitro culture (see text).