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Supplemental Information

Spatiotemporal analysis of human intestinal development at single-cell resolution

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Table S1: Overview of key genes from scRNA-seq data, divided by each cell compartment, that exhibit relatively high or specific expression in each cell types used for characterisation annotation, related to Figure 1 (^afurther sub-division of secretory cells is also shown, ^bComparison made as proportion of each compartment cells, if cluster is locational specific comparison of time-point difference made only in that location and overall. Locational and time-point differences: Wilcox rank test, p-value <0.05 *; p-value <0.01 **; p-value <0.01 ***, p-value <0.001****)

Compartment	Compartment Genes	Cell Type	Key Genes (Cell Type)	Cluster Name (Graph abstraction number)	Key Genes (Cluster)	Locational Differences	Time-point Differences ^b
Epithelial	EPCAM, FABP1	Stem	LGR5, ASCL2, MYC	Proximal Stem Cells (1)	CASP1, GRIA4, PLA2G2A	Increased in small intestine (****)	No significant differences
				Distal Stem Cells (2)	LEFTY1, PTGDR, SMOC2	Increased in Colon (****)	Increases over time in colon and overall
		TA	MKI67, TOP2A, UBE2C	Proximal TA (3)	CENPM, TK1, UBE2T	Increased in small intestine (****)	Decreases over time overall
				Distal TA (4)	HMG3, MND1, TACC3	Increased in colon (****)	No significant differences
		Secretory ^a	FOXA2, INSM1, HES6	Secretory Progenitors (5-15)	ISL1, NEUROG3, GHRL	Increased in small intestine (**)	No significant differences
				EECs (5-15)	CHGA, TPH1, NEUROD1	No locational preference	Increases over time in colon, TI and overall
				Goblet cells (5-15)	MUC2, SPINK4, WFDC2	No locational preference	Increases over time in colon and overall
		Absorptive	FABP2, APOE (proximal), FAM3D (distal)	Proximal Progenitors (16)	FGG, SOX11, FGB	Increased in small intestine (**)	Decreases over time in TI and overall
				Proximal Early Enterocytes (17)	TF, AFP, VTN	Increased in small intestine (**)	No significant differences
				Proximal Enterocytes (18)	CCL25, HEBP1, OSR2	Increased in small intestine (***)	No significant differences
				Proximal Mature Enterocytes (19)	APOC3, ACE, FABP2	Increased in small intestine (**)	Increases over time in TI and overall
				Distal Absorptive (20)	CA12, HMGCS2, SLC13A2	Increased in colon (****)	No significant differences
				Distal Enterocytes (21)	SLC26A2, FABP1, CKB	Increased in colon (****)	No significant differences
				Distal Mature Enterocytes (22)	AQP8, FABP6, IL32	Increased in colon (****)	Increases over time in colon and overall
			N/A	BEST4/OTOP2 cells (23)	BEST4, OTO2, CA7	No locational preference	Increases over time in TI
Secretory ^a	N/A	Progenitor	N/A	NEUROG3+ Progenitor (5)	NEUROG3, CLPS, MDK	N/A	
		Goblet	MUC2, TFF3	Goblet 1(6)	UBE2C, PBK, MKI67		
				Goblet 2 (7)	TRABD2A, PTGDR, MYC		
				Goblet 3 (8)	SPDEF, WFDC2, ATOH1		
		EEC	Cluster specific	A-Cells/M-Cells (9)	CLEC4G, MLN, GHRL		
				D-Cells (10)	SST, HHEX, PCP4		
				Enterochromaffin Cells (11)	TPH1, RXFP4, CHGA		
				I-Cells (12)	CCK, GC, TDO2		
				L-Cells (13)	PYY, GCG, UCN3		
				N-Cells (14)	NTS, HOPX, MEP1A		
		Paneth	N/A	Paneth (15)	PRSS2, DEFA5, DEFA6		
Fibroblast	THY1, COL1A2, VIM	Cycling	N/A	Fibroblast G2M phase (24)	CENPF, TOP2A, MKI67	No locational preference	Decreases over time in colon, TI and overall
			N/A	Fibroblast S-Phase (25)	PCLAF, TYMS, GINS2	No locational preference	Decreases over time in colon, TI and overall
		Progenitor	N/A	Fibroblast progenitor (26)	HMG2, MBP, THY1(low)	No locational preference	Decreases over time in colon, TI and overall
		S1	ADAMDEC1, FABP5, CTSC	S1 (27)	PDLIM3, COL28A1, TFP12	Increased in colon (**)	Increases over time in colon and overall
				S1 COL6A5+ (28)	COL6A5, LXN, WNT4	Increased in small intestine (***)	Increases over time in TI
				S1 IFIT3+ (29)	IFIT3, CLEC2B, GPX3	No locational preference	Increases over time in colon, TI and overall
		S2	FRZB, SOX6, F3	Proximal S2 1 (30)	NPY, CXCL10, BMP2	Increased in small intestine (****)	Increases over time in TI
				Proximal S2 2 (31)	MMP11, INSC, BMP3	Increased in small intestine (****)	No significant differences

				Distal S2 (32)	<i>POSTN, ALKAL2, WNT5B</i>	Increased in colon (****)	Increases over time in colon and overall
				S3 progenitor (33)	<i>OSR2, NR2F1, PTN(low)</i>	No locational preference	Increases then decreases over time in colon and overall
				S3 Transitional (34)	<i>GREM1, GDF10, FBLN1</i>	No locational preference	Increases over time in colon, TI and overall
				S3 (35)	<i>RAMP1, SCN7A, SCUBE2</i>	No locational preference	Increases over time in colon, TI and overall
				S3 EBF+ (36)	<i>PRRX1, EBF3, EBF2</i>	Increased in colon (*)	Increases over time in colon and overall
				S3 HAND1+ (37)	<i>COL9A3, DLK1, HAND1</i>	Increased in colon(*)	Increases over time in colon and overall
				S4 CXL13+ (38)	<i>CXCL13, TNFSF11, CD24</i>	Increased in small intestine (*)	Increases over time in TI and overall
				S4 CCL21+ (39)	<i>CCL21, OLFM3, PTGDS</i>	No locational preference	Increases over time in colon, TI and overall
Myofibroblast /Mesothelium	<i>VIM, FOXF1, TAGLN, RSP02, RGS6(-)</i>	Cycling	N/A	Myofibroblast G2M phase (40)	<i>MKI67, CENPF, TOP2A</i>	No locational preference	No significant differences
			N/A	Myofibroblast S-phase (41)	<i>PCLAF, TYMS, GINS2</i>	No locational preference	Increases over time overall
		Myofibroblast	<i>THY1, NKX2-3, ACTG2</i>	Myofibroblast progenitors(42)	<i>ADAMDEC1, MFAP4, ADAM28</i>	No locational preference	Decreases over time in colon and overall
				Myofibroblasts (43)	<i>ACTA2, MYH11, GREM2</i>	No locational preference	Increases over time in colon, TI and overall
		Mesothelium	<i>MSLN, WT1, RSP01</i>	Mesothelium <i>IL18+</i> (44)	<i>IL18, GATA6, WNT10A</i>	No locational preference	No significant differences
				Mesothelium SOX6+ (45)	<i>SOX6, HPGD, STX2</i>	Increased in colon (**)	No significant differences
Endothelium	<i>PECAM1, CDH5, CLDN5</i>	Cycling	N/A	Endothelium G2M-phase (46)	<i>MKI67, CENPF, TOP2A</i>	No locational preference	Decreases over time in colon, TI and overall
				Endothelium S-phase (47)	<i>PCLAF, TYMS, GINS2</i>	No locational preference	Decreases over time in colon and overall
		Arterial	<i>GJA4, IGFBP3,, UNC5B</i>	Arterial (L) (48)	<i>HEY1, GJA5, ITGB4</i>	No locational preference	Increases over time in colon and overall
				Arterial (M) (49)	<i>UNC5B, DLL4, PRND</i>	No locational preference	Increases over time in colon
				Arterial (CP) (50)	<i>VWA1, AFG1L, EDNRB</i>	No locational preference	Increases over time in colon, TI and overall
				Arterial (CP) 2 (51)	<i>CHST1, LGALS1, IGFBP3</i>	No locational preference	Decreases over time in colon and overall
		Venous	<i>MADCAM1, APLNR, PRCP</i>	Venous (L) (52)	<i>ACKR1, VWF, ADGRG6</i>	No locational preference	Increases over time in colon and overall
				Venous (M) 1 (53)	<i>LRG1, PLVAP, STMN1(-)</i>	No locational preference	Increases over time in colon, TI and overall
				Venous (M) 2 (54)	<i>CALCRL, APLNR, PRCP</i>	No locational preference	Decreases over time overall
				Venous (CP) 1 (55)	<i>CCL2, CD69, RGCC</i>	No locational preference	Decreases over time in colon and overall
				Venous (CP) 2 (56)	<i>LDHB, JUNB(-), ZFP36(-)</i>	No locational preference	Decreases over time in colon, TI and overall
		Lymphatic	N/A	Lymphatic (57)	<i>LYVE1, PROX1, RELN</i>	No locational preference	Increases over time in colon and overall
Pericytes	<i>KCNJ8, ABCG9, RGS5, CSP4G</i>	Cycling	N/A	Pericyte G2M-phase (58)	<i>MKI67, CENPF, TOP2A</i>	No locational preference	Decreases over time in TI and overall
			N/A	Pericyte S-phase (59)	<i>PCLAF, TYMS, GINS2</i>	No locational preference	Decreases over time in colon and overall
		Pericytes	See compartment genes	Pericyte progenitors (60)	<i>THBS1, MBP,CEBPD</i>	No locational preference	Decreases over time in colon and overall
				Undifferentiated pericytes (61)	<i>CYGB, NFKBIA, TESC</i>	No locational preference	Increases over time in colon and overall
				WNT6+ pericytes (62)	<i>WNT6, GPAT2, THBS1(-)</i>	No locational preference	Increases over time in colon and overall
				Angiogenic pericyte (63)	<i>PROCR, EBF2, THBS4</i>	Increased in colon (**)	Increases over time in colon and overall
				BMPER+ pericytes (64)	<i>BMPER, CYGB, SPON2</i>	No locational preference	Increases over time in colon, TI and overall
				Contractile pericyte (65)	<i>ADIRF, MYH11, ACTA2</i>	No locational preference	Increases over time in colon and overall
Neural	<i>PHOX2B, HAND2, TUBB2B</i>	Cycling	N/A	Neural G2M & S-Phase (66)	<i>MKI67, CENPF, TOP2A</i>	No locational preference	Decreases in time in colon and overall
		Glial	<i>S100B, SOX10, PLP1</i>	Lymphoid associated glial (67)	<i>FGL2, GFRA3, RXRG</i>	Increased in colon (**)	Increases over time in colon and overall
				Intraganglionic glial (68)	<i>ENTPD2, SPRY1, SOX6</i>	No locational preference	Increases over time in colon, TI and overall
				Submucosal glia (69)	<i>CEBPD, SOCS3, ZFP36</i>	No locational preference	Increases in time in colon and overall
				Differentiating submucosal glial (70)	<i>BCAN, APOE, LAMP5</i>	No locational preference	Increases over time in colon and overall
				Glial progenitors (71)	<i>PHOX2B, HMGA2, CTGF</i>	No locational preference	Decreases over time in colon, TI and overall
		Neuronal	<i>ELAVL4, CHRNA3, GAP43</i>	ENS progenitors(72)	<i>DLL3, DLL1, ELAVL4(low)</i>	No locational preference	Decreases over time in colon and overall
				Neuroendocrine 1 (73)	<i>NEUROD6, SCGN, SSSTR2, NPY2R</i>	No locational preference	Increases in time in colon and overall
				Neuroendocrine 2 (74)	<i>DGKG, SST, KCTD16</i>	No locational preference	Increases in time in colon, TI and overall

				Excitory motor neuron (75)	<i>CASZ1, RAMP1, GFRA2</i>	No locational preference	No significant differences
				Inhibitory motor neuron precursor (76)	<i>SCGN, CRABP1, NOS1, VIP, ADCYAP1</i>	No locational preference	Decreases over time in T1 and overall
				Inhibitory motor neuron (77)	<i>NOS1, VIP, HTR2B, ETV1</i>	No locational preference	Increases then decreases in time in colon and overall
				Interneuron (78)	<i>PENK, ACHE, TAC1, ONECUT2</i>	No locational preference	Decreases over time
Immune	PTPRC	Macrophage	<i>MERTK, CTSC, CTSD, CD14 (hi)</i>	Macrophage (79)	<i>FGL2, HES1, SLC40A1</i>	Increased in colon (*)	Increases over time in colon and overall
				Macrophage SPP1+ (80)	<i>SPP1, RNASE1, FOLR2</i>	Increased in colon (*)	No significant differences
		Monocyte	<i>CD14 (lo)</i>	Monocyte (81)	<i>FCN1, S100A8, CLEC12A</i>	No locational preference	No significant differences
		Dendritic cell	<i>ETV6, FLT3</i>	pDCs (82)	<i>IL3RA, LILRA4, PTCRA</i>	No locational preference	No significant differences
				DCs (83)	<i>CD207, BATF3, CD1D</i>	No locational preference	No significant differences
		Adaptive lymphoid cells	<i>CD19, EBF1, PAX5</i>	Pre B Cell (84)	<i>IGLL1, VPREB1, RAG1</i>	No locational preference	No significant differences
				B cell (85)	<i>BANK1, CD79B, IGHD</i>	No locational preference	Increases over time in colon, T1 and overall
		Innate lymphoid cells	<i>ETS1, TOX</i>	Naïve T Cell (86)	<i>CD3D, CD3G, CD27</i>	No locational preference	Increases over time in colon, T1 and overall
				NKs and γδ (87)	<i>CD8A, IL2RB, TRDC</i>	Increased in small intestine (*)	No significant differences
				Type 3 ILCs (88)	<i>IL7R, ID2, RORC, KRT86</i>	No locational preference	Increases over time in colon and overall
		Eosinophils	N/A	Mast (89)	<i>TPSAB1, CPA3, MS4A2</i>	No locational preference	Increases over time in T1 and overall. Decreases in colon.
		Cycling	N/A	Immune Cell cycle (90)	<i>MKI67, CENPF, TOP2A</i>	No locational preference	Decreases over time in colon, T1 and overall
Muscle	MYH11, ACTG2, TAGLN	Cycling	N/A	Muscularis G2M phase (91)	<i>MKI67, CENPF, TOP2A</i>	No locational preference	Decreases then increases over time in colon
				Muscularis S-phase (92)	<i>PCLAF, TYMS, GINS2</i>	No locational preference	No significant differences
		Interstitial Cells	<i>KIT</i>	Interstitial Cells of Cajal / ICCs (93)	<i>ANO1, ETV1, SPON2</i>	No locational preference	No significant differences
				PDGFRA+ cells (94)	<i>PDGFRA, ITGA8, BMP4</i>	No locational preference	Decreases over time in colon and overall
		Outer muscularis	<i>FOXF2(-)</i>	OM (95)	<i>BCHE, CAPN3, IGFBP5</i>	No locational preference	Increases over time in colon and overall
		Inner muscularis (IM)	<i>FOXF2, ACTC1</i>	Proximal IM (96)	<i>IGFBP2, HOXC8, IGFBP7</i>	Increased in small intestine (****)	No significant differences
				Distal IM (97)	<i>PNCK, MORN5, AHNAK2</i>	Increased in colon (***)	Increases over time in colon and overall
				Proximal MM (98)	<i>PLCG2, NPNT, IGF1</i>	Increased in small intestine (****)	No significant differences
				Distal MM (99)	<i>PLN, MOXD1, TMEM158</i>	Increased in colon (***)	Increases over time in colon and overall
				IM PMAIP1+ (100)	<i>PMAIP1, HMGCS1, KRT17</i>	No locational preference	Increases then decreases over time in colon and overall. Increases in T1.
		IM progenitor	N/A	IM progenitor (101)	<i>HOXC5, PLPP2, MYOCD</i>	No locational preference	Decreases over time overall.