**Table S1.** Information about organoid donors from different human tissues

| Tissue | Donor ID | Specific biopsy information | Collaborating research team | Research Ethics Committee (REC) | REC # | HMDMC/ HumFre # |
|---|---|---|---|---|---|---|
| Gastric | D88 | Normal gastric tissue from the upper stomach was removed from two patients (Donor 88 and Donor 95) that were undergoing biopsy for an oesophageal tumour. Organoid cultures were derived from the tissue at the Sanger Institute as previously described (Li 2018). | Hayley Francies/ Mathew Garnett (Sanger) | London - Camden and Kings Cross Research Ethics Committee | 16/L0/1110 | 18/054 |
| | D95 | | | | | |
| Colon | SC311 (D311) | Normal sigmoid colon tissue taken by endoscopy from healthy, control donors (note that this was part of an IBD study). | Matthias Zilbauer (Department of Paediatrics, University of Cambridge) | East of England Cambridge South Research Ethics Committee | 17/EE/0265 | 21/0016 |
| | SC351 (D351) | | | | | |
| Kidney | JD021 (D21) | Normal tissue was taken following nephrectomy or biopsy. (REF: An organoid biobank for childhood kidney cancers that captures disease and tissue heterogeneity; 2020) | Jarno Drost (Princess Maxima Centre for Pediatric Oncology, Utrecht, the Netherlands) | Medical ethical committee of the Erasmus Medical Center (Rotterdam, the Netherlands). | MEC-2016-739 | 21/0015 |
| | JD050 (D50) | | | | | |
| Pancreas | D39 | Biopsies of normal pancreatic or liver tissue were obtained from deceased patients during surgery for organ transplantation. | Meritxell Huch (Max Planck Institute of Molecular Cell Biology and Genetics)/ Kourosh Saeb-Parsy (Department of Surgery, Addenbrookes Hospital) | NRES Committee East of England - Cambridge Central | 12/EE/0253; 16/EE/0227 | 18/071 |
| | D44 | | | | | |
| Liver | D4 | | | | | 18/071 |

**Table S2.** Growth media recipes for organoids derived from different human tissues

| Medium component | Final concentration | | | | | | | Source |
|---|---|---|---|---|---|---|---|---|
| | Schlaermann | Pancreas | Liver | Kidney | Colon | Liver Starting | Liver Differentiation | |
| Advanced DMEM/F12 | √ | √ | √ | √ | √ | √ | √ | Life technologies, #12634-010 |
| HEPES | 10 mM | 10 mM | 10 mM | 10 mM | 10 mM | 10 mM | 10 mM | Life Technologies, #15630-056 |
| Glutamax | 1X | 1X | 1X | 1X | 1X | 1X | 1X | Life technologies, #35050-038 |
| WNT3A CM | 50% | - | - | - | 50% | 30% | - | ATCC CRL-2647 cell line |
| R-Spondin-1 CM | 25% | 10% | 10% | 10% | 20% | 10% | - | Cultrex, #3710-001-01 |
| N-acetyl cysteine | 1.25 mM | 1.25 mM | 1.25 mM | 1 mM | 1.25 mM | 1.25 mM | 1.25 mM | Sigma, #A9165 |
| Human Noggin | 150 ng/mL | 25 ng/mL | - | - | - | 25 ng/mL | - | Peprotech, #120-10C |
| Mouse Noggin | - | - | - | - | 100 ng/mL | - | - | Peprotech, #250-38-250ug |
| Recombinant Human EGF | 20 ng/mL | 50 ng/mL | 50 ng/mL | 50 ng/mL | - | 50 ng/mL | 50 ng/mL | Gibco, #PHG0313 |
| Recombinant Mouse EGF | - | - | - | - | 50 ng/mL | | | Gibco, #PMG8041 |
| FGF-10 | 150 ng/mL | 100 ng/mL | 100 ng/mL | 100 ng/mL | - | 100 ng/mL | - | Peprotech, #100-26-25 |
| HGF | - | - | 25 ng/mL | - | - | 25 ng/mL | 25 ng/mL | Peprotech, #100-39 |
| Gastrin I human | 10 nM | 10 nM | 10 nM | - | 10 nM | 10 nM | 10 nM | Sigma, #G9020 |
| FGF-19 | - | - | - | - | - | - | 100 ng/mL | R&D, #969-FG-025 |
| B27 Supplement (+ Vitamin A) | 1X | - | - | 1.50% | 1X | - | 1X | Invitrogen, #17504001 |
| B27 Supplement (- Vitamin A) | - | 1X | 1X | - | - | 1X | - | Invitrogen, #12587001 |
| A83-01 | 1 µM | 5 µM | 5 µM | 5 µM | 0.5 µM | 5 µM | 0.5 µM | Tocris, #2939 |
| PGE2 | - | 3 µM | - | - | - | - | - | Tocris, #2296 |
| N2 Supplement | 1X | 1X | 1X | - | - | 1X | 1X | Gibco, #17502001 |
| Forskolin | - | 10 µM | 10 µM | - | - | 10 µM | - | Tocris, #1099 |
| Nicotinamide | 10 mM | 10 mM | 10 mM | - | 10 mM | 10 mM | - | Sigma, #N0636 |
| SB202190 | 2 µM | - | - | - | 10 µM | - | - | Stem Cell Technologies, #72634 |
| DAPT | - | - | - | - | - | - | 10 µM | Sigma, #D5942 |

| Medium component | Final concentration | | | | | | | Source |
|---|---|---|---|---|---|---|---|---|
| | Schlaermann | Pancreas | Liver | Kidney | Colon | Liver Starting | Liver Differentiation | |
| Dexamethasone | - | - | - | - | - | - | 3 µM | Sigma, #D4902 |
| BMP7 | - | - | - | - | - | - | 25 ng/mL | Peprotech, #OP1 120-03 |
| hES Cell Cloning and Recovery | - | - | - | - | - | 1X | - | Stemgent, #01-0014-500 |

**Table S3.** Genes identified as biologically relevant in at least three organoid types after HT RT-qPCR analysis

| | | | | Gene Classification | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Xenobiotic metabolism | | Oxidative stress response | Transcription factors | Apoptosis | | | Proliferation and cell cycle control | | | | DNA damage response and repair | | | | | |
| | | | | ***NQO1*** | ***UGT1A*** | ***TXNRD1*** | ***MDM2*** | ***PMAIP1*** | ***BAX*** | ***BBC3*** | ***CDKN1A*** | ***CDKN2B*** | ***IL8*** | ***PLK3*** | ***BRCA1*** | ***DDB2*** | ***GADD45A*** | ***MGMT*** | ***RRM2B*** | ***XPC*** |
| **Average log2-fold ratio of BaP-treated samples to vehicle control (BaP [µM])** | Stomach | D88 | **12.5** | 0.1954 | 0.1109 | 0.0668 | 1.8081 | 0.4064 | 1.5964 | 1.2767 | 2.7463 | 0.3204 | 0.6491 | 1.0188 | 0.3776 | 1.9346 | 0.8413 | -0.3333 | 1.5188 | 0.7310 |
| | | | **50** | 0.6975 | 0.7433 | 0.7190 | 2.9285 | 1.6151 | 2.1393 | 2.0772 | 4.0546 | 1.1509 | 1.7934 | 2.0144 | -0.1391 | 2.8355 | 1.8918 | -1.6464 | 2.3348 | 1.6096 |
| | | D95 | **1.56** | 0.0650 | 0.0793 | 0.0222 | 0.2590 | 0.2369 | 0.1380 | 0.1959 | 0.3681 | -0.0008 | 0.3172 | 0.3450 | 0.2100 | 0.3417 | 0.1654 | 0.0477 | 0.0829 | 0.0831 |
| | | | **12.5** | 0.6171 | 0.5085 | 0.3664 | 1.1179 | 0.5993 | 0.5565 | 0.6560 | 1.2007 | -0.2583 | 0.5505 | 0.6182 | 0.5037 | 0.9507 | 0.6479 | -0.5632 | 0.7152 | 0.5531 |
| | Pancreas | D44 | **12.5** | 0.6749 | 2.2367 | 0.5952 | 1.9156 | 0.7579 | 0.9065 | 1.7614 | 2.1599 | 0.3902 | 0.1287 | 0.7528 | -0.2945 | 1.5017 | 0.9838 | -0.6160 | 1.2767 | 0.6689 |
| | | | **50** | 1.6698 | 3.8430 | 1.8294 | 2.4969 | 2.0918 | 1.2295 | 2.7522 | 2.9155 | 1.7688 | 0.4499 | 1.0070 | -0.9679 | 2.1531 | 2.1940 | -1.9658 | 1.9655 | 1.5219 |
| | | D39 | **12.5** | 0.9859 | 3.0186 | 0.9398 | 1.9035 | 0.7592 | 0.7680 | 1.6830 | 1.9245 | 0.7057 | -0.0950 | 0.6432 | -0.8505 | 1.5440 | 1.1394 | -1.0585 | 1.2977 | 0.6032 |
| | | | **50** | 1.5104 | 3.8031 | 1.5510 | 2.0703 | 1.4753 | 1.0173 | 2.0862 | 2.2105 | 1.4575 | 0.1829 | 0.7543 | -1.3242 | 2.0619 | 1.8033 | -1.5218 | 1.6114 | 1.1281 |
| | Liver | D4 Und. | **12.5** | 0.5052 | 1.4298 | 0.3759 | 0.7229 | 0.6970 | 0.3863 | 0.6511 | 0.9631 | 0.3519 | 0.2919 | 0.0597 | 0.1309 | 0.5581 | 0.4044 | -0.6940 | 0.4218 | 0.2379 |
| | | | **50** | 1.2151 | 2.4602 | 1.2826 | 1.2888 | 1.7066 | 0.7195 | 1.3660 | 1.6892 | 1.1711 | 0.3058 | 0.4803 | 0.1610 | 1.1608 | 1.2959 | -1.3105 | 1.0362 | 0.8392 |
| | | D4 Diff. | **12.5** | 0.1107 | 0.5825 | 0.0725 | 0.4916 | 0.7239 | 0.2229 | 0.3288 | 0.6074 | 0.0264 | 0.1942 | 0.2643 | -0.3718 | 0.4305 | 0.2076 | -0.6019 | 0.3856 | 0.1106 |
| | | | **50** | 0.7195 | 1.5815 | 0.4717 | 0.9602 | 1.1142 | 0.5028 | 0.5818 | 1.0763 | 0.1660 | -0.0274 | 0.4475 | -0.2611 | 0.7856 | 0.3577 | -1.0616 | 0.7295 | 0.5379 |
| | Kidney | D50 | **12.5** | 1.7180 | 1.6468 | 1.4455 | 2.0680 | 1.1573 | 0.9544 | 1.8907 | 2.5837 | 1.6348 | 1.0841 | 1.9191 | -0.6292 | 1.4419 | 1.4544 | -0.2874 | 1.7112 | 0.6360 |
| | | | **50** | 3.1033 | 2.5711 | 2.2397 | 2.4257 | 2.7607 | 1.2659 | 2.1887 | 2.8660 | 2.8197 | 2.2176 | 2.7293 | -1.1169 | 1.6931 | 2.1243 | -1.5874 | 2.3221 | 1.5109 |
| | | D21 | **12.5** | 1.4791 | 1.4132 | 0.8611 | 2.0467 | 0.5983 | 1.1559 | 2.0626 | 2.7150 | 1.3012 | 2.1161 | 1.5611 | -0.8030 | 1.7584 | 0.9925 | -0.2191 | 1.5220 | 0.7216 |
| | | | **50** | 3.0202 | 2.5109 | 1.4868 | 2.7795 | 2.4745 | 1.3636 | 2.6361 | 3.3010 | 2.7446 | 4.3890 | 2.5338 | -1.0518 | 2.4143 | 2.2375 | -1.7270 | 2.5928 | 1.7610 |
| | Colon | D311 | **25** | 0.7400 | 0.8895 | 0.7096 | 1.6908 | 0.6284 | 0.7048 | 0.7963 | 1.1208 | 0.5175 | 1.5690 | 1.2815 | -0.8472 | 1.0182 | 0.7101 | -0.3672 | 1.2911 | 0.6157 |
| | | | **50** | 1.0302 | 1.0813 | 1.2215 | 2.1740 | 0.9385 | 1.2044 | 1.1924 | 1.4331 | 0.7611 | 2.2522 | 1.6916 | -2.1199 | 1.2714 | 1.2842 | -1.1890 | 1.6062 | 1.0023 |
| | | D351 | **25** | 0.7232 | 0.9257 | 0.8630 | 1.4591 | 0.5465 | 0.7188 | 0.8728 | 1.1829 | 0.5887 | 1.5499 | 1.1955 | -0.9431 | 1.0530 | 0.8153 | -0.2987 | 0.9556 | 0.6112 |
| | | | **50** | 1.1014 | 1.1407 | 1.4017 | 1.7968 | 0.9474 | 0.7864 | 1.1372 | 1.4766 | 0.7751 | 2.2392 | 1.5600 | -1.7755 | 1.2543 | 1.1617 | -0.8674 | 1.2854 | 0.7091 |