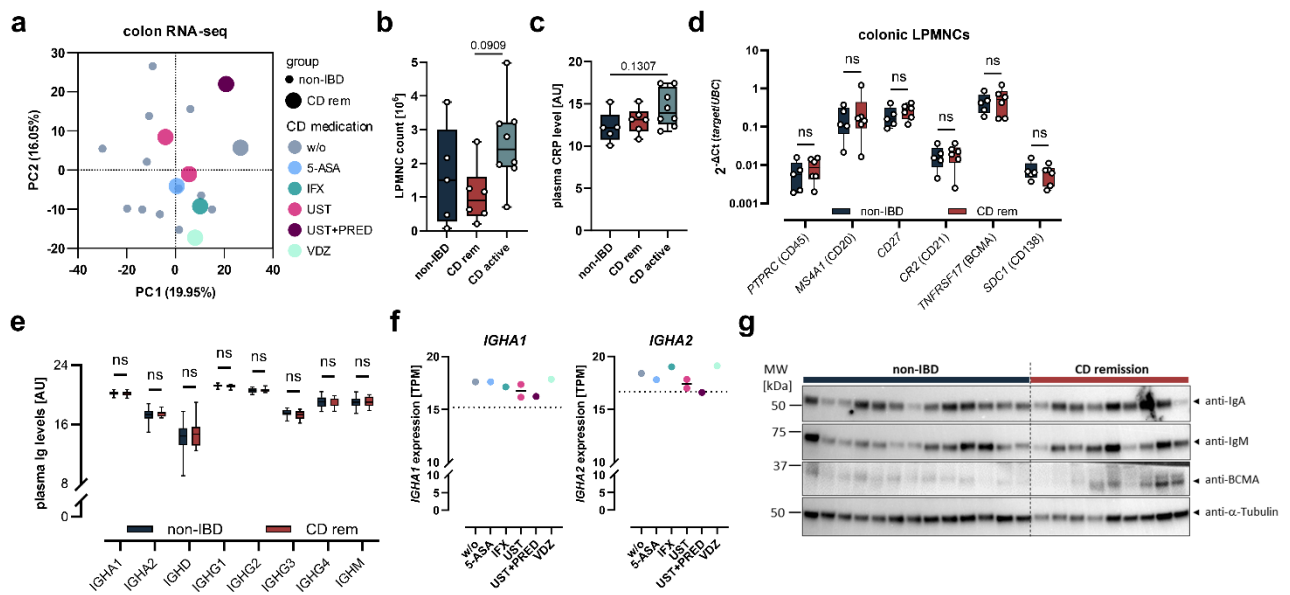
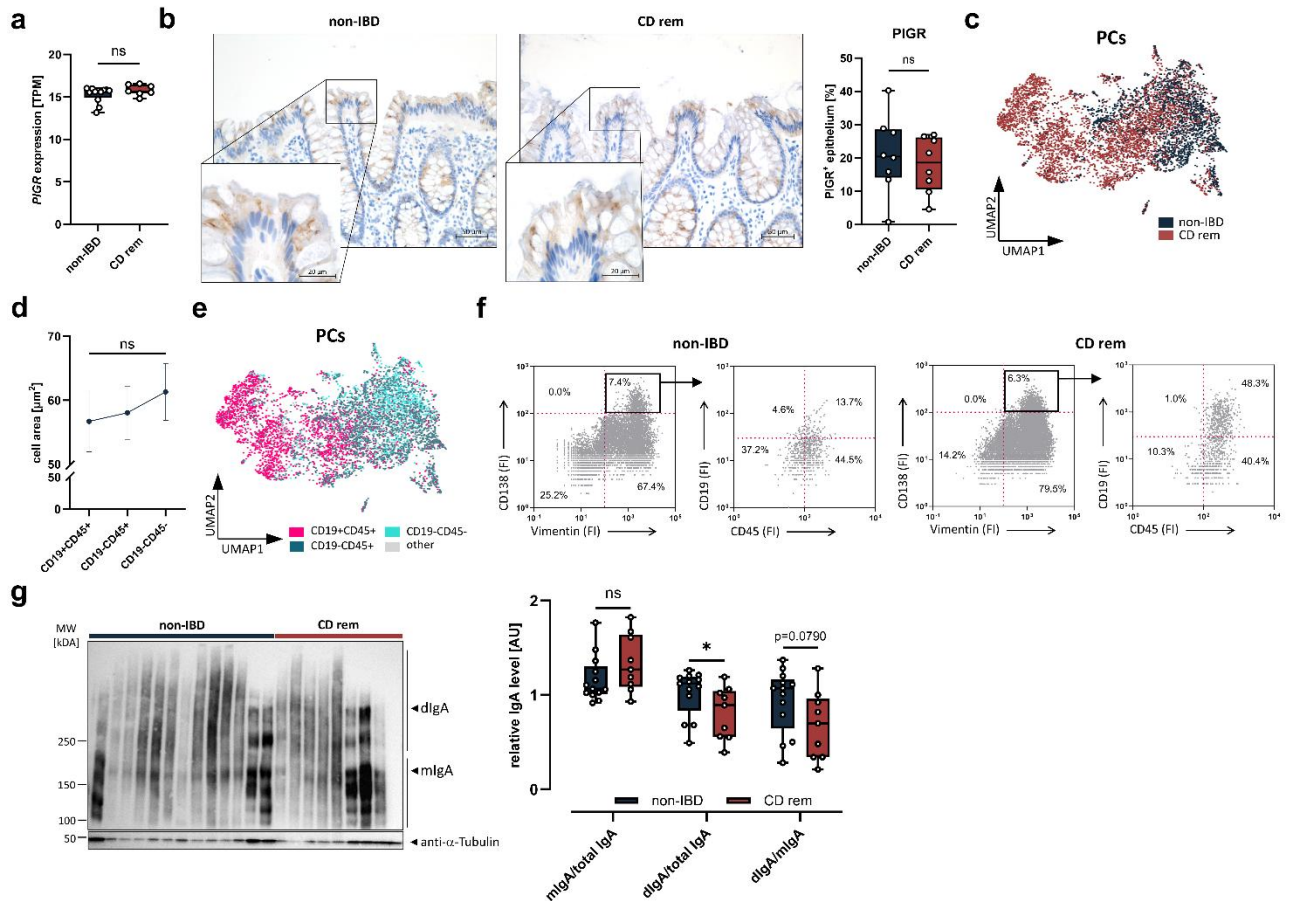


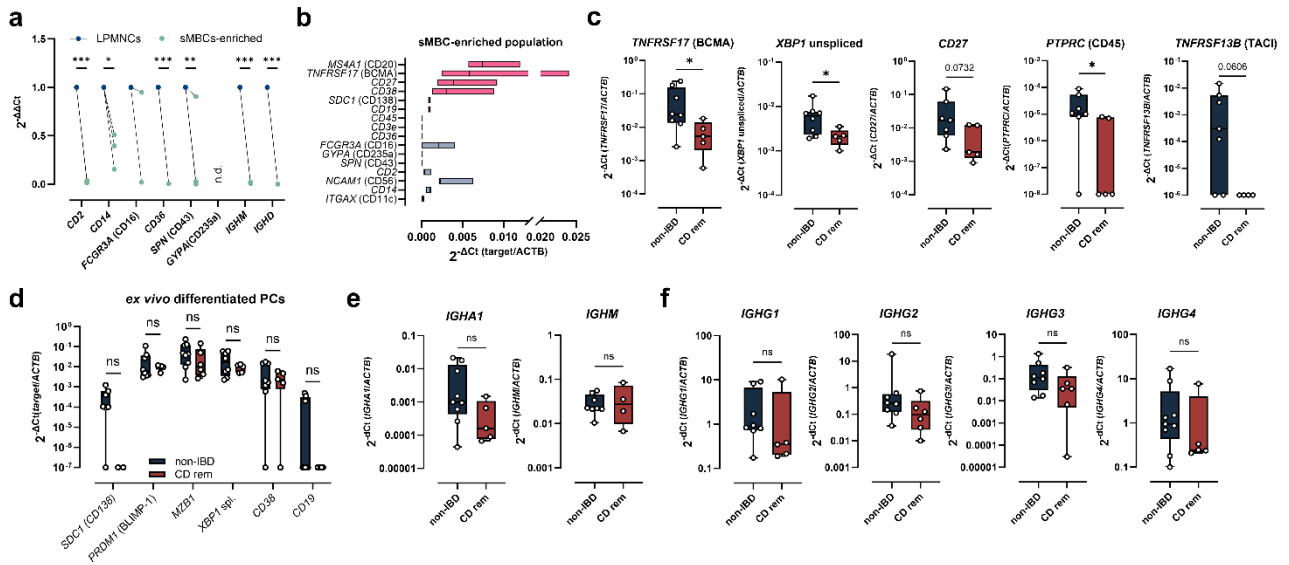
## 1 Supplementary Figures



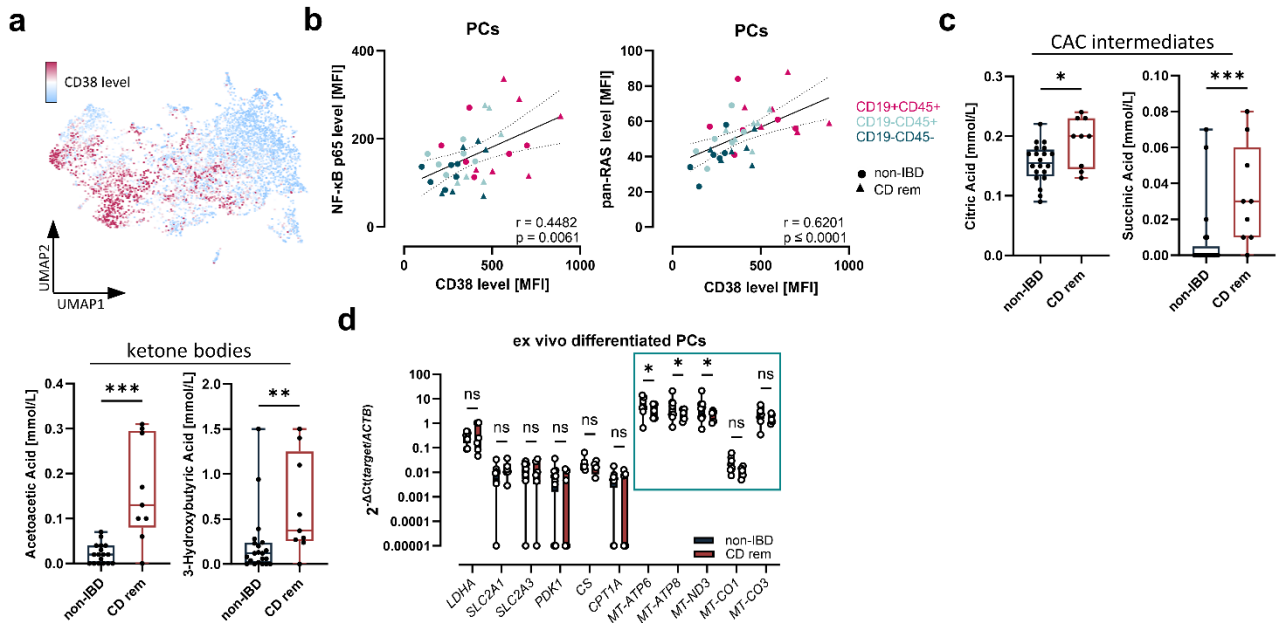
**2 Supplementary Fig. 1 | Characterization of colonic LPMNCs and Ig levels in CD<sup>rem</sup> patients and non-**  
**3 IBD controls. (a)** PCA displaying the colonic transcriptomic profile (standardized TPM values of the 1,000  
**4** most variable genes) of CD<sup>rem</sup> patients receiving different medications (n=7) and non-IBD controls (n=12).  
**5 (b)** Cell count of isolated colonic LPMNCs (CD<sup>rem</sup> n=6, CD<sup>active</sup> n=8, non-IBD n=5). **(c)** Plasma CRP levels  
**6** were determined using LC-MS proteomics (CD<sup>rem</sup> n=6, CD<sup>active</sup> n=8, non-IBD n=5). **(d)** Expression of not  
**7** significantly regulated B-cell markers in the isolated colonic LPMNCs of CD<sup>rem</sup> (n=6) and non-IBD (n=5)  
**8** was quantified using RT-qPCR. **(e)** Plasma Ig levels of CD<sup>rem</sup> patients (n=10) and non-IBD controls (n=21)  
**9** were quantified using LC-MS proteomics. **(f)** Colonic expression of *IGHA1* and *IGHA2* of CD<sup>rem</sup> patients  
**10** was quantified *via* RNA-seq and displayed as transcripts per million (TPM) grouped by medication. **(g)**  
**11** Detection of colonic IgA, IgM, and BCMA in CD<sup>rem</sup> (n=9) and non-IBD (n=13) *via* Western blotting. **(b)** and  
**12 (c)** Kruskal-Wallis test with Dunn's multiple comparisons test, **(d)** Two-way ANOVA with Šídák's multiple  
**13** comparisons test, **(e)** Multiple Mann-Whitney *U* test. 5-ASA, Mesalazine; AU, arbitrary units; IFX, Infliximab;  
**14** UST, Ustekinumab; PRED, Prednisolone; VDZ, Vedolizumab.



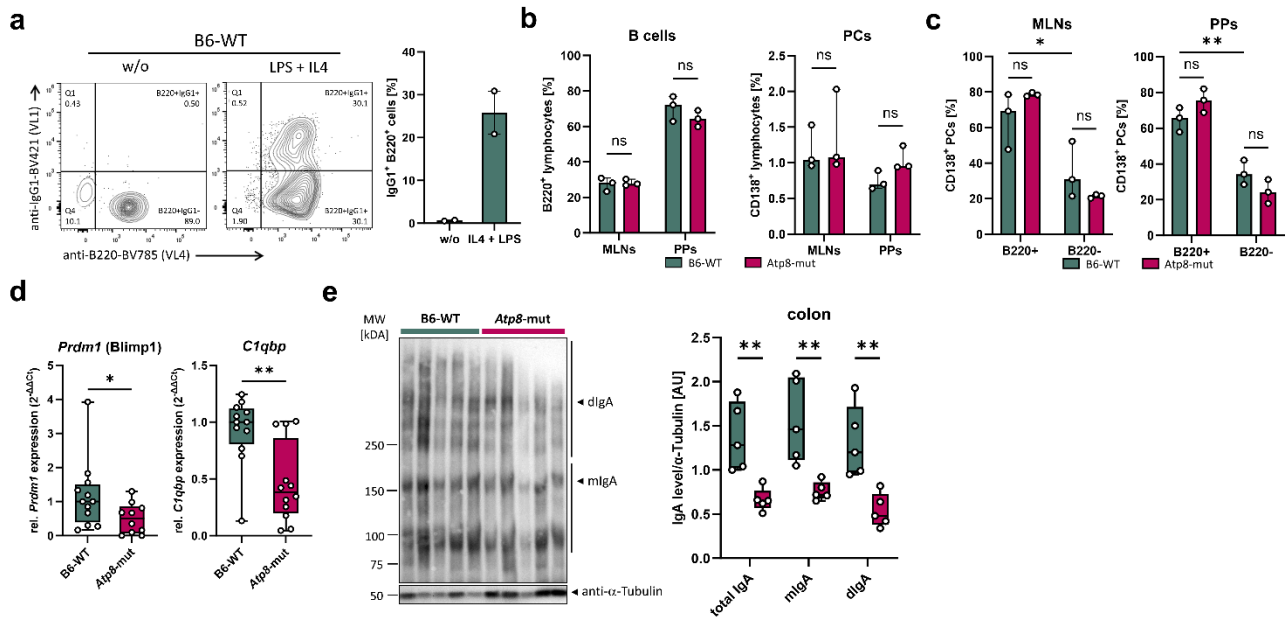
**Supplementary Fig. 2 | Analysis of colonic PIGR levels, PCs and dIgA in CD<sup>rem</sup> patients.** (a) Colonic expression of *PIGR* in CD<sup>rem</sup> (n=7) and non-IBD (n=12) from RNA-seq data is displayed as transcripts per million (TPM). (b) IHC staining of colonic plgR (CD<sup>rem</sup> n=8, non-IBD n=8) (left) and quantification of epithelial plgR (right). (c) UMAP of total colonic CD138<sup>+</sup> PCs of the second SSCP experiment (CD<sup>rem</sup> n=3, non-IBD n=3). (d) Median cell area of mucosal PC subpopulations of six non-IBD controls was determined using cell segmentation of SSCP. (e) UMAP displaying the colonic CD138<sup>+</sup> PC subtypes of CD<sup>rem</sup> patients (n=3) and non-IBD controls (n=3) of the second SSCP experiment. (f) Representative scatter plots of PCs (Vim<sup>+</sup>CD138<sup>+</sup>) from total colonic mucosal cells of a non-IBD patient (left) and a CD<sup>rem</sup> patient (right) analyzed for the expression of CD19 and CD45. (g) Detection of non-reduced mIgA and dIgA in colonic biopsies of CD<sup>rem</sup> patients (n=9) and non-IBD controls (n=13) via Western blotting (left) and quantification of mIgA/total IgA, dIgA/total IgA, and dIgA/mIgA ratios (right). (a), (b), and (g) (Multiple) Mann-Whitney *U* test, (d) Kruskal-Wallis test with Dunn's multiple comparisons test. \**P*≤.05. AU, arbitrary units; FI, fluorescence intensity.



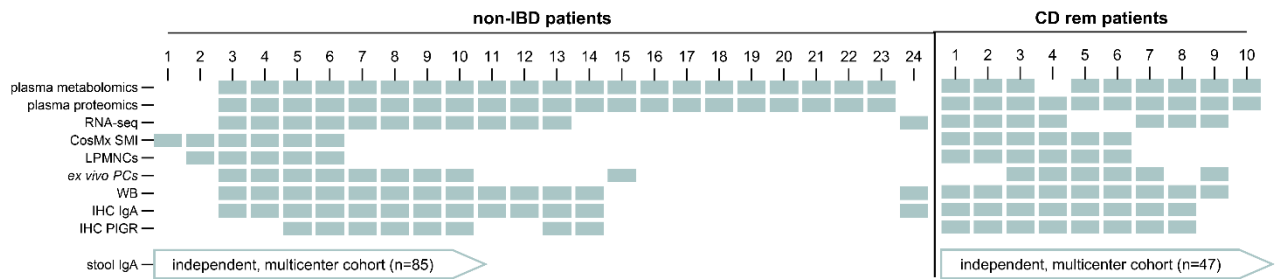
**Supplementary Fig. 3 | Phenotyping of ex vivo differentiated colonic PCs.** (a) Depletion of cells positive for CD2, CD14, CD16, CD36, CD43, CD235a, IgM, or IgD via MACS was verified by RT-qPCR using LPMNCs and isolated sMBCs (n=3 each). Expression of each target gene was normalized to the housekeeper *UBC* ( $2^{-\Delta Ct}$ ) and depicted as relative mRNA expression to the respective LPMNCs ( $2^{-\Delta\Delta Ct}$ ). (b) Expression of B-cell related transcripts (pink) and transcripts present in T cells, natural killer (NK) cells, monocytes, macrophages, erythrocytes, dendritic cells (DCs) or granulocytes (bluish gray) in the sMBC-enriched cell population was determined using RT-qPCR. (c) Expression of not significantly regulated PC markers in CD<sup>rem</sup>- (n=2-6) and non-IBD-derived (n=7-9) ex vivo differentiated colonic PCs on Day 14 was quantified using RT-qPCR. (d) Expression of *TNFRSF17*, *XBP1 unspliced*, *CD27*, *TNFRSF13B*, and *PTPRC* in ex vivo differentiated colonic PCs from CD<sup>rem</sup> and non-IBD. (e) Expression of *IGHA1* and *IGHM* transcripts in ex vivo differentiated CD<sup>rem</sup>- or non-IBD-derived colonic PCs. (f) Expression of *IGHG1*, *IGHG2*, *IGHG3*, and *IGHG4* in ex vivo differentiated CD<sup>rem</sup>- and non-IBD-derived colonic PCs. (a) Two-way ANOVA with Bonferroni's multiple comparisons test, (c)-(f) (Multiple) Mann-Whitney *U* test for comparison of CD<sup>rem</sup> against non-IBD. \* $P \leq .05$ , \*\* $P \leq .01$ , \*\*\* $P \leq .001$ . AU, arbitrary units; n.d., not detected.



1 **Supplementary Fig. 4 | Analysis of CD38 expression and mitochondrial metabolism in CD<sup>rem</sup>.** (a)  
2 UMAP displaying the level of CD38 within all colonic PCs of CD<sup>rem</sup> patients (n=3) and non-IBD  
3 (n=3) of the second SSCP experiment. (b) Correlation of CD38 levels with NF-κB p65 (left) and pan-RAS  
4 levels (right) across all three colonic CD138<sup>+</sup> PC subpopulations in CD<sup>rem</sup> (n=6) and non-IBD (n=6). (c)  
5 Plasma levels of citric acid, succinic acid, acetoacetic acid, and 3-hydroxybutyric acid in CD<sup>rem</sup> patients  
6 (n=9) compared to non-IBD controls (n=21). (f) Expression levels of metabolic enzyme(s) (subunits) were  
7 determined in non-IBD- and CD<sup>rem</sup>-derived ex vivo differentiated colonic PCs on Day 14 using RT-qPCR  
8 with mitochondrial genes highlighted in a green box. (b) Spearman correlation and linear regression with  
9 95% confidence interval (dashed lines), (d) Mann-Whitney *U* test, (d) Two-way ANOVA with Fisher's least  
10 significant difference (LSD) test. \* $P \leq 0.05$ , \*\* $P \leq 0.01$ , \*\*\* $P \leq 0.001$ . MFI, median fluorescence intensity.



1 **Supplementary Fig. 5 | Comparison of the intestinal B-cell/PC compartment between *Atp8*-mutant**  
2 **and B6-WT mice. (a)** Representative contour plots of B220 and IgG1 on splenic B cells of B6-WT mice  
3 (left) show the generation of IgG1<sup>+</sup> B cells upon stimulation with LPS+IL4 (right). **(b)** Percentages of B220<sup>+</sup>  
4 B cells (left) and CD138<sup>+</sup> PCs (right) in the lymphocytes isolated from MLNs and PPs of *Atp8*-mutant and  
5 B6-WT mice. **(c)** Percentages of B220<sup>+</sup> and B220<sup>-</sup> CD138<sup>+</sup> PCs isolated from the MLNs (left) and PPs (right)  
6 of *Atp8*-mutant (n=3) and B6-WT mice (n=3). **(d)** Expression of *Prdm1* and *C1qbp* mRNA was quantified in  
7 colonic tissue of *Atp8*-mutant (n=10-12) and B6-WT mice (n=12) via RT-qPCR. Data were normalized to  
8 *Actb* and are displayed as values relative to B6-WT mice for each sampling round. **(e)** Quantification via  
9 Western blotting indicated reduced total IgA, mIgA, and dIgA in colonic samples from *Atp8*-mutant (n=5)  
10 compared to B6-WT mice (n=5). **(b)**, **(c)**, and **(e)** Two-way ANOVA with Šídák's (B and F) or Tukey's (C)  
11 multiple comparisons test, **(d)** Mann-Whitney *U* test. \**P*≤.05, \*\**P*≤.01. AU, arbitrary units.



- 1 **Supplementary Fig. 6 | Patient-Method matrix.** Matrix displaying which of the 24 non-IBD control patients
- 2 (left) and 10 CD<sup>rem</sup> patients (right) were included in each method in this study.

## Supplementary Tables

**Supplementary Table 1.** Patient characteristics of plasma and stool samples.

|                |                                                                                               | Non-IBD                          | CD remission                                                                                            |
|----------------|-----------------------------------------------------------------------------------------------|----------------------------------|---------------------------------------------------------------------------------------------------------|
| Plasma samples |                                                                                               |                                  |                                                                                                         |
| Metabolomics   | Total number of patients                                                                      | 21                               | 9                                                                                                       |
|                | Female/male                                                                                   | 16 (76.2)/5 (23.8)               | 5 (55.6)/4 (44.4)                                                                                       |
|                | Age, y                                                                                        | 60.0 (48.0-65.0)                 | 50.0 (38.5-61.0)                                                                                        |
|                | Macroscopic inflammation                                                                      |                                  |                                                                                                         |
|                | Terminal Ileum/ICV/Colon/NA                                                                   | -/-/-/7 (33.3)                   | 2 (22.2)/1 (11.1)/-/-                                                                                   |
|                | Medication                                                                                    |                                  |                                                                                                         |
| Proteomics     | 5-ASA/ADA/IFX/UPA/UST/<br>UST+PRED/VDZ/None                                                   | -/-/-/-/-/21 (100.0)             | 1 (11.1)/1 (11.1)/2 (22.2)/1 (11.1)/2 (22.2)/<br>1 (11.1)/1 (11.1)/-                                    |
|                | Total number of patients                                                                      | 21                               | 10                                                                                                      |
|                | Female/male                                                                                   | 16 (76.2)/5 (23.8)               | 6 (60.0)/4 (40.0)                                                                                       |
|                | Age, y                                                                                        | 60.0 (48.0-65.0)                 | 47.0 (35.0-60.0)                                                                                        |
|                | Macroscopic inflammation                                                                      |                                  |                                                                                                         |
|                | Terminal Ileum/ICV/Colon/NA                                                                   | -/-/-/7 (33.3)                   | 2 (20.0)/1 (10.0)/-/-                                                                                   |
| IgA-ELISA      | Medication                                                                                    |                                  |                                                                                                         |
|                | 5-ASA/ADA/IFX/UPA/UST/<br>UST+PRED/VDZ/None                                                   | -/-/-/-/-/21 (100.0)             | 1 (10.0)/1 (10.0)/2 (20.0)/1 (10.0)/2 (20.0)/<br>1 (10.0)/1 (10.0)/1 (10.0)                             |
| Stool samples  |                                                                                               |                                  |                                                                                                         |
| IgA-ELISA      | Total number of patients                                                                      | 85                               | 47                                                                                                      |
|                | Female/male                                                                                   | 56 (65.9)/29 (34.1)              | 30 (63.8)/17 (36.2)                                                                                     |
|                | Age, y                                                                                        | 35.0 (28.0-56.0)                 | 38.0 (29.0-49.0)                                                                                        |
|                | Disease manifestation                                                                         |                                  |                                                                                                         |
|                | uGIT/Ileal/Colonic/Ileocolonic/<br>Ileocolonic + uGIT                                         | NA                               | 1 (2.1)/2 (4.3)/12 (25.5)/27 (57.4)/<br>5 (10.6)                                                        |
|                | Harvey-Bradshaw Index (HBI)                                                                   |                                  |                                                                                                         |
|                | 0/1/2/3/unknown                                                                               | NA                               | 11 (23.4)/9 (19.1)/5 (10.6)/3 (6.4)/19 (40.4)                                                           |
|                | CRP, mg/l                                                                                     |                                  |                                                                                                         |
|                | < 5/5-17/unknown                                                                              | -/-/85 (100.0)                   | 36 (76.6)/1 (2.1)/10 (21.3)                                                                             |
|                | Fecal Calprotectin, µg/g                                                                      |                                  |                                                                                                         |
|                | ≤ 50/51-100/> 100/unknown                                                                     | -/-/-/85 (100.0)                 | 26 (55.3)/13 (27.7)/-/8 (17.0)                                                                          |
|                | Medication                                                                                    |                                  |                                                                                                         |
| IgA-ELISA      | 5-ASA/AZA/AZA+UST/AZA+<br>VDZ/AZA+UST+BUD+PRED/<br>RZB/TNF/TNF+5-ASA/<br>TNF+AZA/UST/VDZ/None | -/-/-/-/-/-/-/-/-/<br>85 (100.0) | 1 (2.1)/2 (4.3)/3 (6.4)/1 (2.1)/1 (2.1)/2 (4.3)/15<br>(31.9)/5 (10.6)/7 (14.9)/7 (14.9)/2 (4.3)/1 (2.1) |

Values are median (IQR) or n (%). 5-ASA, 5-aminosalicylic acid (mesalazine); ADA, Adalimumab; AZA, Azathioprine; BUD, Budesonide; CD, Crohn's disease; CRP, C-reactive protein; IBD, inflammatory bowel disease; ICV, ileocecal valve; IFX, Infliximab; IQR, interquartile range; NA, not applicable/not available; PRED, Prednisolone; RZB, Risankizumab; TNF, Anti-TNF; uGIT, upper gastrointestinal tract; UPA, Upadacitinib; UST, Ustekinumab; VDZ, Vedolizumab.

**Supplementary Table 2.** Patient characteristics of native and formalin-fixed colon biopsies.

|                 |                             | Non-IBD                   | CD remission                                 |
|-----------------|-----------------------------|---------------------------|----------------------------------------------|
|                 |                             | Colon biopsies            |                                              |
| CosMx SMI       | Total number of patients    | 6                         | 6                                            |
|                 | Female/male                 | 3 (50.0)/3 (50.0)         | 3 (50.0)/3 (50.0)                            |
|                 | Age, y                      | 50.0 (33.5-64.5)          | 54.5 (35.0-63.0)                             |
|                 | Macroscopic inflammation    |                           |                                              |
|                 | Terminal Ileum/Colon        | -/-                       | 2 (33.3)/-                                   |
|                 | Origin of colon biopsy      |                           |                                              |
|                 | C. descendens/C. sigmoideum | 3 (50.0)/3 (50.0)         | 5 (83.3)/1 (16.7)                            |
| IHC IgA         | Medication                  |                           |                                              |
|                 | 5-ASA/IFX/UPA/UST/None      | -/-/-/-/6 (100.0)         | 1 (16.7)/2 (33.3)/1 (16.7)/1 (16.7)/1 (16.7) |
|                 | Total number of patients    | 13                        | 8                                            |
|                 | Female/male                 | 7 (53.8)/6 (46.2)         | 3 (50.0)/3 (50.0)                            |
|                 | Age, y                      | 54.0 (48.5-67.0)          | 47.0 (36.8-62.0)                             |
|                 | Macroscopic inflammation    |                           |                                              |
|                 | Terminal Ileum/ICV/Colon    | -/-/-                     | 2 (25.0)/1 (12.5)/-                          |
| IHC pIGR        | Origin of colon biopsy      |                           |                                              |
|                 | Flexura coli sinistra/      | 1 (7.7)/                  | -/                                           |
|                 | C. descendens/C. sigmoideum | 7 (53.8)/5 (38.5)         | 6 (75.0)/2 (25.0)                            |
|                 | Medication                  |                           |                                              |
|                 | 5-ASA/IFX/UPA/UST/          | -/-/-/-/-/13 (100.0)      | 1 (12.5)/2 (25.0)/1 (12.5)/1 (12.5)/         |
|                 | UST+PRED/VDZ/None           |                           | 1 (12.5)/1 (12.5)/1 (12.5)                   |
|                 | Total number of patients    | 8                         | 8                                            |
| Transcriptomics | Female/male                 | 5 (62.5)/3 (37.5)         | 3 (50.0)/3 (50.0)                            |
|                 | Age, y                      | 53.5 (51.5-64.5)          | 47.0 (36.8-62.0)                             |
|                 | Macroscopic inflammation    |                           |                                              |
|                 | Terminal Ileum/ICV/Colon    | -/-/-                     | 2 (25.0)/1 (12.5)/-                          |
|                 | Origin of colon biopsy      |                           |                                              |
|                 | C. descendens/C. sigmoideum | 4 (50.0)/4 (50.0)         | 6 (75.0)/2 (25.0)                            |
|                 | Medication                  |                           |                                              |
| Western Blot    | 5-ASA/IFX/UPA/UST/          | -/-/-/-/-/8 (100.0)       | 1 (12.5)/2 (25.0)/1 (12.5)/1 (12.5)/         |
|                 | UST+PRED/VDZ/None           |                           | 1 (12.5)/1 (12.5)/1 (12.5)                   |
|                 | Total number of patients    | 12                        | 7                                            |
|                 | Female/male                 | 6 (50.0)/6 (50.0)         | 4 (57.1)/3 (42.9)                            |
|                 | Age, y                      | 58.5 (47.8-68.0)          | 50.0 (42.0-59.0)                             |
|                 | Macroscopic inflammation    |                           |                                              |
|                 | Terminal Ileum/ICV/Colon    | -/-/-                     | 1 (14.3)/1 (14.3)/-                          |
| Western Blot    | Origin of colon biopsy      |                           |                                              |
|                 | Flexura coli sinistra/      | 1 (8.3)/7 (58.3)/4 (33.3) | -/6 (85.7)/1 (14.3)                          |
|                 | C. descendens/C. sigmoideum |                           |                                              |
|                 | Medication                  |                           |                                              |
|                 | 5-ASA/IFX/UST/UST+PRED/     | -/-/-/-/-/12 (100.0)      | 1 (14.3)/1 (14.3)/2 (28.6)/1 (14.3)/         |
|                 | VDZ/None                    |                           | 1 (14.3)/1 (14.3)                            |
|                 | Total number of patients    | 13                        | 9                                            |
| Western Blot    | Female/male                 | 7 (53.8)/6 (46.2)         | 5 (55.6)/4 (44.4)                            |
|                 | Age, y                      | 54.0 (48.5-67.0)          | 50.0 (38.5-61.0)                             |
|                 | Macroscopic inflammation    |                           |                                              |
|                 | Terminal Ileum/ICV/Colon    | -/-/-                     | 2 (22.2)/1 (11.1)/-                          |
|                 | Origin of colon biopsy      |                           |                                              |
|                 | Flexura coli sinistra/      | 1 (7.7)/7 (53.8)/5 (38.5) | -/7 (77.8)/2 (22.2)                          |
|                 | C. descendens/C. sigmoideum |                           |                                              |
| Western Blot    | Medication                  |                           |                                              |
|                 | 5-ASA/IFX/UPA/UST/          | -/-/-/-/-/13 (100.0)      | 1 (11.1)/2 (22.2)/1 (11.1)/2 (22.2)/         |
|                 | UST+PRED/VDZ/None           |                           | 1 (11.1)/1 (11.1)/1 (11.1)                   |

Values are median (IQR) or n (%). 5-ASA, 5-aminosalicylic acid (mesalazine); CD, Crohn's disease; IBD, inflammatory bowel disease; ICV, ileocecal valve; IFX, Infliximab; IQR, interquartile range; NA, not applicable/not available; PRED, Prednisolone; UPA, Upadacitinib; UST, Ustekinumab; VDZ, Vedolizumab.

**Supplementary Table 3.** Patient characteristics of isolated colonic LPMNCs, plasma CRP quantification, and *ex vivo* differentiated PCs.

|                                |                                | Non-IBD                         | CD remission                                              |
|--------------------------------|--------------------------------|---------------------------------|-----------------------------------------------------------|
|                                |                                | Colon biopsies + plasma samples |                                                           |
| colonic LPMNCs<br>& plasma CRP | Total number of patients       | 5                               | 6                                                         |
|                                | Female/male                    | 3 (60.0)/2 (40.0)               | 3 (50.0)/3 (50.0)                                         |
|                                | Age, y                         | 53.0 (36.5-66.0)                | 54.5 (35.0-63.0)                                          |
|                                | Macroscopic inflammation       |                                 |                                                           |
|                                | Terminal Ileum/ICV/Colon       | -/-/-                           | 2 (33.0)/-/-                                              |
|                                | Medication                     |                                 |                                                           |
|                                | 5-ASA/IFX/UPA/UST/None         | -/-/-/-/5 (100.0)               | 1 (16.7)/2 (33.0)/1 (16.7)/1 (16.7)/1 (16.7)              |
| <i>ex vivo</i> PCs             | Total number of patients       | 9                               | 6                                                         |
|                                | Female/male                    | 5 (55.6)/4 (44.4)               | 5 (83.3)/1 (16.7)                                         |
|                                | Age, y                         | 63.0 (49.5-67.0)                | 46.0 (35.0-59.3)                                          |
|                                | Macroscopic inflammation       |                                 |                                                           |
|                                | Terminal Ileum/ICV/Colon       | -/-/-                           | 1 (16.7)/1 (16.7)/-                                       |
|                                | Medication                     |                                 |                                                           |
|                                | 5-ASA/IFX/UPA/UST/VDZ/<br>None | -/-/-/-/-/9 (100.0)             | 1 (16.7)/1 (16.7)/1 (16.7)/1 (16.7)/1 (16.7)/<br>1 (16.7) |

Values are median (IQR) or n (%). 5-ASA, 5-aminosalicylic acid (mesalazine); CD, Crohn's disease; CRP, C-reactive protein; IBD, inflammatory bowel disease; ICV, ileocecal valve; IFX, Infliximab; IQR, interquartile range; LPMNC, lamina propria mononuclear cell; NA, not applicable/not available; PC, plasma cell; UPA, Upadacitinib; UST, Ustekinumab; VDZ, Vedolizumab.

**Supplementary Table 4.** Active CD patient characteristics of isolated colonic LPMNCs and plasma CRP quantification.

|                             |                                               | CD active                            |
|-----------------------------|-----------------------------------------------|--------------------------------------|
|                             |                                               | Colon biopsies + plasma samples      |
| colonic LPMNCs & plasma CRP | Total number of patients                      | 8                                    |
|                             | Female/male                                   | 2 (25.0)/6 (75.0)                    |
|                             | Age, y                                        | 33.0 (25.5-47.8)                     |
|                             | Macroscopic inflammation                      |                                      |
|                             | Terminal Ileum/Colon                          | 4 (50.0)/7 (87.5)                    |
|                             | Medication                                    |                                      |
|                             | 5-ASA+UST/6-MP+UST/ADA+PRED+MTX/BUD+CORT+VDZ/ | 1 (12.5)/1 (12.5)/1 (12.5)/1 (12.5)/ |
|                             | IFX/None                                      | 1 (12.5)/3 (37.5)                    |

Values are median (IQR) or n (%). 5-ASA, 5-aminosalicylic acid (mesalazine); 6-MP, 6-Mercaptopurine; ADA, Adalimumab; BUD, Budesonide; CD, Crohn's disease; CORT, Cortisone; CRP, C-reactive protein; IFX, Infliximab; IQR, interquartile range; LPMNC, lamina propria mononuclear cell; MTX, Methotrexate; PRED, Prednisolone; UST, Ustekinumab; VDZ, Vedolizumab.

**Supplementary Table 5.** Sequences of the primer pairs used for RT-qPCR (produced by Metabion international AG (Planegg, Germany)).

| Target gene           | Forward primer (5'-3')   | Reverse primer (5'-3')  |
|-----------------------|--------------------------|-------------------------|
| <b>human</b>          |                          |                         |
| <i>ACTB</i>           | ACATCCGCAAAGACCTGTACG    | TTGCTGATCCACATCTGCTGG   |
| <i>CD14</i>           | CATCCAGAATCTAGCGCTGC     | CAGCGAACGACAGATTGAGG    |
| <i>CD19</i>           | TCTTCTGCCTGTGTTCCCTT     | GCTGCTCGGGTTTCCATAAG    |
| <i>CD2</i>            | GAATGCCTTGGAACCTGGG      | TTCGGGGTCAGTTCCATTCA    |
| <i>CD27</i>           | CTGCTCAGTGTGATCCTTGC     | GTCAGCGAAGGGTTTGGAAG    |
| <i>CD36</i>           | AAAACGGCTGCAGGTCAAC      | TCACCACACCAACACTGAGT    |
| <i>CD38</i>           | GGAGAAAGGACTGCAGCAAC     | CATGTATCACCCAGGCCTCT    |
| <i>CD3E</i>           | CGGTGGCCACAATTGTCATA     | TCAGGCCAGAATACAGGTCC    |
| <i>CPT1A</i>          | GAGAGACAGCAAGCACATCG     | ACATCGGCCGTGTAGTAGAG    |
| <i>CR2</i>            | GTCCAGTGCTCACATGTCCA     | ACTCTGTCTCACATGCTGGC    |
| <i>CS</i>             | CAGTGCAGAAAGGAAGTTGG     | AGTACACCCAATGCTCGTGA    |
| <i>FCGR3A</i>         | GTGTTCTGAGCCTCAATG       | TGAGGGTGGAGAGGTTTGTC    |
| <i>GYPA</i>           | TGGCTGGTGTATTGGAACG      | TCATTGATCACTTGTCTCTGGAT |
| <i>IGHA1</i>          | AAGACCTTCACTTGCACTGC     | TTCTTCCAGTCCTCGGCTG     |
| <i>IGHA2</i>          | AGGATGTGACTGTGCCCTG      | TAGTGGGGTCTTCAACTCGG    |
| <i>IGHD</i>           | CGTCAAGCTTTCCCTGAACC     | CGCTGTTCTCATCCTTGCTC    |
| <i>IGHG1</i>          | AGGACTCTACTCCCTCAGCA     | GGTGGGCATGTGTGAGTTTT    |
| <i>IGHG2</i>          | GACAAGACAGTTGAGCGCAA     | TGTTGGAGACCTTGCACTTG    |
| <i>IGHG3</i>          | AGGACTCTACTCCCTCAGCA     | CAGGGGTCCGGGAAATCATA    |
| <i>IGHG4</i>          | AGGACTCTACTCCCTCAGCA     | GGTCCGGGAGATCATGAGAG    |
| <i>IGHM</i>           | CAGAAATGCGTCCTCCATGTG    | GTGGCAGCAAGTAGACATCG    |
| <i>ITGAX</i>          | CCAGGAAACAAAGAACC GGAG   | GAGGCCGTGAAGTATCTCTGA   |
| <i>JCHAIN</i>         | ACAAATGTAAGTGTGCCCGG     | CCAGCTCCACTTCTGTAGGA    |
| <i>LDHA</i>           | GCACCCAGTTTCCACCATGA     | GCACTCTTCTTCAAACGGGC    |
| <i>MS4A1</i>          | ACCCATCTGTGTGACTGTGT     | AGAAATGGCAGCAAAGAGGC    |
| <i>MT-ATP6</i>        | GCCACCCTAGCAATATCAACC    | TGTGTTGTCGTGCAGGTAGA    |
| <i>MT-ATP8</i>        | CACAACTACCACCTACCTCC     | GGGGCAATGAATGAAGCGAA    |
| <i>MT-CO1</i>         | CGTTATCGTCACAGCCCATG     | GTTCAACCTGTTCTGCTCC     |
| <i>MT-CO3</i>         | TTTACCACTCCAGCCTAGCC     | CTCTGAGGCTTGTAGGAGGG    |
| <i>MT-ND3</i>         | GACTACCACAACTCAACGGC     | GGGCTCATGGTAGGGGTAA     |
| <i>MZB1</i>           | CGAGTTGGTCTACACGGATG     | TGACACCTTCTCTGAGCAGG    |
| <i>NCAM1</i>          | AATGTGCCACCTACCATCCAG    | AGATGTACTCAGCCTCGTCG    |
| <i>PDK1</i>           | GTCACCAGCCAGAATGTTCA     | CTCTGTTGGCATGGTGTTC     |
| <i>PRDM1</i>          | GCAGAACGGCAAGATCAAGT     | CCGTGTGTACCAGGTAGTGT    |
| <i>PTPRC</i>          | ACATCATCACCTAGCAGTTTCATG | GGAAGGTGTTGGGCTTTG      |
| <i>SDC1</i>           | GCCGCAAATTGTGGCTACT      | GCTGCGTGTCTTCCAAGT      |
| <i>SLC2A1</i>         | TGGCATCAACGCTGTCTTCT     | CTAGCGCGATGGTCATGAGT    |
| <i>SLC2A3</i>         | GGCTGCTTTATGGGACTGTG     | CAAAATGGAAGGGCTGCACT    |
| <i>SPN</i>            | CCGGAACCCAGATGAGAACT     | AGACTTCAGCTCCTCCATCG    |
| <i>TNFRSF13B</i>      | TTTGCAACCATCAGAGCCAG     | TTCAACTTCTCCACTCCGCT    |
| <i>TNFRSF17</i>       | CCTCCTCTAACATGTCAGCG     | TTCATCACCAGTCCTGCTCT    |
| <i>UBC</i>            | CCGGGATTTGGGTCGCAG       | TCACGAAGATCTGCATTGTCAAG |
| <i>XPB1_spliced</i>   | CTGAGTCCGCAGCAGGTG       | AAGGGAGGCTGGTAAGGAAC    |
| <i>XPB1_unspliced</i> | TCAGACTACGTGCACCTCTG     | AAGGGAGGCTGGTAAGGAAC    |
| <b>murine</b>         |                          |                         |
| <i>Cd19</i>           | TCTGGCTGTTGAGAACTGGT     | GGAGAGCACATTCCCGTACT    |
| <i>C1qbp</i>          | CGCTCTGCACACGGAAGGAG     | CGGCCTCATCTTCGTGTCCA    |
| <i>Igha</i>           | ACCGTAAACTTCCACCTGC      | GGACGGCGTTAGAGTCATGT    |
| <i>Prdm1</i>          | GTCGCGGAGACGCAAG         | CCACGCCAATAACCTCTTTG    |
| <i>Ptprc</i>          | TCATGGTCAACGATGTGAAGA    | AGCCCGAGTGCCTTCCT       |
| <i>Sdc1</i>           | AGGATGGAAGTCCAATCAG      | ATCCGGTACAGCATGAAAGC    |
| <i>Tnfrsf17</i>       | GGTGCTCTGGATCTTCTTGG     | CCGTAGTCACCCGTTTTTGT    |

**Supplementary Table 6.** Details of applied primary and secondary antibodies.

| Primary antibody                                              | Species                                | Company                                | Working concentration           |
|---------------------------------------------------------------|----------------------------------------|----------------------------------------|---------------------------------|
| Anti- $\alpha$ -Tubulin (clone 11H10) (#2125)                 | rabbit                                 | Cell Signaling Technology, Danvers, MA | 8 ng/ml (WB)                    |
| Anti-human BCMA/TNFRSF17 (clone E6D7B) (#88183)               | rabbit                                 | Cell Signaling Technology, Danvers, MA | 0.78 $\mu$ g/ml (WB)            |
| Anti-human IgA (clone AD3) (#LS-B3728)                        | mouse                                  | LifeSpan Biosciences, Seattle, WA      | 0.5 $\mu$ g/ml (IF, IHC)        |
| Anti-human IgA HRP-conjugated (#PA1-74395)                    | goat                                   | Thermo Fisher Scientific, Waltham, MA  | 1:8000 (ELISA, WB) <sup>†</sup> |
| Anti-human IgG HRP-conjugated (#62-8420)                      | goat                                   | Thermo Fisher Scientific, Waltham, MA  | 0.25 $\mu$ g/ml (WB)            |
| Anti-human IgM (#A80-100A)                                    | goat                                   | Bethyl Laboratories, Montgomery, TX    | 0.5 $\mu$ g/ml (WB)             |
| Anti-human PIGR (clone EPR23314-256) (#ab275020)              | rabbit                                 | Abcam, Cambridge, United Kingdom       | 4.82 $\mu$ g/ml (IHC)           |
| Anti-mouse B220 BV785 <sup>TM</sup> (clone RA3-6B2) (#103245) | rat                                    | BioLegend, San Diego, CA               | 1 $\mu$ g/ml (FC)               |
| Anti-mouse CD138 BV711 <sup>TM</sup> (clone 281-2) (#563193)  | rat                                    | BD Biosciences, Franklin Lakes, NJ     | 1 $\mu$ g/ml (FC)               |
| Anti-mouse CD16/32 (clone 93) (#101301)                       | rat                                    | BioLegend, San Diego, CA               | 2 $\mu$ g/ml (FC)               |
| Anti-mouse IgA (alpha chain) (#PAB9360)                       | rabbit                                 | Abnova, Taipei, Taiwan                 | 125 ng/ml (WB)                  |
| Anti-mouse IgA HRP-conjugated (#A90-103P)                     | goat                                   | Bethyl Laboratories, Montgomery, TX    | 4 $\mu$ g/ml (IHC)              |
| Anti-mouse IgG1 BV421 <sup>TM</sup> (clone RMG1-1) (#406615)  | rat                                    | BioLegend, San Diego, CA               | 0.125 $\mu$ g/ml (FC)           |
| Anti-P32 (clone EPR8871) (#ab131284)                          | rabbit                                 | Abcam, Cambridge, United Kingdom       | 2.5 $\mu$ g/ml (IF)             |
| Secondary antibody                                            | Company                                |                                        | Working concentration           |
| Anti-goat Igs HRP-conjugated (#P0449)                         | Agilent Technologies, Santa Clara, CA  |                                        | 0.25 $\mu$ g/ml (WB)            |
| Anti-rabbit IgG HRP-conjugated (#7074)                        | Cell Signaling Technology, Danvers, MA |                                        | 19.25 ng/ml (WB)                |
| EnVision+ anti-mouse HRP (#K400111-2)                         | Agilent Technologies, Santa Clara, CA  |                                        | Not applicable                  |
| EnVision+ anti-rabbit HRP (#K400311-2)                        | Agilent Technologies, Santa Clara, CA  |                                        | Not applicable                  |
| Goat anti-mouse IgG Alexa Fluor <sup>®</sup> 488 (#4408)      | Cell Signaling Technology, Danvers, MA |                                        | 4 $\mu$ g/ml (IF)               |
| Goat anti-rabbit IgG Alexa Fluor <sup>TM</sup> 546 (#A-11035) | Thermo Fisher Scientific, Waltham, MA  |                                        | 8 $\mu$ g/ml (IF)               |

ELISA, enzyme-linked immunosorbent assay; FC, flow cytometry; IF, immunofluorescence; IHC, immunohistochemistry; WB, western blot. <sup>†</sup> If stock concentration was not provided by the manufacturer, dilution from stock solution is indicated.