**Supplementary Table 1** Anti-inflammatory effects of anthocyanidins enriched plant and fruit (cell and animal study).

| Food | Model | Model | Route of administration/dosage | Result | Ref. |
|---|---|---|---|---|---|
| Blueberry | Assessment of cecal microbiota activity and colon morphology | mdr1a/mice | Oral: 10% | ↑Concentrations of butyric acid ↓concentrations of succinic acid<br>↑Colon crypt size and number of goblet cells per crypt<br>↓Number of Clostridium perfringens, Enterococcus spp. and Lactobacillus spp. | [1] |
| | TNBS-induced UC | Female-C57BL/6 mice | Oral: 10, 20 and 40 mg/ kg | ↓Weight gain ↓Mortality ↓Diarrhea score<br>↓Shortening of the colons owing to inflammation and hydropsia<br>↓Mucosal congestion, erosion and thickening of the colon wall<br>↑Goblet cells and IL-10 ↓NO, MPO, IL-12, TNFa and IFN-g | [2] |
| | DSS-induced UC | Rat | Oral: 5 g/rat | ↓Disease activity index ↓MPO activity ↓MDA<br>↓Bacterial translocation ↓Aerobic and anaerobic bacterial count<br>↓MCP-1and GRO/CINC-1 (not significant) ↑Cecal SCFA | [3] |
| Barberry | Acetic acid-induced UC | Male Wistar rats | Oral: 375, 750, and 1500 mg/kg<br>Rectal: 750 and 1500 mg/kg | ↓Ulcer area and macroscopic ulcer index<br>↓Colon wet weight/length ratio<br>↓Inflammatory cells infiltration ↓Epithelial necrosis and lesions<br>↑Colon crypt size and number of goblet cells per crypt | [4] |
| Sunrouge | DSS-induced UC | Male-specific pathogenfree ICR mice | Oral: 0.16 mg/day | ↑Survival rates ↓Body weight loss ↑Length of colorectum<br>↓Spleen hypertrophy ↑Anthocyanin concentrations in tissues and serum<br>↑ALT, no difference in TNFa, IL-1b and IL-6 | [5] |
| Cranberry | DSS-induced UC | Male BALB/c mice | Oral: 0.1 and 1% extract powder, 1.5% dried whole cranberry powder | ↓Colon length ↓MPO activity ↓TNFa and IL-1b serum level<br>↓TNFa and IL-1b gene expression ↓Disease activity index<br>↓Structural damage in colonic mucosa<br>↓Inflammatory cells infiltration | [6] |
| Bilberry | DSS-induced UC | BALB/c mice | Oral: 20% dried bilberry 1 and 10% anthocyanin extract | ↓Secretion of IFN-g, TNFa and IL-6 ↓Intestinal inflammation<br>↓Histological scores ↓Colon shortening<br>↓leukocytes infiltration ↓Apoptotic epithelial cells | [7] |
| | Intestinal oxidative stress induced by ischemia reperfusion | Male BALB/c mice | Oral: 1.62 g/mouse | ↓MDA ↓Mucosal injury in the ileum | [8] |
| Cooked navy and black bean | DSS-induced UC | C57BL/6 mice | Oral: 20% navy bean or black bean | ↑Cecal SCFA concentrations<br>↓mRNA expression of colonic inflammatory cytokines (IL-6, IL-9, IFN-g and IL-17A) ↑Anti-inflammatory IL-8, IL-10, Tlr4 and FasL | [9] |

| | | | | | |
|---|---|---|---|---|---|
| | | | | ↓Serum levels of IL-1b, TNFa, IFN-g and IL-17a<br>↑Cecal SCFA and fecal phenolic compound concentrations<br>↑Histological injury score and apoptosis<br>↑Serum ORAC, reversed splenic tissue weight increase | |
| Black raspberry | DSS-induced UC | C57BL/6J male mice | Oral: 5% black raspberry diets | ↓Staining of macrophages and neutrophils<br>↓NFkB p65 nuclear localization in the colon<br>↓Ulceration in the mucosa, submucosa and muscularis on day 28<br>↓Protein expression of DNMT3B, HDAC1, HDAC2 and MBD2<br>↓HDAC1 mRNA expression in spleen,<br>↓mRNA expression of DNMT3B, HDAC1, HDAC2 and MBD2 in bone marrow<br>↑Methylation and mRNA expression of dkk3, dkk2 and apc<br>↓B-catenin nuclear localization | [10] |

ALT: Alanine transaminase; DNMT: Deoxyribonucleic acid methyltransferase; DSS: Dextran sodium sulfate; FasL: Fas ligand; GRO/CINC-1: Growth-regulated oncogene/cytokine induced neutrophil chemoattractants-1; HDAC: Histone deacetylases; iNOS: Inducible nitric oxide synthase; MBD: Methyl-binding domain; MCP-1: Monocyte chemoattractant protein-1; MDA: Malondialdehyde; MPO: Myeloperoxidase; NO: Nitric oxide; ORAC: Oxygen radical absorbance capacity; p-Ikba: Phospho-Ikba; PMN: Polymorphonuclear; SCFA: Short-chain fatty acids; Tlr4: Toll-like receptor 4; TNBS: 2,4,6-Trinitrobenzene sulfonic acid; UC: Ulcerative colitis.

**Notes and references:**


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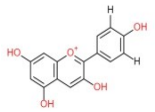
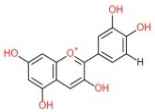
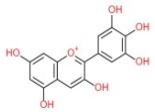
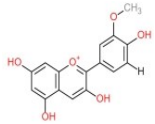
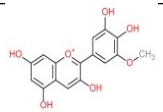
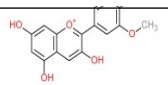
**Supplementary Table 2** Anti-inflammatory activity/ potential of the six most common anthocyanidins.

| Anthocyanidins | Structure | Model | Concentration/dose | Signaling pathways and downstream genes | Pharmacological activity | Ref. |
|---|---|---|---|---|---|---|
| Pelargonidin |  | Murine J774 macrophages | 100 µmol L–1 | ↓iNOS, ↓NFκB | Anti-inflammatory activity | [1] |
| Cyanidin |  | In vitro enzyme inhibition assay | IC50 = 90 µmol L–1<br>IC50 = 60 µmol L–1 | ↓COX-1 ↓COX-2 | Anti-inflammatory potential | [2] |
| | | In vitro enzyme inhibition assay | 40 µmol L–1 | ↓COX-1* ↓COX-2* | Anti-inflammatory potential | [3] |
| | | In vitro enzyme inhibition assay | 0.15-1.2 µmol L–11 | ↓PLA2 A | Anti-inflammatory potential | [4] |
| | | LPS-induced RAW 264.7 cells | 1-5 µmol L–1 | ↓COX-2 ↓ERK1/2<br>↓IL-1 ↓iNOS,<br>↓IκB-α ↓JNK1/2<br>↓NF-κB ↓p38<br>↓TNF-α | Anti-inflammatory activity | [5] |
| Delphinidin |  | In vitro enzyme inhibition assay | 0.15-1.2 mmol L–1 | ↓PLA2 | Anti-inflammatory potential | [6] |
| | | LPS-activated murine macrophage RAW264 cells | 25-100 µmol L–1 | ↓AP-1 ↓C/EBPδ<br>↓c-Jun ↓COX-2<br>↓ERK1/2 ↓IκB-α<br>↓JNK1/2 ↓NF-κB<br>↓p38 | Anti-inflammatory activity | [7] |
| Peonidin |  | In vitro enzyme inhibition assay | 0.15-2.1 µmol L–1 | ↓PLA2 | Anti-inflammatory potential | [6] |
| | | TPS-stimulated JB6 P+ mouse epidermal cells | 5-20 µmol L–1 | ↓COX-2<br>↓ERK1/2 A | Anti-inflammatory activity | [8] |
| Petunidin |  | In vitro enzyme inhibition assay | 0.15-2.1 µmol L–1 | ↓PLA2 | Anti-inflammatory | [6] |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | potential | |
| Malvidin |  | In vitro enzyme inhibition assay | 0.15-2.1 µmol L–1 | ↓PLA2 | Anti-inflammatory potential | [6] |
| | | In vitro enzyme inhibition assay | 40 µmol L–1 | ↓COX-1 ↓COX-2 | Anti-inflammatory potential | [3] |

↓inhibition. *, the most potent inhibitor when compared to other anthocyanidins. AP: activator protein; COX: cyclooxygenase; C/EBP: CCAAT/enhancer-binding protein; ERK: extracellular signal-regulated kinase; iNOS: inducible nitric oxid synthase; IκB: inhibitor of nuclear factor kappa B kinase; IL: interleukin; JNK: c-Jun N-terminal kinase; NF-κB: nuclear factor kappa B; PLA: phospholipase A; p38: p38 kinase; TNF: tumor necrosis factor;

## Notes and references: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**Supplementary Table 3**

**All of the biological processes of the most common anthocyanidins treated IBD**

| GO-BP | Category | Description | Count | % | Log10(P) |
|---|---|---|---|---|---|
| GO:0033674 | GO biological processes | Positive regulation of kinase activity | 15 | 34.09 | -12.995 |
| GO:1901699 | GO biological processes | Cellular response to nitrogen compound | 15 | 34.09 | -12.531 |
| GO:0034614 | GO biological processes | Cellular response to reactive oxygen species | 10 | 22.73 | -12.374 |
| GO:1904645 | GO biological processes | Response to amyloid-beta | 7 | 15.91 | -10.918 |
| GO:2000377 | GO biological processes | Regulation of reactive oxygen species metabolic process | 9 | 20.45 | -10.166 |
| GO:0034762 | GO biological processes | Regulation of transmembrane transport | 12 | 27.27 | -9.576 |
| GO:0006690 | GO biological processes | Icosanoid metabolic process | 7 | 15.91 | -8.738 |
| GO:0060326 | GO biological processes | Cell chemotaxis | 9 | 20.45 | -8.502 |
| GO:0019221 | GO biological processes | Cytokine-mediated signaling pathway | 12 | 27.27 | -7.960 |
| GO:0045124 | GO biological processes | Regulation of bone resorption | 5 | 11.36 | -7.911 |
| GO:0097237 | GO biological processes | cellular response to toxic substance | 8 | 18.18 | -7.84 |
| GO:0050878 | GO biological processes | regulation of body fluid levels | 9 | 20.45 | -6.6 |
| GO:0045907 | GO biological processes | positive regulation of vasoconstriction | 4 | 9.09 | -6.44 |
| GO:0008610 | GO biological processes | lipid biosynthetic process | 10 | 22.73 | -6.35 |
| GO:0030155 | GO biological processes | regulation of cell adhesion | 10 | 22.73 | -6.34 |
| GO:0045927 | GO biological | positive regulation of growth | 7 | 15.91 | -6.23 |

| | | | | | |
|---|---|---|---|---|---|
| | processes | | | | |
| GO:0031334 | GO biological processes | positive regulation of protein complex assembly | 7 | 15.91 | -6.13 |
| GO:0031623 | GO biological processes | receptor internalization | 5 | 11.36 | -5.72 |
| GO:0050727 | GO biological processes | regulation of inflammatory response | 8 | 18.18 | -5.51 |
| GO:0035690 | GO biological processes | cellular response to drug | 7 | 15.91 | -5.34 |

**All of the KEGG pathways of the most common anthocyanidins treated IBD**

| KEGG | Category | Description | Count | % | Log10(P) |
|---|---|---|---|---|---|
| hsa01521 | KEGG pathway | EGFR tyrosine kinase inhibitor resistance | 8 | 18.18 | -11.86 |
| hsa04611 | KEGG pathway | Platelet activation | 7 | 15.91 | -8.64 |
| hsa04913 | KEGG pathway | Ovarian steroidogenesis | 5 | 11.36 | -7.52 |
| hsa05206 | KEGG pathway | MicroRNAs in cancer | 8 | 18.18 | -7.25 |
| hsa04520 | KEGG pathway | Adherens junction | 5 | 11.36 | -6.71 |
| hsa05202 | KEGG pathway | Transcriptional misregulation in cancer | 6 | 13.64 | -6.08 |
| hsa00590 | KEGG pathway | Arachidonic acid metabolism | 4 | 9.09 | -5.32 |
| hsa04921 | KEGG pathway | Oxytocin signaling pathway | 5 | 11.36 | -5.1 |
| hsa04022 | KEGG pathway | cGMP-PKG signaling pathway | 5 | 11.36 | -4.96 |
| hsa02010 | KEGG pathway | ABC transporters | 3 | 6.82 | -4.16 |
| hsa04080 | KEGG pathway | Neuroactive ligand-receptor interaction | 5 | 11.36 | -3.86 |
| hsa04972 | KEGG pathway | Pancreatic secretion | 3 | 6.82 | -3.16 |
| hsa04010 | KEGG pathway | MAPK signaling pathway | 3 | 6.82 | -1.96 |