71° Congresso Nazionale Fimmg - Metis

UN MEDICO PER LA PERSONA, LA FAMIGLIA, LA SOCIETÀ

PERCORSI SIMPeSV PER UN AMBULATORIO DEGLI STILI DI VITA

Malattie infiammatorie croniche intestinali

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SIMPeSV
Società Italiana di Medicina di Prevenzione e degli Stili di Vita

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Role of "Western Diet" in Inflammatory Autoimmune Diseases

Arndt Manzel[1], Dominik N. Muller[2], David A. Hafler[3,4], Susan E. Erdman[5], Ralf A. Linker[1], and Markus Kleinewietfeld[3,4,6]

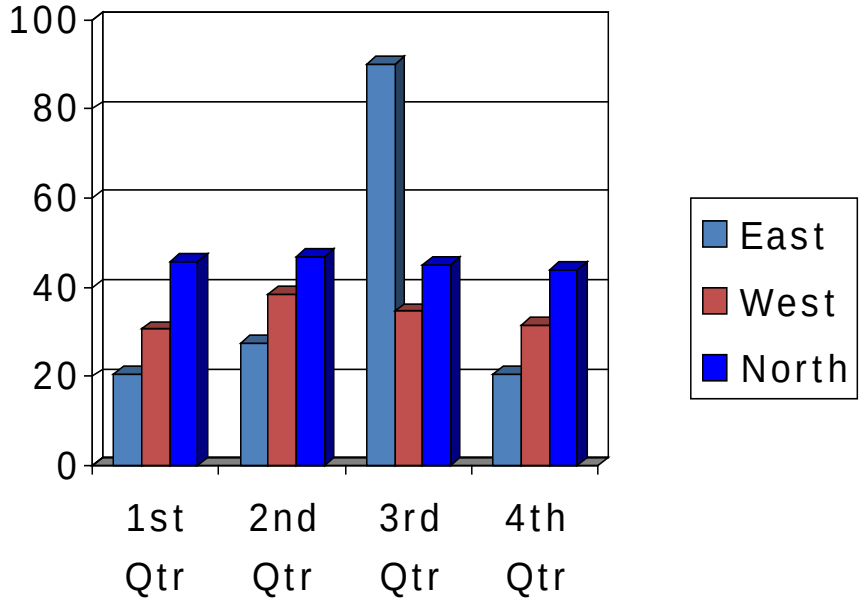
- **Autoimmune diseases** such as multiple sclerosis, rheumatoid arthritis, IBD, T1D and psoriasis are a heterogeneous set of diseases that share common hallmarks including multifactorial aetiologies, involvement of T cell-mediated autoimmune pathomechanisms, and a chronic clinical course that often requires life-long disease management.

- **Numerous foods and food components** including dietary milk, CHO, fats, protein, fiber, fruit, and vegetables have been studied as potential aetiological factors in IBD, but the results from the majority of studies have been equivocal and do not yet support any of these macronutrients as causal factors.

- **IBD in turn is not convincingly linked to overweight, obesity, or metabolic syndrome** on a population level, probably because the symptoms of the disease can severely compromise food intake

IBD epidemiology

- Prevalence: ~250 cases per 100,000[1]
  - More than 1 million cases estimated in United States[1]
  - Ulcerative colitis (UC): 50%[1]
  - Crohn's disease (CD): 50%[1]
- Incidence: ≤15 cases per 100,000[1]
  - Onset: 30% between 10 and 19 years of age[2]
  - Young children: <2%[2]
  - Peak age of onset: 20s & 30s, again in 60s[3]
  - Slightly greater risk for women and elderly[4]



[1]CCFA Library: Basic Facts. Available at: http://www.ccfa.org. [2]Grand RJ, et al. *Clin Invest Med.* 1996;19:373-380. [3]Hanauer SB. *Cecil Textbook of Medicine*. 20th ed. Philadelphia, Pa: WB Saunders Co; 1996:707. [4]Lashner BA. In: Stein SH, Rood RP, eds. *Inflammatory Bowel Disease: A Guide for Patients and Their Families*. 2nd ed. Philadelphia, Pa: Lippincott-Raven Publishers; 1999:23-29.

Geographical variability and environmental risk factors in inflammatory bowel disease

Siew C Ng,[1] Charles N Bernstein,[2] Morten H Vatn,[3] Peter Laszlo Lakatos,[4] Edward V LoftusJr,[5] Curt Tysk,[6] Colm O'Morain,[7] Bjorn Moum,[8] Jean-Frédéric Colombel,[9] on behalf of the Epidemiology and Natural History Task Force of the International Organization of Inflammatory Bowel Disease (IOIBD)

Gut 2013;**62**:630–649. doi:10.1136/gutjnl-2012-303661

- IBD has become a **global disease**.

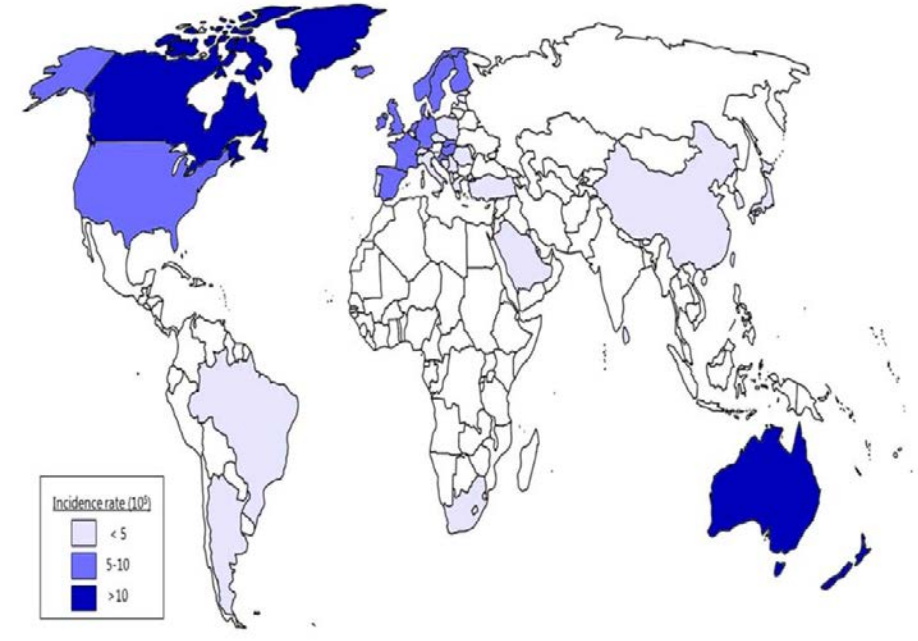


Figure 1 Global map of Crohn's disease incidence. This figure is only reproduced in colour in the online version.

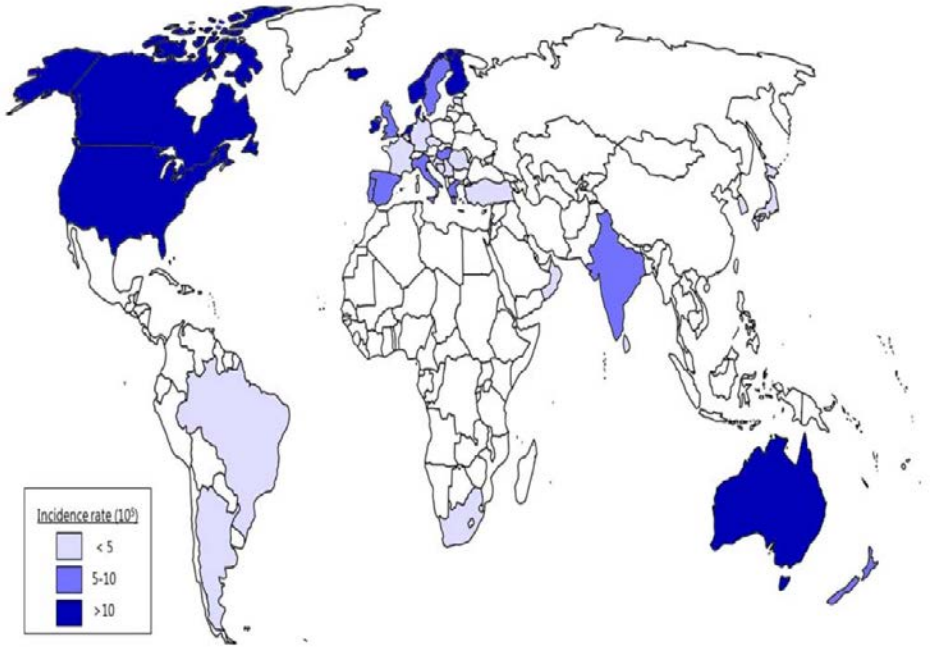


Figure 2 Global map of ulcerative colitis incidence. This figure is only reproduced in colour in the online version.

Geographical variability and environmental risk factors in inflammatory bowel disease

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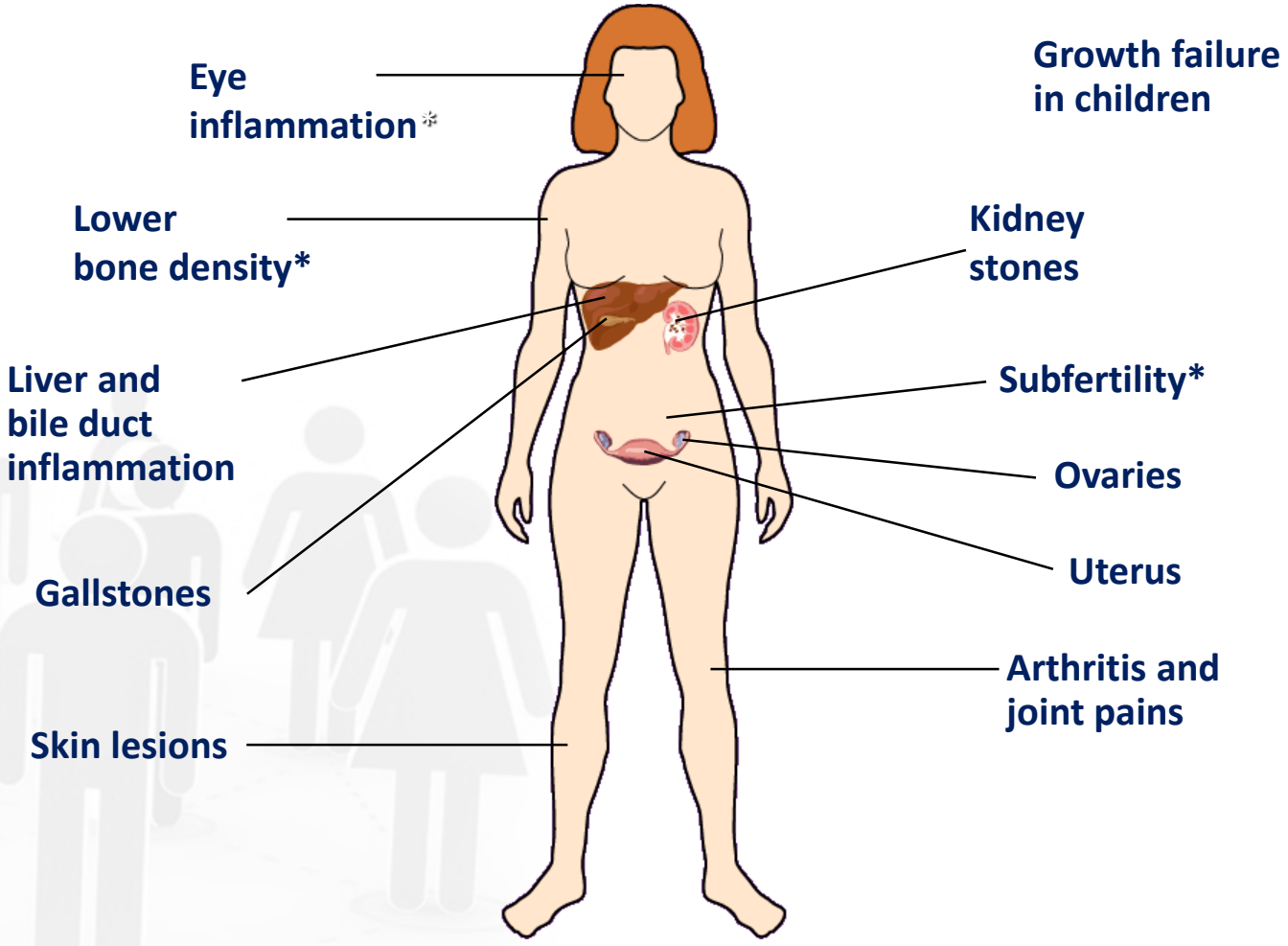
- Accumulating data suggest that the increased frequency of IBD in the industrialised parts of the world is mainly explained by **environmental risk factors**.

- Of all factors identified, **not a single one** alone may, up to now, totally explain the worldwide epidemiology of IBD.
- Some issues studied may not be factors in themselves but rather **markers** for other unidentified influences.

- It is highly likely that **genetic influences** critically determine the role that individual environmental factors may play in triggering disease.
- It is also possible that the strength of influence by risk factors or lack of protective factors in a society is different, depending **on geography or urbanisation.**

IBD systemic complications



*Higher incidence in women.

IBD: permeabilità barriera intestinale e microbiota

Bischoff et al. BMC Gastroenterology 2014, 14:189
http://www.biomedcentral.com/1471-230X/14/189

BMC Gastroenterology

REVIEW Open Access

Intestinal permeability – a new target for disease prevention and therapy

Stephan C Bischoff[1*], Giovanni Barbara[2], Wim Buurman[3], Theo Ockhuizen[4], Jörg-Dieter Schulzke[5], Matteo Serino[6], Herbert Tilg[7], Alastair Watson[8] and Jerry M Wells[9]

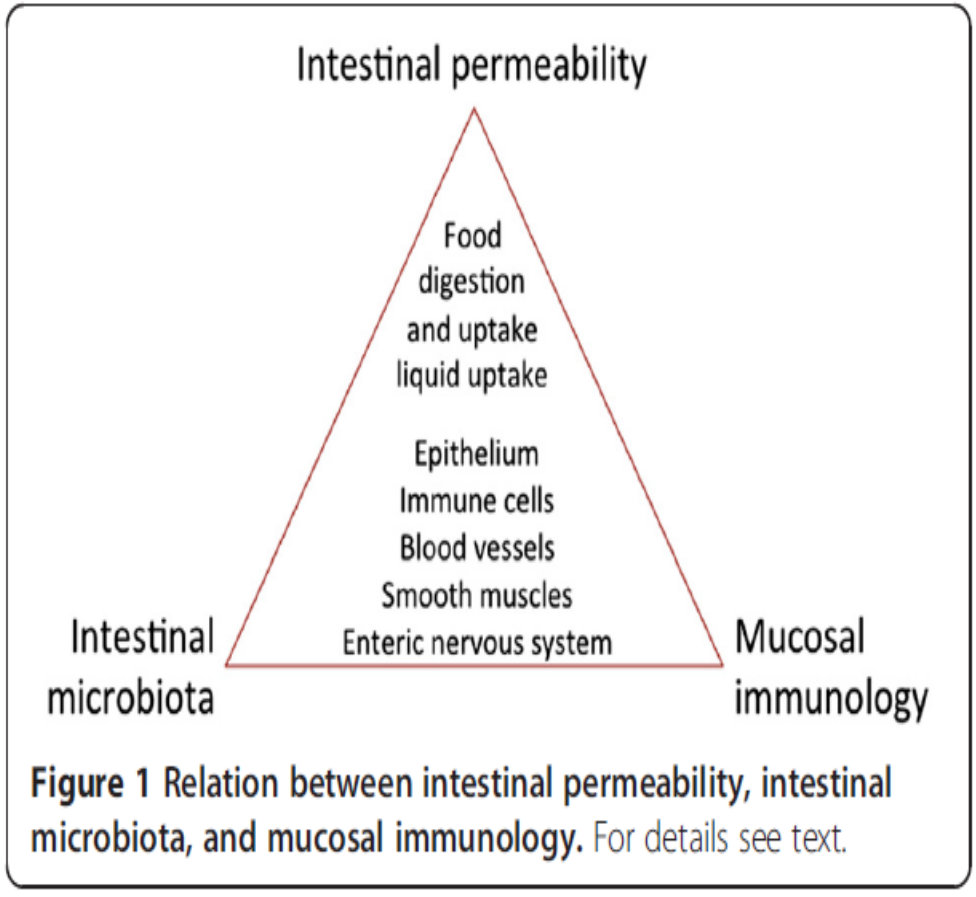


Figure 1 Relation between intestinal permeability, intestinal microbiota, and mucosal immunology. For details see text.

Many factors can alter intestinal permeability such as **gut microbiota modifications, mucus layer alterations, and epithelial damage**, resulting in **translocation of luminal content to the inner layers of the intestinal wall**.

Moreover, **lifestyle and dietetic factors like alcohol and energy-dense Western style diet** can increase intestinal permeability.

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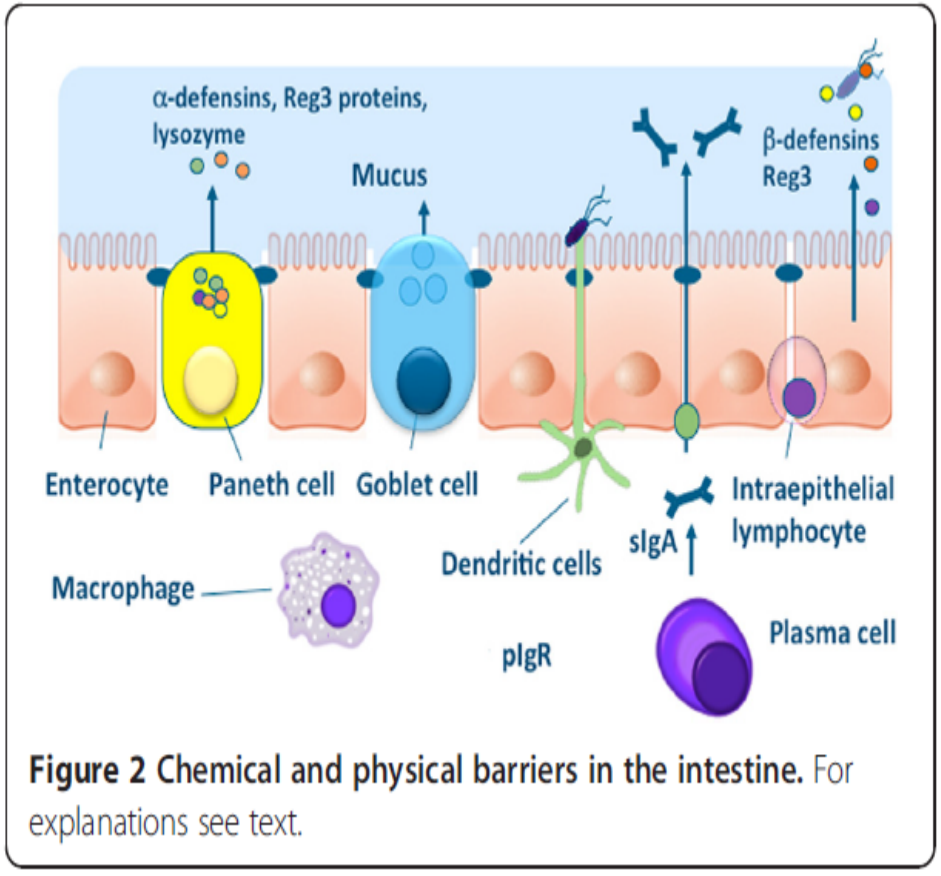

Figure 2 Chemical and physical barriers in the intestine. For explanations see text.

A **single layer of epithelial cells** form the main physical barrier between the lumen and mucosal tissues.

The paracellular space is sealed by **tight junctions** (TJ) which regulate the flow of water ions and small molecules through the composition of claudins and other proteins in the junctional complex.

Below the tight junctions are the **adherence junctions** (AJ), which are important in cell-cell signaling and epithelial restitution as well as **desmosomes** supporting epithelial stability.

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Table 8 Factors proposed to support the gut barrier

Dietetic approach	Avoidance of high amounts of sugar and fat
	Avoidance of energy-dense Western-style diet
	FODMAP diet
	Prebiotics/fibers
	Glutamine
	Other immune-modulating formula
Probiotic approach	Selected probiotics
	Probiotic cocktails (multispecies concept)
	Synbiotics (combination of probiotics and prebiotics)
Drugs/others	Short-chain fatty acids (SCFA)
	Metformin
	Quercetin and other flavonoids

Dig Dis Sci (2015) 60:1396–1405
DOI 10.1007/s10620-014-3437-3

ORIGINAL ARTICLE

Environmental Factors in the Relapse and Recurrence of Inflammatory Bowel Disease: A Review of the Literature

Thomas D. Martin · Simon S. M. Chan · Andrew R. Hart

Exposure	State of the evidence	What needs to be done?
Smoking	Plausible biological mechanisms including decreased blood vessel patency and increased thrombotic tendency. Clinical data report that smoking increases the risk of relapses of CD, but reduces that of UC	Clarify the underlying biological mechanisms to support the consistent observational data
NSAIDs	Plausible biological mechanisms involving increased intestinal permeability and altered production. Conflicting epidemiological data reporting positive or no associations	Cohort studies comparing relapse rates in patients with IBD according to prior NSAID use, adjusting for all covariates, including maintenance therapies
Estrogen-containing medications	Possible effects in increasing the thrombotic tendency. For the OCP, studies document positive, or no, associations. For HRT, data showing inverse or no associations	Detailed prospective studies of patients investigating CD and UC individually, the varying clinical scenarios and the dose and duration of estrogen use

IBD inflammatory bowel disease, *CD* Crohn's disease, *UC* ulcerative colitis, *NSAID* nonsteroidal anti-inflammatory drugs, *HRT* hormone replacement therapy

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Exposure	State of the evidence	What needs to be done?
Antibiotics	Plausible mechanisms involving antibiotics inducing changes in the proportions of pathogenic and commensal gut bacteria. Epidemiological work for CD documenting inverse associations between general antibiotic use and relapse, but not for UC	Clarification of the mechanisms of individual microorganisms in the pathogenesis of relapse. Prospective cohort studies measuring antibiotics, including their dose and duration of use for different clinical manifestations of IBD. Importantly, consistency is required between the mechanistic and epidemiological data
Stress	Mechanisms unknown, although possible effects on decreasing mucous secretion and increasing gut permeability. Most observational work shows positive associations between stress and relapse, but no proven beneficial psychological interventions	Assessment of psychological interventions, in randomized controlled clinical trials, to lower stress and reduce relapse rates

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Thomas D. Martin · Simon S. M. Chan · Andrew R. Hart

Exposure	State of the evidence	What needs to be done?
Diet	Laboratory and observational work that excess dietary sulfur may precipitate relapse	Detailed cohort studies in patients with IBD recording their dietary intake and correlating with clinical relapse. Randomized controlled clinical trials of dietary interventions, including a low-sulfur diet in UC
Pollution	Laboratory work reports detrimental effects of air pollutants on the intestinal mucosa. Ecological work reporting associations with density of air pollutants and IBD hospitalizations	Analytical epidemiological studies comparing exposure to pollutants and risk of clinical relapse

IBD inflammatory bowel disease, *CD* Crohn's disease, *UC* ulcerative colitis, *NSAID* nonsteroidal anti-inflammatory drugs, *HRT* hormone replacement therapy

Dig Dis Sci (2015) 60:290–298
DOI 10.1007/s10620-014-3350-9

REVIEW

Environmental Risk Factors for Inflammatory Bowel Diseases: A Review

Ashwin N. Ananthakrishnan

Vitamin D

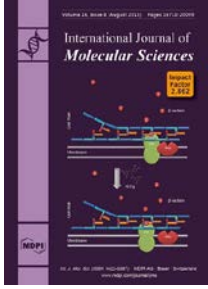
- there is a geographic variation in IBD incidence even within a specific country and have suggested a greater incidence in areas associated with reduced exposure to UV light
- in the Nurses' Health Study cohort described above demonstrated a lower risk for both CD (HR 0.48, 95 % CI 0.30–0.77) and UC (HR 0.62, 95 % CI 0.42–0.90) in women residing in southern latitudes at age 30 compared to those residing in northern latitudes
- compared to women in the lowest quartile of predicted plasma vitD those in the highest quartile of predicted vitD had a **lower risk of CD** (HR 0.54, 95 % CI 0.30–0.99). Higher dietary vitD intake was inversely associated with **reduced risk of UC** ⇒ vitD may have a role in the pathogenesis of both diseases (greater strength of association for CD)
- lower plasma 25(OH)D was associated with an increased **risk of surgery** and IBD-related hospitalizations in both CD and UC (OR 0.56, 95 % CI 0.32–0.98)
- IBD patients with low plasma vitD may have increased **risk of cancers**, in particular colorectal cancer, and **clostridium difficile infection**
- in animal models **vitD administration** may reduce risk of relapses. Similar results seems to be present also in humans with a borderline statistically significant reduction in risk of relapse (13 vs. 29 %, p = 0.06) (1,200 IU vitD3 vs placebo for 12 months)

vitamin D deficiency may merely be a marker of severe disease and a confounder rather than a true biologic (immunological) mediator ??

Impacts of Gut Bacteria on Human Health and Diseases

Yu-Jie Zhang [1], Sha Li [2], Ren-You Gan [3], Tong Zhou [1], Dong-Ping Xu [1] and Hua-Bin Li [1,]

Int. J. Mol. Sci. **2015**, *16*, 7493-7519; doi:10.3390/ijms16047493



Dietary Influence on Gut Bacteria

- **feeding ways of infants**
  - infants fed with breast milk have higher levels of *Bifidobacteria* spp., while infants fed with formula have higher levels of *Bacteroides* spp., *Clostridium coccoides* and *Lactobacillus* spp.
  - mice fed with Western-diet and low-fat-chow-diet display different structures of gut bacteria (increase of *Bacteroidetes and Proteobacteria*, decrease for *Firmicutes*
- **long-term diets**
  - enterotypes are strongly associated with protein and animal fat (*Bacteroides*) versus carbohydrates (*Prevotella*).
- **animal-based diet**
  - increases the abundance of bile-tolerant microorganisms (*Alistipes*, *Bilophila*, *Bacteroides*) and decreases the levels of *Firmicutes* that metabolize dietary plant polysaccharides
  - results in significantly lower levels of the products of CHO fermentation and a higher concentration of the products of AA fermentation compared with the plant-based diet

Impacts of Gut Bacteria on Human Health and Diseases

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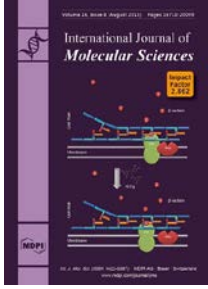

Dietary Influence on Gut Bacteria

- **bioactive molecules**
  - phenolics and their derivatives repress the growth of certain pathogenic bacteria such as *Clostridium perfringens*, *Clostridium difficile*, and *Bacteroides* spp., while they less severely affected commensal anaerobes, such as *Clostridium* spp., *Bifidobacterium* spp., and *Lactobacillus* sp. stimulates the production of SCFA by the gut bacteria
  - fiber fortified enteral formula have less negative symptoms related to bowel urgency, and decreases in total bacteria and *Bifidobacteria* were less severe compared with the fiber-free formula
  - dietary iron mostly from red meat and fortified cereals can also change the gut bacteria composition, increase the proliferation/virulence of gut bacteria and increase the permeability of the gut barrier.
- **prebiotics** (CHO-like compounds, such as lactulose and resistant starch) can influence the composition of gut bacteria to benefit the host targeting bifidobacteria and lactobacilli, which are two kinds of probiotics

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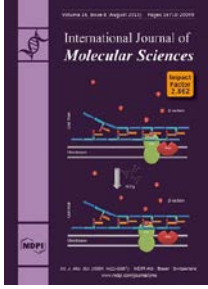
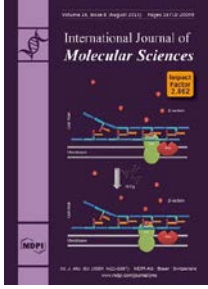


Gut Bacteria and IBD

- disorders in bacterial recognition by macrophages are strongly related to pathogenesis of IBD
- IBD could results from an **abnormal immune response against the commensal microbiota in a genetically susceptible host**
- **bacterial products exacerbate acute inflammation** via TLR2- and TLR4-signaling and potentially trigger TLR-dependent accumulation of neutrophiles and T-cells.

Impacts of Gut Bacteria on Human Health and Diseases



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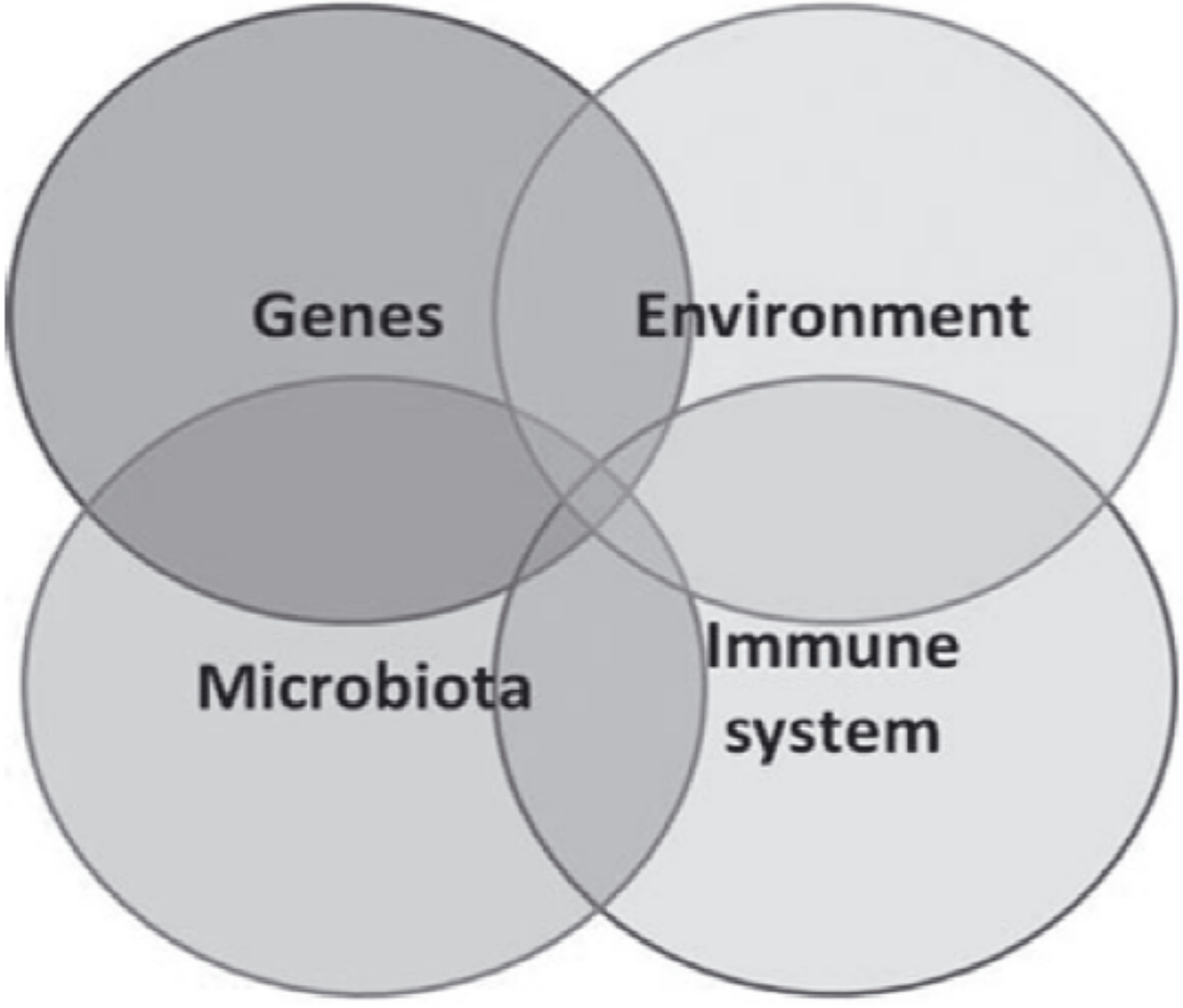
Gut Bacteria and IBD

- colonic bacterial communities from diseased mice are less complex, indicating **less diversity** of bacterial composition during acute inflammation
- **numbers of lactobacilli** are significantly lower during the active phase of UC, while lactobacilli communities differ in remission and acute phase
- percentages of **potentially protective bacterial species** (e.g., *Lachnospiraceae* and Ruminococcaceae) are lower in acute phase of UC
- families of bacteria of the **Clostridiales group** are more prominent in samples from the inflamed colon, indicating these bacteria might accumulate during colitis
- in Crohn's disease (CD) the **fecal microflora** in patients with both inactive and active disease contained significantly more enterobacteria than in healthy subjects while 30% of the dominant bacteria did not belong to the usual dominant phylogenetic groups
- **four bacterial species** characterised dysbiosis in CD patients (decrease in *Dialister invisus*, *Faecalibacterium prausnitzii* and *Bifidobacterium adolescentis*, and an increase in *Ruminococcus gnavus*)

Role of nutrition and microbiota in susceptibility to inflammatory bowel diseases

Liljana Gentschew[1,2] *and Lynnette R. Ferguson*[1,2]

Mol. Nutr. Food Res. 2012, *56*, 524–535



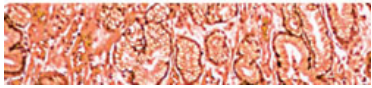
Comportamento alimentare nei soggetti con IBD

Dietary management of IBD—insights and advice

Nat. Rev. Gastroenterol. Hepatol. 12, 133–146 (2015);

Emma P. Halmos and Peter R. Gibson

nature REVIEWS GASTROENTEROLOGY & HEPATOLOGY



- Diet is the primary behavioural factor manipulated by patients with IBD.
- Crucially, patients with IBD want to know what they should eat to improve their underlying condition.
- They generally find it a **frustrating trial-and-error process** of identifying foods that trigger symptoms.
- An examination of the top 30 hits on two popular search engines published in 2014 revealed a surfeit of advice for food choice in patients with IBD, but the **recommendations were often conflicting** (Hou JK et al: *Clin. Gastroenterol. Hepatol.* 2014).
- These findings are supported in a UK survey of patients with ulcerative colitis, in which **adherence to national dietary guidelines was poor and food avoidance strategies led to nutritional inadequacy** (Walton M, *Brit. J. Nutr.* 2014).

Original Communication

What Are Adults With Inflammatory Bowel Disease (IBD) Eating? A Closer Look at the Dietary Habits of a Population-Based Canadian IBD Cohort

Kathy Vagianos, RD, MSc[1]; Ian Clara, PhD[2]; Rachel Carr, MSc[3]; Leslie A. Graff, CPsych, PhD[4]; John R. Walker, CPsych, PhD[5]; Laura E. Targownik, MD[6]; Lisa M. Lix, PhD, PStat[7]; Linda Rogala, BN[8]; Norine Miller, RN[8]; and Charles N. Bernstein, MD[9]

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American Society for Parenteral and Enteral Nutrition

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Table 2. Proportion of Participants With IBD Who Always Avoid Particular Food Items or Avoid When Disease Is Active.[a]

Food Item	Always Avoid, No. (%)	Normally Eat but Avoid When Disease Is Active, No. (%)
Alcohol	104 (31)	142 (42)
Popcorn	100 (30)	129 (38)
Legumes (beans, chickpeas, lentils)	103 (30)	96 (28)
Nuts and seeds (peanuts, almonds, walnuts, sunflower seeds, pumpkinseeds)	92 (27)	119 (35)
Deep-fried higher fat (food purchased at fast-food restaurants, fried potatoes, or burgers)	85 (25)	143 (42)
Processed deli meat (bologna, corned beef, or salami)	85 (25)	65 (19)
Tea or coffee	43 (13)	86 (25)
Milk/milk products (milk, cheese, yogurt, ice cream)	42 (12)	97 (29)
Salad or raw vegetables, any type	35 (10)	156 (46)
Tomato products (tomato sauce, tomato juice, or ketchup)	30 (9)	69 (20)
Red meat (ground beef, steak, or pork)	26 (8)	91 (27)
Raw fruit	22 (6.5)	100 (29)

[a]n = 319 participants with inflammatory bowel disease (IBD) participants; responses collected between 2006 and 2007.

Original Communication

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Table 3. Proportion of Participants With IBD Reporting Particular Reasons for Avoiding Food Item.[a]

Food Avoided (No. of Responses)	GI Upset (24 h), %	GI Upset (Days to Weeks), %	Heard "Should Avoid," %	Professional Advice, %	Do Not Like, %	Other, %
Alcohol (n = 96)	14	8	1	3	70	4
Popcorn (n = 93)	24	14	3	10	45	4
Legumes (n = 97)	16	7	4	0	69	3
Nuts and seeds (n = 88)	38	10	2	3	32	15
Deep-fried/higher fat food (n = 78)	40	8	1	9	32	10
Processed deli meat (n = 73)	15	5	1	3	67	8
Tea or coffee (n = 36)	8	3	3	3	81	3
Milk/milk products (n = 41)	51	15	0	15	12	7
Salad and raw vegetables (n = 35)	71	17	0	6	6	0
Tomato products (n = 29)	55	10	3	3	24	3
Red meat (n = 25)	44	4	4	4	36	8
Raw fruit (n = 20)	40	15	5	5	25	10

[a]n = 319 participants with inflammatory bowel disease (IBD) participants; responses collected between 2006 and 2007. Response options for food avoidance: (1) eating this food causes me to have gastrointestinal (GI) upset with symptoms that last up to 24 hours, (2) eating this food causes me to have GI upset with symptoms that last days to weeks, (3) I have read/heard that people with IBD should avoid this food, (4) a health professional has advised me to avoid this food, (5) I do not like this food, and (6) other.

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Table 4. Mean Number of Weekly Portions of Sugar-Laden Food and Drink Among Participants With IBD Comparing Those With Inactive and Active Disease and Comparing IBD Subtypes.[a]

Food (Portion Size)	Active IBD	Inactive IBD	CD	UC
Sugar (tsp)	10.1	11.2	11.7	9.7
Candy (1 candy)	4.5	5.9	5.7	4.7
Chocolate (bar = 70 g)	1.5	1.3	1.2	1.6
Pastries (1 piece)	3.3	3.1	3.3	3.1
Jam or jelly (1 tsp)	2.8	2.7	2.5	3
Regular soft drinks (can = 355 mL)	3.4	3.1	3.8	2.8
Diet soft drinks (can = 355 mL)	4.4	4.0	4.4	4.2
Sports drinks (bottle = 591 mL)	2.3[b]	1.0	2.03	1.4
Fruit juice (250 mL)	6.3	6.6	7.1	5.9
Sweetened drinks (1 cup)	5.1[b]	2.6	4.0	3.5

[a]n = 319 participants with inflammatory bowel disease (IBD) participants; responses collected between 2006 and 2007.
[b]*P* = .05 was for mean comparisons between active and inactive disease and between ulcerative colitis (UC) and Crohn's disease (CD).

- A survey of Canadian adults with IBD showed that **food avoidance was far more common than in the general population**, …
- … but **sugar consumption from sweetened beverages was far greater** in those with active IBD, potentially giving rise to undernutrition or overnutrition.

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Dietary management of IBD—insights and advice

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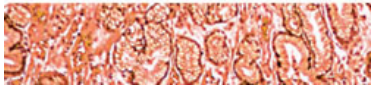

- **Dietary history** (retrospective questioning of usual dietary intake; by 24 h recall; or by a 3–7 day documented food record) ⇒ detection of normal dietary variation, for example, on weekends compared with weekdays, meal pattern and portions, food variety, snacking between meals ⇒ an estimated energy, macronutrient and micronutrient intake should be ascertained
  - 67% of patients under-report their intake compared with both weighed food record and energy intake calculated to basal metabolic rate. Moreover, patients with a BMI >30 kg/m2 seem to under-report to a greater degree than those of normal weight

NUTRITION ISSUES IN GASTROENTEROLOGY, SERIES #5
Series Editor: Carol Rees Parrish, M.S., R.D., CNSD
PRACTICAL GASTROENTEROLOGY • MAY 2003

Nutritional Considerations in Inflammatory Bowel Disease

Factors Altering Nutritional Status in Patients with IBD

- Decreased nutrient intake
  - Anorexia
  - Fear of eating
- Nausea, vomiting, abdominal pain, diarrhea
- Restrictive diets
- Side effects of medications
- Appetite suppression, taste changes
- Oral aphthous ulcerations
- Protein losses from inflamed, ulcerated mucosal
- Increased needs for healing
- Surgical resections
- Increased vitamin and mineral needs
- Bacterial overgrowth
- Malabsorption
- Blood loss

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Indications for referral to dietitian	Grounds for increased risk of overnutrition	Grounds for increased risk of undernutrition
Skipping breakfast, lunch or dinner	Overeating at other meals of the day	Not able to meet energy, macronutrient and/or micronutrient intake
Continual grazing	Low volumes of food are not stimulating satiety and enables overeating	Small volumes are inadequate over the day
Inappropriate eating times (e.g. overnight)	Overeating from additional meals	Avoiding or eating less at traditional meal times
Extreme dietary restriction due to philosophy, religion or cultural beliefs	Food restriction resulting in compensation of other foods of higher energy	Food restriction resulting in undereating
Similar diet everyday	Diet providing more nutrients than required	Diet providing less nutrients than required and limited variety
Poor knowledge of intake	Overnutrition from food choice	Undernutrition from food choice
Fussy eater	Including only foods of high energy	Including insufficient energy intake and limited variety
Excessive attention to food and/or disordered eating	Episodes of binging leading to overnutrition	Intentional and inappropriate food restriction leading to undernutrition

*Indications might arise from taking a dietary history, and possible attributing factors to overnutrition and undernutrition are listed.

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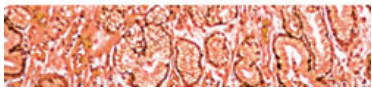

- **Dietary history** (retrospective questioning of usual dietary intake; by 24 h recall; or by a 3–7 day documented food record) ⇒ detection of normal dietary variation, for example, on weekends compared with weekdays, meal pattern and portions, food variety, snacking between meals ⇒ an estimated energy, macronutrient and micronutrient intake should be ascertained
  - 67% of patients under-report their intake compared with both weighed food record and energy intake calculated to basal metabolic rate. Moreover, patients with a BMI >30 kg/m2 seem to under-report to a greater degree than those of normal weight

- **Nutritional status evaluation**: anthropometry (minimum: BMI), protein status (minimum: visual assessment of skeletal muscle mass), and energy status (minimum: assessment of subcutaneous fat stores), laboratory assessment (negative acute-phase proteins albumin, prealbumin and transferrin)
  - Undernutrition is common in active IBD due to any combination of anorexia or poor dietary intake associated with being unwell, increased nutritional requirements resulting from inflammation and impairment of nutrient absorption related to small bowel inflammatory disease

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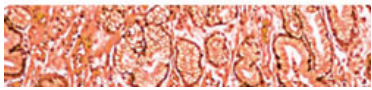

Table 2 | Global measures of nutritional status

Measure	Indicated population	What it assesses	Description	Pros	Cons
BMI[11]	Everyone	Undernutrition and overnutrition	Ratio of weight (in kg) to the square of height (in m)	Easy and immediate information	Poor marker of malnutrition, muscle and fat mass, particularly in overweight or in the presence of oedema; might falsely reassure
Subjective Global Assessment[128]	Hospitalized adult patients	Undernutrition	Five-point questionnaire providing descriptive information	Accurate and detailed information easily referenced after completion	Very time consuming and difficult to complete
Malnutrition Screening Tool[129]	Hospitalized adult patients	Undernutrition	Two questions regarding appetite and recent unintentional weight loss	Simple and quick to complete	Lacks details
Mini Nutritional Assessment[130]	Elderly patients in community	Undernutrition	An initial six questions that indicate whether the full 18-question assessment is required	Validated and reliable	Only applicable in elderly patients
Skin-fold measurements[131]	Everyone	Undernutrition and overnutrition	Estimating body fat percentage through clasping fat with callipers	Cheap, easy and immediate information	Only assesses fat mass and has large interobserver and intraobserver variations
Bioelectrical Impedance Analysis[132]	Everyone	Undernutrition and overnutrition	Estimates total body water, fat mass, fat-free mass and muscle mass through measures of resistance, usually with a stand-on scale	Cheap, easy, noninvasive and immediate information	Will usually measure body composition through legs only; inaccurate in the presence of expansion of extracellular water
Whole-body MRI[133]	Everyone	Undernutrition and overnutrition	Assessment of skeletal muscle, subcutaneous fat, visceral fat and intermuscular fat of separate anatomical regions	Visceral fat is better identified than in bioelectrical impedance analysis	Expensive
Dual-energy X-ray absorptiometry[134]	Everyone	Undernutrition and overnutrition	Measures total lean body mass and total and regional fat mass	Similar estimates of fat mass to MRI	Cheaper than MRI; exposure to ionising radiation, but dose very small
Albumin[135]	Everyone	Undernutrition	Potential marker of malnutrition in quiescent disease; also influenced by factors other than nutrition such as rate of synthesis by the liver (negative-phase reactant) and loss of protein from gut and/or kidney	Cheap, easy and can be included as part of routine blood tests	Poor predictor of nutritional status in active disease
Pre-albumin[136]	Everyone	Undernutrition	Potential marker of malnutrition in quiescent disease, but also influenced by factors other than nutrition	Shorter half-life and potentially better indicator of nutritional status than albumin	Poor predictor of nutritional status in active disease

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Table 3 | Key micronutrients commonly at risk of deficiency in patients with IBD

Micronutrient	At-risk individuals	Method of detection	Food sources	Preferred way of repletion	Common consequences of deficiency
Iron[137]	Those with active disease; vegetarians and vegans; pre-menopausal women	Serum ferritin levels, transferrin saturation, transferrin receptor levels	Red meat; offal	Intravenous infusion (especially in active disease due to impaired absorption); oral supplementation (less tolerated, might exacerbate intestinal inflammation)	Anaemia, fatigue, weakness, brittle nails
Vitamin D[86]	Dark-skinned patients; those with decreased exposure to UV rays	Serum concentrations of 25(OH) vitamin D	Limited amount in fortified foods (e.g. margarine, milk)	Oral supplementation; sun exposure	Disturbed calcium homeostasis and bone health; possible enhancement of inflammatory activity
Vitamin B_{12}[138]	Vegetarians and vegans; ileal disease or resection	Serum concentrations of vitamin B_{12}, holocobalamin, methylmalonic acid levels when uncertainty	Animal-based foods	Intramuscular injection; oral supplements if absorption normal	Anaemia, fatigue, neurological effects
Zinc[139]	Vegetarians and vegans; chronic diarrhoea	Plasma concentration (insensitive indicator of decreased zinc stores)	Meat; fortified cereals	Oral supplementation	Impaired healing, disturbed smell and taste, delayed growth in children
Folate[140]	Those on restrictive or elimination diets; sulfasalazine therapy	Serum folate levels	Whole grains; leafy-green vegetables; fortified cereals	Oral supplementation	Anaemia, fatigue
Calcium[141]	Restriction of dairy	Serum calcium levels; correction for low albumin	Dairy; calcium-fortified dairy alternatives	Oral supplementation	Decreased bone density
Magnesium[142]	Chronic or severe acute diarrhoea	Serum magnesium levels	Leafy-green vegetables; soybean	Oral supplementation (osmotic effect might induce diarrhoea); intravenous	Disturbed bone health, muscular cramps, fatigue

Implications of IBD on Nutrition

- Reduced absorption may lead to nutritional deficiencies

Iron
- Decreased absorption
- Bleeding

Vitamin B_{12}
- Ileal resection

Vitamin D
- Intestinal surgery
- Common deficiency in CD

Zinc
- Chronic diarrhea
- Fistula

Intervento nutrizionale nei soggetti con IBD

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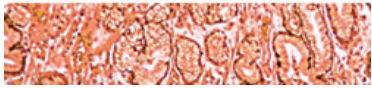

IDENTIFICATION OF CANDIDATE DIETARY FACTORS IN IBD PATHOGENESIS.

- alteration of **bacterial exposure** in childhood (the so-called cold-chain hypothesis)
- **impairment of the epithelial barrier** by multiple food components that have included emulsifiers, fermentable oligosaccharides, disaccharides, monosaccharides and polyols (FODMAPs) in Crohn's disease, and foods that induce excessive nitric oxide and sulphide production in the lumen of the large bowel in ulcerative colitis
- **direct modulation of the control of mucosal inflammatory processes** by indigestible particles or exposure to various combination or individual lipids.

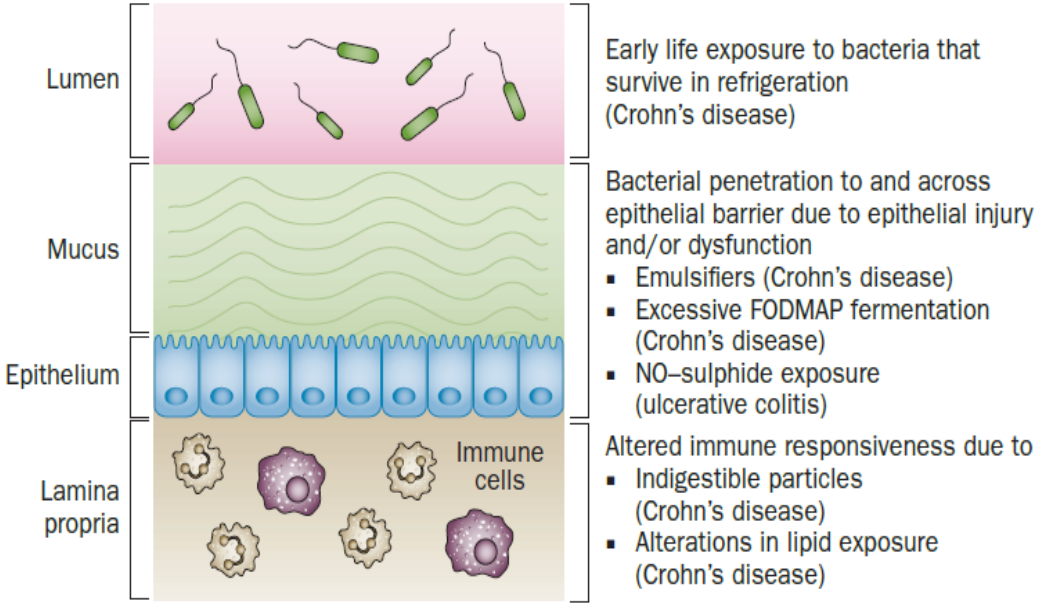

Figure 2 | Some of the dietary factors hypothesized to be involved in the pathogenesis of IBD. Ingestion of food might drive IBD via three broad mechanisms: by enabling exposure to specific microbiota in early life;[37] by enabling greater bacterial penetration of the epithelial barrier to induce inflammatory events;[38,39,127] and by directly altering immune responsiveness.[41,45] Abbreviations: FODMAP, fermentable oligosaccharide, disaccharide, monosaccharide and polypol; NO, nitric oxide.

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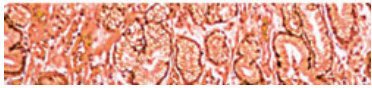

USING DIET TO PREVENT IBD

- **'Westernized' diet**—characterized by increased intake of the amount of food *per se* and of food that has higher fat and refined carbohydrate with low-fibre content, and by reduced intake of fruit and vegetables—is associated with the development of both Crohn's disease and ulcerative colitis and that each specific component cannot account for disease.

- The best advice that can emerge from the evidence is to follow current recommendations of a **'healthy diet',** which comprises adequate but not excessive protein, correct ratio of PUFA, high levels of fibre and increased intake of fruit and vegetables (high levels of unrefined grains and vegetables, moderate amounts of meat and/or meat alternatives and fruit, together with a variety of foods from all food groups, inclusion of whole-foods instead of refined products and emphasis of increased plant-based instead of animal-derived foods)

- **Breastfeeding** of neonates for at least 3 months should be encouraged.

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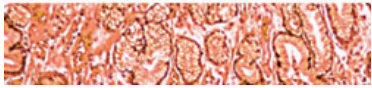

DIET TO INFLUENCE DISEASE ACTIVITY

- Penetration into therapeutic guidelines and actual clinical practice of dietary approaches to reduce inflammation has been limited.

- **EEN** for active Crohn's disease, at least in paediatric practice ⇒ remission and mucosal healing without corticosteroids, and promote growth,
- **Correction of vitamin D** deficiency is recommended on the basis of bone health alone.
- **Increasing dietary fibre** intake in maintenance of ulcerative colitis has some support, but it is not clear what fibre should be used.
- The use of **personalized whole-food avoidance strategies** in maintenance of remission in Crohn's disease is a challenging technique and the increment of benefit demonstrated is not great.

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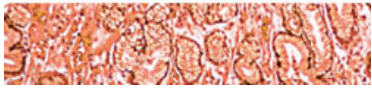


SYMPTOMS AMENABLE TO DIETARY CHANGE

- **Micronutrient deficiency** (Fe, Mg, Zn, folate, vit B_{12}, vit D) $\Rightarrow$ dietary modification and oral supplementation
- **Functional gut symptoms** $\Rightarrow$ FODMAP, gluten-free, wheat-free, dairy free diets
- **Prevention of obstruction** $\Rightarrow$ diet low in insoluble fibre or total fibre
- **Fat maldigestion or absorption** (pancreatic exocrine isnufficnecy in IBD = 22%) $\Rightarrow$ matching fat intake with adequate dosing of pancreatic enzyme replacement therapy rather than restriction of dietary fat, because malnutrition and nutritional adequacy of particularly fat-soluble vitamins are of concern in IBD
- **Prevention of kidney stones** (in particular in resectional surgery) prevention of dehydration, Ca supplementation or increased dietary Ca to bind available oxalate and a low oxalate diet.

Interaction between ingested nutrients and gut endocrine cells in patients with irritable bowel syndrome (Review)

MAGDY EL-SALHY[1,2], ODD HELGE GILJA[2,3], DORIS GUNDERSEN[4], JAN G. HATLEBAKK[2] and TRYGVE HAUSKEN[2]

INTERNATIONAL JOURNAL OF MOLECULAR MEDICINE 34: 363-371, 2014

Diet triggers symptoms in IBD patients, possibly as a result of interactions with the **gut endocrine cells**.

The **protein, fat and CHO content of ingested foods determine the amount and type of gut hormones released, which will in turn regulate and control gastrointestinal motility and sensation,** that have been reported to be abnormal in IBD patients

- **FODMAPs** in the diet increase the osmotic pressure and provide a substrate for bacteria fermentation and gas production in the large intestine, resulting in **abdominal distension.**
- The increase in intestinal pressure may cause the release of **serotonin and substance P**, which in turn may result in the sensation of **abdominal discomfort or pain**.

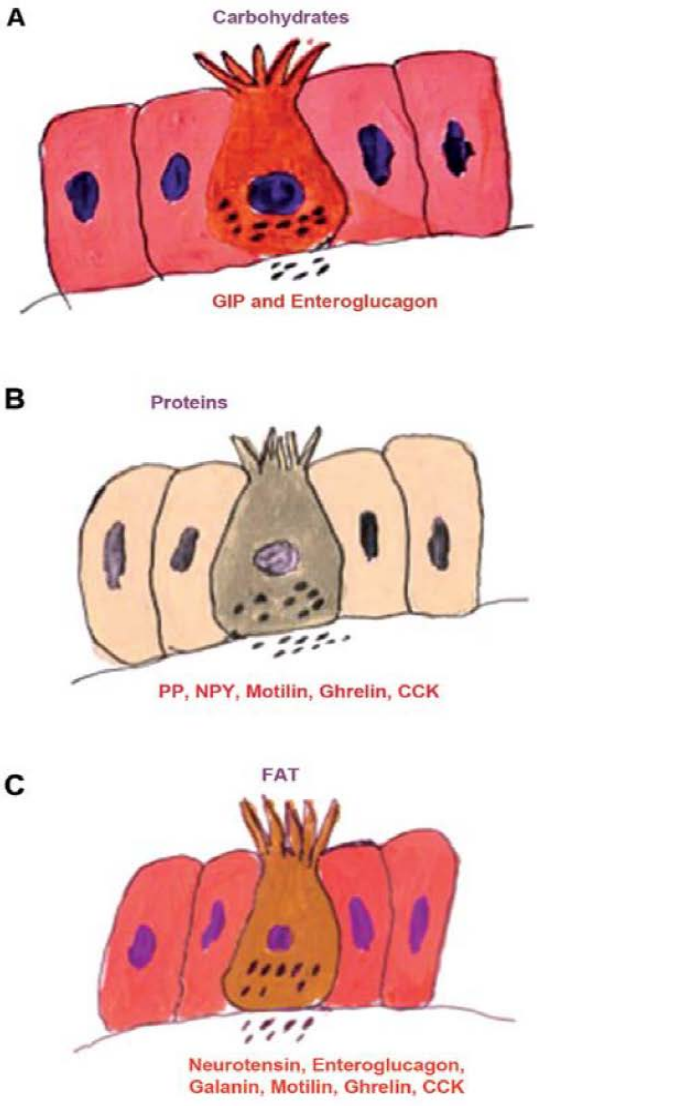


Figure 1. The gut hormones released into the interstitial fluid of the lamina propria in response to intraluminal nutrient content vary according to the proportions of (A) carbohydrates, (B) proteins and (C) fats. These hormones may act in an endocrine/paracrine manner or as neurotransmitters/neuro-modulators of neurons in the ENS.

Environmental Factors in the Relapse and Recurrence of Inflammatory Bowel Disease: A Review of the Literature

Thomas D. Martin · Simon S. M. Chan · Andrew R. Hart

Dig Dis Sci (2015) 60:1396–1405

DIETARY FACTORS AND IBD RELAPSE

- One mineral for which there are plausible biological mechanisms for inducing relapse is **sulfur**. Dietary sulfur is present as sulfated amino acids, inorganic sulfur and a preservative food additive. Sulfur may be toxic to human colonocytes following its metabolism by colonic bacteria to hydrogen sulfide (H_2S) superficial mucosal ulceration, dose dependent apoptosis, and loss or shrinkage of goblet cells and crypts, inhibitionof the butyrate-dependent energy metabolism of colonocytes
  - A high consumption of red and processed meat was positively associated with relapse (OR 5.19, 95 % CI 2.09–12.9), and meat protein is an important source of sulfide generation in the gut. Furthermore, a high alcohol intake was also positively associated with UC (OR 2.42, 95 % CI 1.04–5.62), which may be relevant as sulfides are added to alcohol for both flavor and a preservative.

- A **high intake of total, saturated, and monounsaturated fats**, and a **higher ratio of n-6/n-3 polyunsaturated fatty acids** with active disease are associated with a more active disease phenotype, mainly in patients carrying the variant alleles of TNF-alpha (857 C/T polymorphism) and IL6 (174 G/C polymorphism).

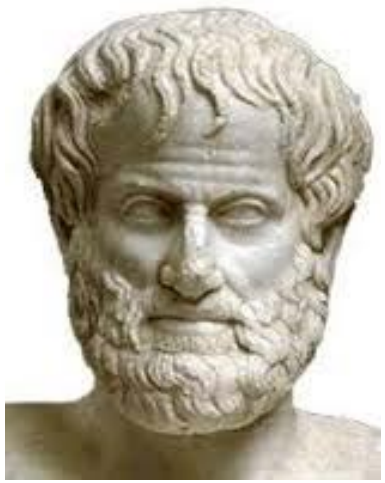
Diet and lifestyle considerations:

- **dietary changes may help reduce symptoms**:
  - during increased disease activity, it is appropriate to decrease the amount of fiber
  - dairy products can be maintained unless not tolerated
  - a low-residue diet may decrease the frequency of bowel movements
  - a high-residue diet may be indicated in cases of ulcerative proctitis (disease limited to the rectum, where constipation can be more of a problem than diarrhea)
  - there are limited data suggesting that a reduction of dietary fermentable oligosaccharides, disaccharides, and monosaccharides and polyols may reduce the symptoms of IBD
- **dietary or lifestyle changes may reduce inflammation in IBD**:
  - a liquid diet, pre-digested formula, or nothing by mouth (NPO status) may reduce obstructive symptoms. Exclusive enteral nutrition can settle inflammatory disease, especially in children
  - smoking cessation benefits patients with IBD
- reduction of **stress** and better stress management may improve symptoms or the patients' approach to their disease

Continuons à utiliser notre raison médicale dans toute sa complexité.

Quiconque possède la définition sans l'expérience et acquiert la connaissance de l'universel, mais ignore le singulier contenu dans l'universel, se trompera souvent de traitement, car ce que l'on soigne est le singulier.

Aristote. Métaphysique, A, 1, 981a



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