ADI

Associazione Italiana di Dietetica e Nutrizione Clinica ONLUS
Federata FESIN - Sezione Trentino Alto Adige

Nuove frontiere nella Nutrizione Clinica
13 - 14 aprile 2012
Palalevico - Levico Terme (TN)

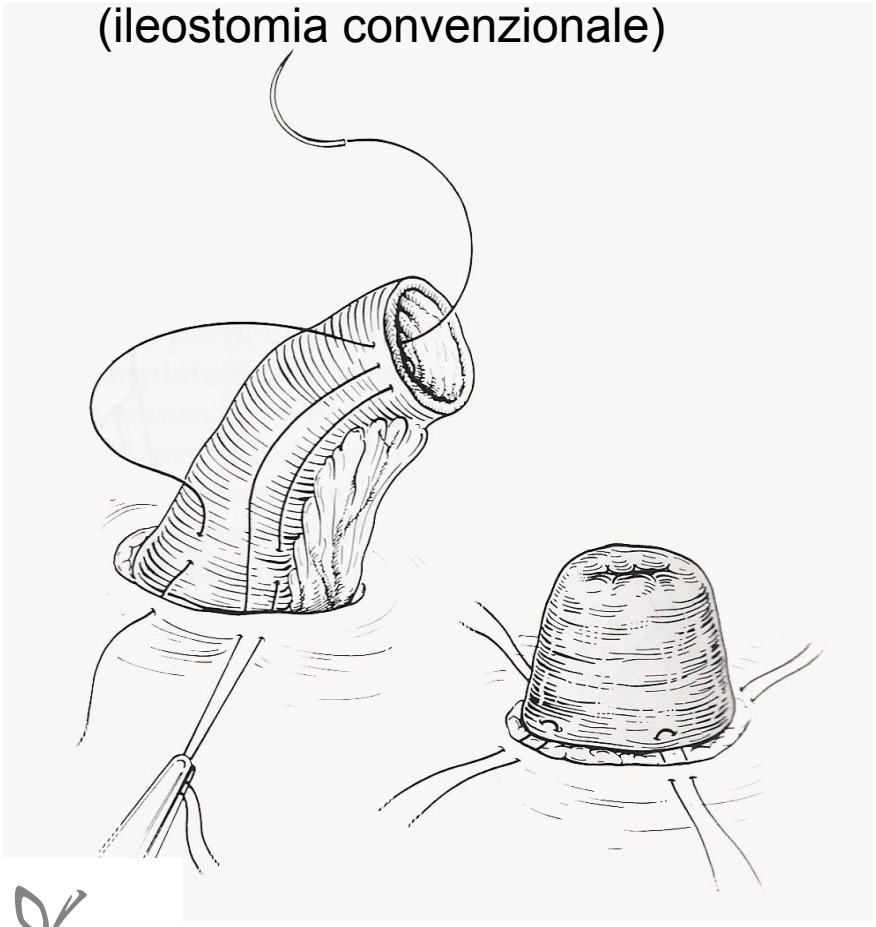
Ileostomia e Nutrizione

Dr. Giovanni Ronzani
Specialista in scienze dell'alimentazione
e malattie dell'apparato digerente

Dr. Giovanni Ronz
Specialista in Gastroenterologia
Specialista in Scienza dell'Alimentazione

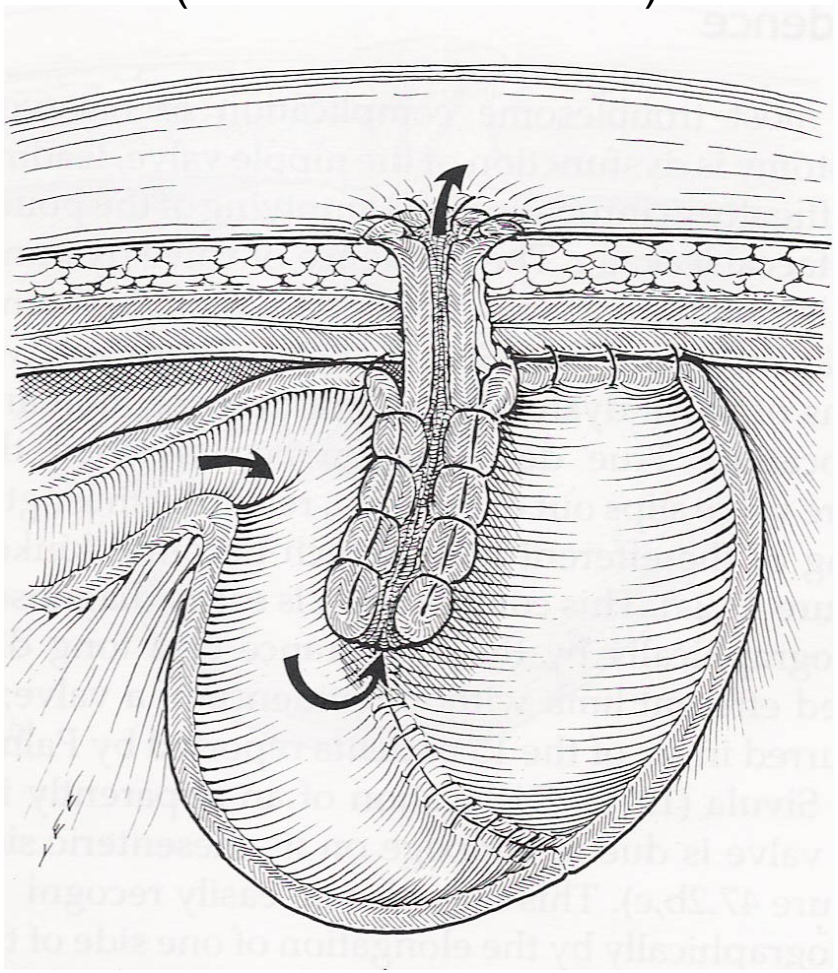
Ileostomia Terminale

Tecnica di Brooke
(ileostomia convenzionale)



Ileostomia con Reservoir

Tecnica di Kock
(Ileostomia continente)



Procto-Colectomia totale : FAP, C.U. e M.Crohn

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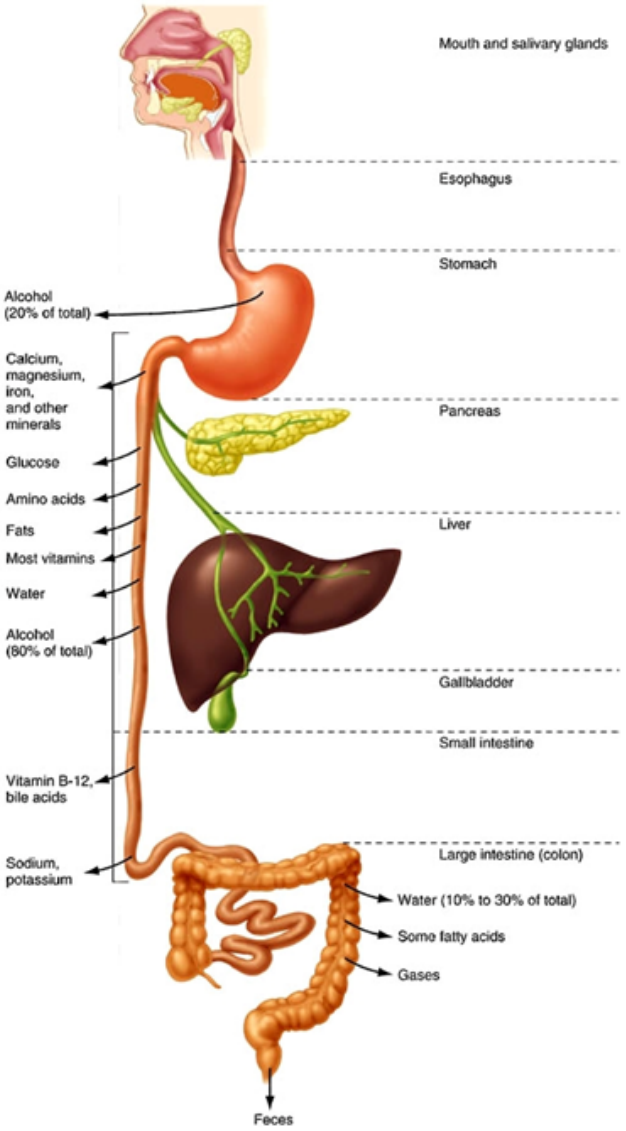
Fisiopatologia delle ileostomie

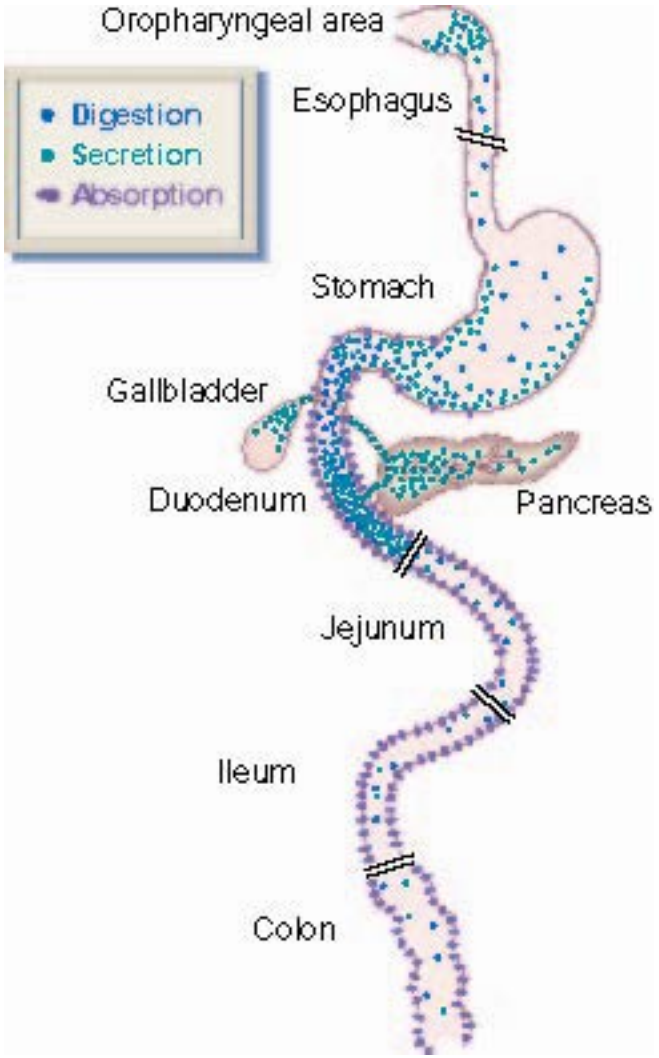
- Normalmente nel colon entrano da 1 a 1.5 litri di liquido
- L' output dell'ileostomia è, in media, 10-15 mL/kg/die.
- L'intestino prossimale puo' adattarsi a perdite idroelettrolitiche legate ad uno stoma distale.
- Dopo un periodo di adattamento le capacità assorbenti del tenue prossimale all'ileostomia aumentano e le perdite idrolettrolitiche si riducono di 2/3 rispetto all'output iniziale.
- L'adattamento riduce le perdite a circa 750 ml/die di media;.
- Il 90% di queste perdite sono di acqua
- Il tenue, diversamente dal colon, è poco efficace nel conservare NaCl
- I pazienti con ileostomia hanno una perdita obbligatoria di NaCl da 30 a 40 meq/day
- I pazienti con ileostomia hanno un basso rapporto Na/K urinario dovuto al risparmio di acqua e sodio operato dal rene (iperaldosteronismo)
- La composizione dell'urina cambia predisponendo all'urolitiasi (4 volte superiore rispetto ai gruppi di controllo)
- I pazienti con ileostomie da lungo tempo presentano spesso ipomagnesiemia (non affidabile il dosaggio ematico del Mg) e, talora, una riduzione dell'assorbimento di vitamina B-12.

Dr. Giovanni Ronzani
Specialista in scienze dell'alimentazione
e malattie dell'apparato digerente

Assorbimento



Secrezione-Digestione



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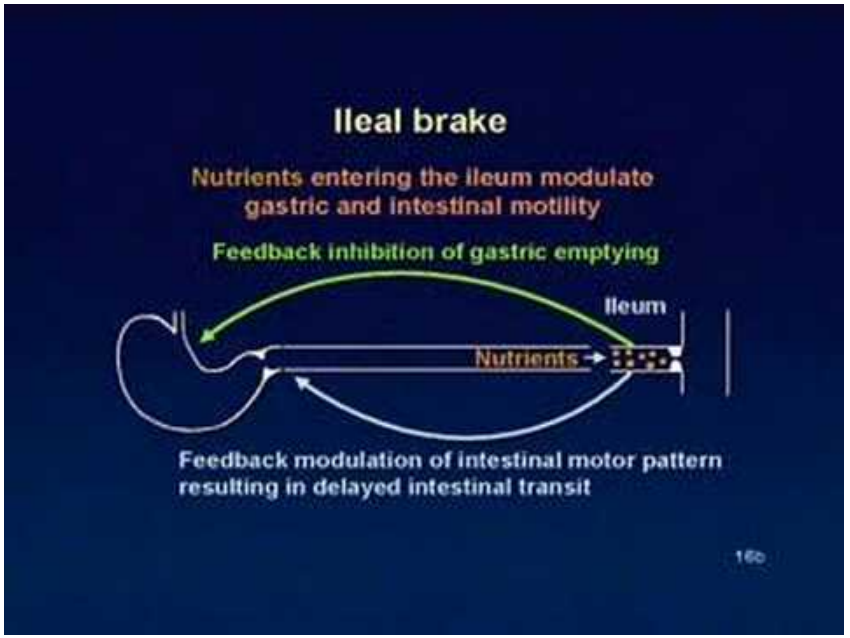
Gastrointestinal Motility



Jejunostomy: FAST	Ileostomy: NORMAL(?)

*Peptide YY and GLP-2 (glucagon-like peptide 2) are released **when food passes the terminal ileum and caecum** that act as ileal and colonic braking mechanisms; this is lost in jejunostomy*

Dr. Giovanni Ronzani
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Ileal brake

The ileal brake is an intraluminal nutrient-triggered feedback control from the distal to the proximal gut. The inhibitory response of upper gastrointestinal motility **differs** with respect to the **type of the nutrients** administered into the ileum. In both humans and dogs, infusion of **fat** into the ileum **delays gastric emptying and increases intestinal transit time** . Within the range of different lipid emulsions, free **fatty acids and digested triglycerides have been shown to be more potent than neutral triglycerides** in eliciting the ileal brake effect . Intraileal **carbohydrates**, on the other hand, delay gastric emptying **only at high concentrations** . Data concerning intraileal **proteins** and the activation of the ileal brake are **contradictory.**

- **Ileal brake and gastric emptying** (inibisce lo svuotamento gastrico, la motilità antro duodenale e stimola la contrazione pilorica)
- **Ileal brake and intestinal motility and transit** (azione non ancora chiara sul complesso motorio migrante interdigestivo; rallenta il transito postprandiale)
- **Ileal brake and gastric acid and exocrine pancreatic secretion** (inibisce la secrezione gastrica; risultati contraddittori su quella pancreatica)
- **Ileal brake and satiety** (riduzione assunzione di cibo nell'uomo)

Spiller RC, Trotman IF, Adrian TE, Bloom SR, Misiewicz JJ, Silk DB. Further characterisation of the 'ileal brake' reflex in man--effect of ileal infusion of partial digests of fat, protein, and starch on jejunal motility and release of neurotensin, enteroglucagon, and peptide YY. Gut. 1988 Aug;29(8):1042-51.

Dr. Giovanni Ronzani
Specialista in scienze dell'alimentazione
e malattie dell'apparato digerente

Journal of Surgical Research Vol 46, Issue 4, 1989, 300–305

Gastrointestinal transit after proctocolectomy with ileal pouch-anal anastomosis or ileostomy

N.J. Soper, B.e A. Orkin, A. Kelly, S. F. Phillips,M. L. Brown.

La proctocolectomia con ileostomia continente **aumenta il numero di scariche forse per la perdita del brake ileale o colonico ?.** Per verificare se ileostomia terminale o con pouch ileale acceleravano il transito intestinale, sono stati misurati svuotamento gastrico di liquidi e transito nel tenue con con una tecnica a due isotopi. Lo svuotamento gastrico era simile. Il transito intestinale postprandiale era più lento dei soggetti con pouch rispetto ai soggetti con ileostomia terminale e ai controlli. Quindi **la rimozione del colon rallenta il transito nel tenue** sebbene non modifichi lo svuotamento gastrico dei liquidi. Tuttavia **alcuni pazienti con pouch hanno transito accelerato e scariche frequenti** per scarso adattamento alla colectomia

Am J Surg. 2004 Jan;187(1):76-82.

Relationship between gastrointestinal transit time and daily stool frequency in patients after Ileal J pouch-anal anastomosis for ulcerative colitis.

Tomita R, Fujisaki S, Tanjoh K.

Sono stati studiati 40 pazienti divisi in **2 gruppi (6 scariche o meno/die e 7 o più scariche/die)** utilizzando marcatori radiopachi. Conclusioni: un transito rapido può condurre ad un numero di scarcihe al giorno superiore a 7 (molto più spesso di notte) con disturbi alla defecazione (evacuazione incompleta,feci èpiù molli, solilig, incontinenza). Ciò che risulta dallo studio è la **criticità di una resezione superiore a 15 cm di ileo nel determinare un peggiore outcome.**

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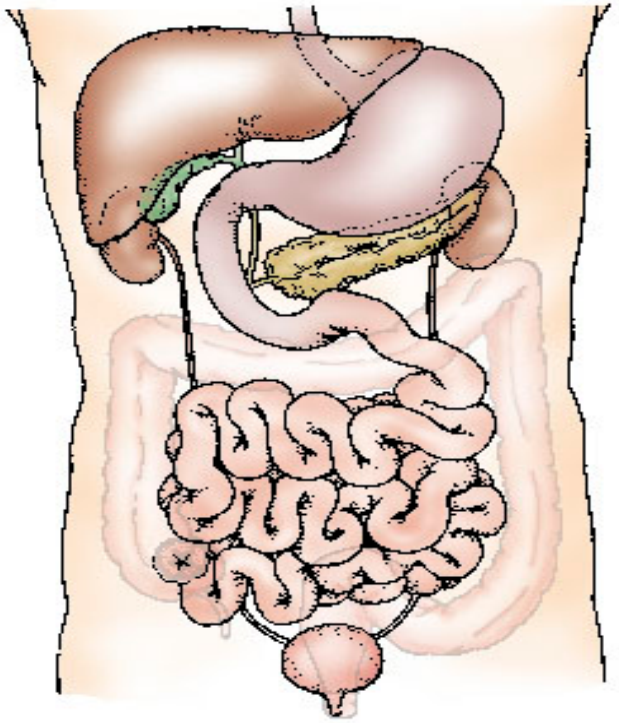
Cosa possiamo perdere

- Acqua
- Sodio
- SCFA
- Acidi Biliari
- Vit B12



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Dis Colon Rectum. 2012 Feb;55(2):175-80.

Dehydration is the most common indication for readmission after diverting ileostomy creation.

Messaris E, Sehgal R, Deiling S, Koltun WA, Stewart D, McKenna K, Poritz LS.

BACKGROUND:
Ileostomies are commonly used to prevent symptomatic anastomotic complications in colorectal resections.
OBJECTIVE:
The aim of this study was to identify **factors predictive of readmission after colectomy/proctectomy and diverting loop ileostomy.**
DESIGN:
This study is a retrospective review.
RESULTS:
602 loop ileostomies were created mostly in white (95.3%), male (55.6%) patients undergoing colon or rectal resections. IBD was the most common indication at 50.9%, with rectal cancer at 16.1%, and other at 31.0%. The 60-day readmission rate was 16.9% (n = 102) with the **most common cause dehydration** (n = 44, 43.1%). Regression analysis demonstrated that the laparoscopic approach (p = 0.02), lack of epidural anesthesia (p = 0.004), preoperative use of steroids (p = 0.04), and postoperative use of diuretics (p = 0.0001) were highly predictive for readmission. Furthermore, regression analysis for **readmission for dehydration identified the use of postoperative diuretics as the sole risk factor (p = 0.0001).**
LIMITATIONS:
This study is limited by the retrospective analysis of data, and it does not capture patients that were treated at home or in clinic.
CONCLUSION:
Readmission after colon or rectal resection with diverting loop ileostomy was high at 16.9%. Dehydration was the major cause for readmission. Patients receiving diuretics are at increased risk for readmission for dehydration. High-risk patients should be treated more cautiously as inpatients and closely monitored in the outpatient setting to help reduce dehydration and readmission.

La disidratazione è il maggior motivo di nuovo ricovero nei pazienti con ileostomia

Dr. Giovanni Ronzani
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The Health of Subjects Living with a Permanent Ileostomy

H. J. KENNEDY, E. C. G. LEE, GORDON CLARIDGE AND S. C. TRUELOVE

From the Nuffield Department of Clinical Medicine and the Department of Surgery, John Radcliffe Hospital, Oxford OX3 9DU; and the Department of Psychology, University of Oxford

Quarterly Journal of Medicine, New Series LI, No. 203, pp. 341–357, Summer 1982

Bilancio idro-elettrolitico

La disidratazione e la perdita di sodio è stata associata al periodo postoperatorio precoce dei pazienti ileostomizzati. Successivamente Gallagher descrisse episodi di deficit di acqua e sale in ileostomie stabilizzate ed altri hanno dimostrato che anche pazienti apparentemente sani hanno una carenza persistente di acqua. In questo studio negli **ileostomizzati per CU e per Crohn** si sono dimostrati una renina ed un **aldosterone plasmatico significativamente aumentati rispetto ai soggetti sani di controllo**.Il volume dell'effluente nelle 24 ore era di 606 ml nella CU e 635 nel M.Crohn; la perdita media di sodio dall'ileostomia era di 71 mmol e 79 mmol al giorno rispettivamente nella CU e nel M.di Crohn. Wrong ha ipotizzato che, nei soggetti normali, il volume di liquidi perso con le feci sia inferiore a 150 ml e che la perdita di sodio con le feci sia inferiore a 5 mmol al giorno.In questo studio, quindi, **presentato un eccesso di perdita pari a 500 ml di liquidi e a 70 mmol di Na /die rispetto a quella aspettata per i soggetti normali**.

Esami bioumorali normali

Antropometria normale

TABLE 3. *Standard measurements in a group of ileostomists who had had ulcerative colitis and in another group with Crohn's disease, compared with those in a group of healthy control subjects who were age- and sex-matched to the patients in the ulcerative colitis group. The values given are the arithmetic means ± 1 standard deviation*

Variable	Ulcerative colitis group (39 patients)	Healthy control group (39 subjects)	Crohn's disease group (12 patients)
Height (cm)	169·7 ± 10·2	169·7 ± 8·9	166·1 ± 10·3
Span (cm)	173·1 ± 10·1	172·3 ± 10·3	168·0 ± 10·6
Weight (kg)	70·0 ± 11·9	71·3 ± 14·5	62·5 ± 12·3
Blood pressure (mm Hg)			
Systolic lying	133 ± 23	133 ± 19	132 ± 21
Systolic standing	124 ± 20	126 ± 15	126 ± 20
Diastolic lying	83 ± 11	82 ± 11	82 ± 14
Diastolic standing	82 ± 10	81 ± 9	82 ± 11

TABLE 4. *A 12-channel plasma 'biochemical profile' in a group of ileostomists who had had ulcerative colitis and in another group with Crohn's disease compared to that in a group of healthy control subjects age- and sex-matched to the patients in the ulcerative colitis group. The values given are the arithmetic means ± 1 standard deviation*

Variable	Ulcerative colitis group (39 patients)	Healthy control group (39 subjects)	Crohn's disease group (12 patients)
Sodium (mmol/l)	141·9 ± 3·0	141·2 ± 2·4	141·2 ± 2·9
Potassium (mmol/l)	3·90 ± 0·70	4·00 ± 0·71	4·02 ± 0·52
Chloride (mmol/l)	102 ± 3	102 ± 2	100 ± 3
Bicarbonate (mmol/l)	26 ± 5	25 ± 5	28 ± 4
Urea (mmol/l)	5·7 ± 1·1	6·3 ± 1·9	5·3 ± 1·5
Creatinine (umol/l)	83 ± 21	84 ± 17	75 ± 18
Calcium (mmol/l)	2·45 ± 0·14	2·40 ± 0·09	2·40 ± 0·13
Phosphate (mmol/l)	0·98 ± 0·20	0·88 ± 0·16	0·99 ± 0·16
Total protein (g/l)	74·8 ± 4·8***	70·1 ± 4·3	71·5 ± 4·0
Albumin (g/l)	44·2 ± 2·9*	42·7 ± 2·2	41·3 ± 3·0
Bilirubin (μmol/l)	10·15 ± 3·98	11·41 ± 4·98	12·58 ± 8·35
Alkaline phosphatase (iu/l)	211·7 ± 64·1*	181·9 ± 40·1	232·0 ± 55·2**
Aspartate transaminase (iu/l)	26·1 ± 10·5	22·4 ± 8·4	24·8 ± 10·7

Statistical significance of the differences: * = $p < 0.02$; ** = $p < 0.01$; *** = $p < 0.001$.

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Absorption studies in patients six to 10 years after construction of ileostomy reservoirs

L. O. NILSSON, H. ANDERSSON, L. HULTÉN, R. JAGENBURG, N. G. KOCK, H. E. MYRVOLD, AND B. PHILIPSON

From the Department of Surgery II, the Department of Clinical Chemistry, and the Institution of Clinical Nutrition, Sahlgrenska Sjukhuset, University of Göteborg, Göteborg, Sweden

Gut, 1979, **20**, 499-503

Na urinario normale fra 50-250 mEq/24h

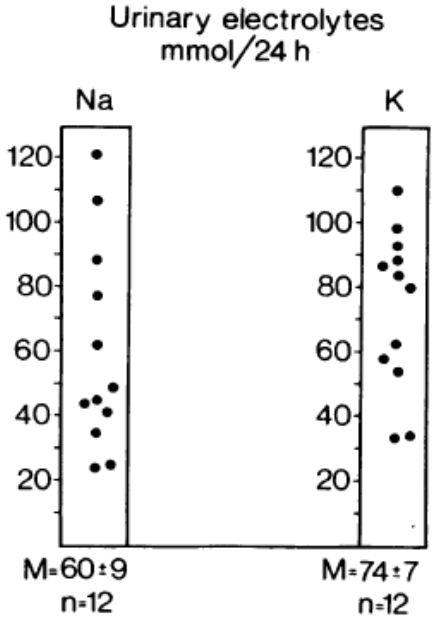

Fig. 3 *Urinary excretion of sodium and potassium in patients with ileostomy reservoirs. Mean and range for patients with conventional ileostomies (Gallagher et al., 1962): Na 70 mmol/day (1-250), K 78 mmol/day (28-90).*

According to Hill (1976), clinical signs of sodium depletion are practically absent when the urinary output is above 10 mmol/ day. In the **present series the mean sodium output was 60 mmol/ day** and no patient had a sodium output of less than 20 mmol/day. The findings suggest that the **net sodium absorption from the gastrointestinal tract in patients with ileostomy reservoirs is of the same order of magnitude as in patients with conventional ileostomies,** thus indicating sodium absorption from the ileal pouch.

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Gut, 1979, **20**, 499-503

L'escrezione media di acido colico marcato con C14 era del 46% nel gruppo con reservoir contro il 17% con ileostomia convenzionale nelle 24 ore di circolo enteroepatico. La differenza è statisticamente significativa (p<0,01).

Non c'era correlazione fra ecrezione di acido colico marcato con C14 ed escrezione di grassi fecali.

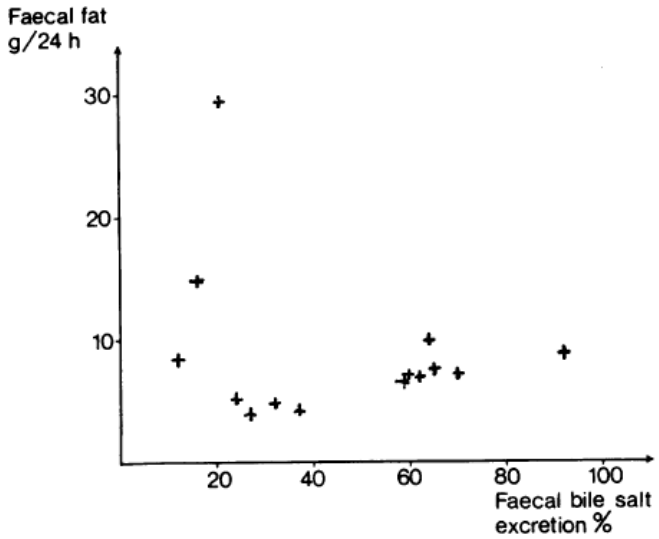

Fig. 2 *Faecal fat in relation to faecal excretion of ^{14}C-cholic acid in patients with ileostomy reservoirs.*

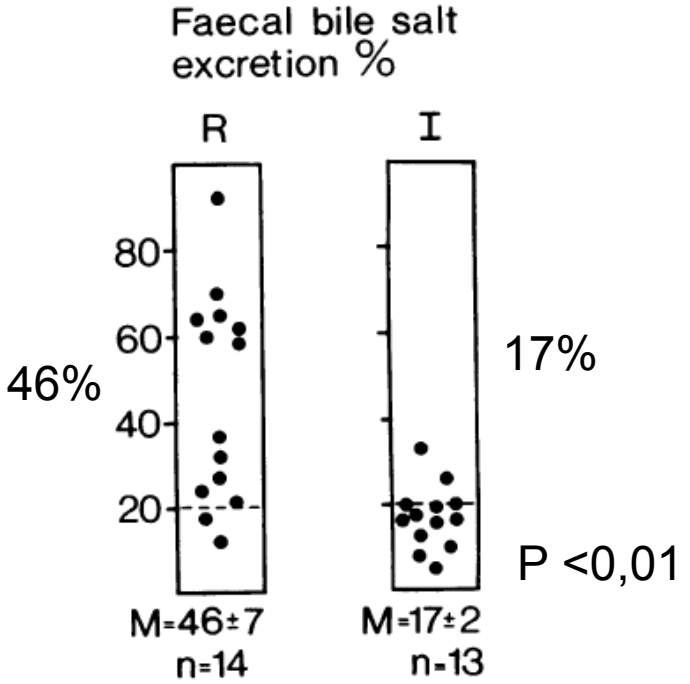

Fig. 1 *Faecal excretion of intravenously administered ^{14}C- cholic acid in patients with ileostomy reservoirs (R) and in patients with conventional ileostomies (I).*

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Int J Colorectal Dis. 2004 Jul;19(4):316-8. Epub 2003 Nov 15.

hould we monitor vitamin B12 levels in patients who have had end-ileostomy for inflammatory bowel disease?

Jayaprakash A, Creed T, Stewart L, Colton B, Mountford R, Standen G, Probert C.

Studio prospettico su 39 pazienti con MICI e ileostomia terminale da più di 30 mesi.
Il 5,1% (n=2) dei pazienti mostrava un deficit di vit B12 (<150 ng/L) . Uno dei 2 aveva anche avuto una resezione ileale per ostruzione (Crohn). In uno non c'era spiegazione.
Non c'era correlazione fra durata dell'ileostomia e livelli sierici di B12 (media di durata dell'ileostomia 12,53 anni).
Gli autori **non raccomandano screening per vit B12 a meno che non sia presente anche una resezione ileale o ci sia ancora una MICI attiva**

Scand J Gastroenterol. 1984 May;19(3):369-74.

Vitamin B12 in plasma in patients with continent ileostomy and long observation time.

Nilsson LO, Myrvold HE, Swolin B, Ojerskog B.

Valutazione della vit B12 plasmatica in 213 pazienti con ileostomia continente.
Il 7% (14) dei pazienti presentava valori bassi ed un altro 7% (14) presentava valori borderline sviluppatasi in un intervallo medio di tempo di 7,5 anni (3-11 anni). Tuttavia **11 dei 14 pazienti con B12 bassa e 8 dei 14 pazienti con B12 borderline aveva avuto anche una resezione di tenue.** Nessun paziente aveva sviluppato anemia o disturbi neurologici dovuti a carenza di B12. Gli autori concludono che **non c'è bisogno di profilassi di B12 nei pazienti con ileostomia continente**. Tuttavia poichè il 7% presenta valori bassi è **consigliabile un monitoraggio periodico.**

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An Acute Ileal Amino Acid Digestibility Assay Is a Valid Procedure for Use in Human Ileostomates[1]

Paul J. Moughan, Christine A. Butts,* Henk van Wijk,† Angela M. Rowan,** and Gordon W. Reynolds†

*Riddet Centre, Massey University, Palmerston North, New Zealand; *New Zealand Institute for Crop & Food Research Limited, Palmerston North, New Zealand; †Institute of Food Nutrition and Human Health, Massey University, Palmerston North, New Zealand; and **Fonterra Research Centre, Palmerston North, New Zealand*

J. Nutr. 135: 404–409, 2005.

	g dry matter/750 mL			
Protein-containing drink	Diet 1	Diet 2	Diet 3	Diet 4
Ingredient[4,5]				
Sodium caseinate	26.8			
Whey protein concentrate		33.1		
Soy protein isolate			28.3	
Soy protein concentrate				38.9
Flavour/sugar[6]	80.0	80.0	80.0	80.0

Eight adult human ileostomates each received a single meal of protein-free biscuits and a **drink containing sodium caseinate, whey protein concentrate, soy protein isolate, or soy protein concentrate**; this meal was followed by a 9-h total digesta collection period.

True ileal digestibilities for total nitrogen were 101.9 ±0.70, 98.3±0.80, 99.5±0.80, and 98.5±1.20% for sodium caseinate, whey protein concentrate, soy protein isolate, and soy protein concentrate, respectively. **The 4 protein sources were virtually completely digested in humans by the end of the small intestine.**

True ileal amino acid and total nitrogen digestibilities in humans given milk protein and soy protein products[1,2]

Amino acid	Sodium caseinate	Whey protein concentrate	Soy protein isolate	Soy protein concentrate
		%		
Aspartate	98.1 ± 0.70	97.7 ± 0.43	97.2 ± 0.44	96.6 ± 0.79
Threonine	99.5 ± 0.77	92.7 ± 0.58	97.8 ± 0.91	96.7 ± 1.88
Serine	98.8 ± 0.63	93.0 ± 0.69	97.9 ± 0.76	97.0 ± 1.35
Glutamate	98.6 ± 0.29	97.6 ± 0.28	99.1 ± 0.29	97.9 ± 0.35
Proline	99.2 ± 0.28	95.1 ± 0.43	97.8 ± 0.62	96.4 ± 1.17
Glycine	102.4 ± 2.06	97.8 ± 2.36	95.3 ± 2.43	96.2 ± 1.47
Alanine	99.7 ± 0.98	97.3 ± 0.53	96.9 ± 0.53	96.6 ± 0.86
Cysteine	105.3 ± 5.66	99.3 ± 1.92	97.3 ± 1.57	90.5 ± 2.74
Methionine	99.5 ± 0.26	98.5 ± 0.48	98.4 ± 0.44	96.1 ± 0.70
Valine	99.6 ± 0.54	98.3 ± 0.57	97.2 ± 0.69	96.5 ± 0.94
Isoleucine	99.5 ± 0.47	98.5 ± 0.32	97.1 ± 0.46	97.2 ± 0.66
Leucine	100.1 ± 0.46	99.2 ± 0.30	97.2 ± 0.49	96.7 ± 0.64
Tyrosine	100.2 ± 0.59	98.7 ± 0.72	98.8 ± 0.73	98.8 ± 0.86
Phenylalanine	99.7 ± 0.52	98.8 ± 0.65	97.9 ± 0.51	97.1 ± 0.52
Histidine	99.0 ± 0.92	89.2 ± 1.91	99.3 ± 0.88	96.9 ± 1.90
Lysine	99.8 ± 0.47	96.7 ± 0.37	99.1 ± 0.51	98.2 ± 0.61
Arginine	100.2 ± 0.70	98.9 ± 0.76	99.4 ± 0.33	99.7 ± 0.86
Total N	101.9 ± 0.70	98.3 ± 0.80	99.5 ± 0.80	98.5 ± 1.20

[1] Values are means ± SE, $n = 8$.
[2] Digestibility coefficients were calculated using AIA as an indigestible marker to correct for incomplete digesta collection.

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I Fagioli ?

Eur J Clin Nutr. 1990 Aug;44(8):559-66.

Nutrients excreted in ileostomy effluents after consumption of mixed diets with beans or potatoes. Minerals, protein, fat and energy.

Langkilde AM, Andersson H, Schweizer TF, Torsdottir I.

Department of Clinical Nutrition, Göteborg University, Sahlgrenska Hospital, Sweden.

Sono state studiate, in 2 giorni di raccolta, le perdite intestinali (da ileostomia) di energia, grassi, proteine, magnesio, calcio, ferro e zinco con 2 diete isocaloriche contenenti fiocchi di fagiolo verso fiocchi di patate che fornivano cierca il 50% delle calorie. Con I fiocchi di patate sono stati persi 11% delle calorie e 12% delle proteine; con I fagioli il 16% delle calorie ed il 15% delle proteine ($p<0,001$). Nessuna differenza per I grassi. L'assorbimento del magnesio era inferiore con I fagioli. Conclusioni : **una dieta con fiocchi di fagioli determina un assorbimento di nutrienti (Calorie, proteine, magnesio) solo lievemente inferiore rispetto ai fiocchi di patate così che le conseguenze nutrizionali sembrano essere modeste**

Dr. Giovanni Ronzani
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Effect of ingestion of fat on ileostomy effluent

Gut, 1990, **31**, 435–438

S E Higham, N W Read

Confronto fra diete ad alto e basso contenuto in grassi ma con pari quantità di carboidrati, proteine e fibre. TT valutato con marcatori solidi e liquidi. **Con la dieta ad alto contenuto in grassi tutti I soggetti hanno aumentato l'effluente ileale**. Vi era una **maggior eliminazione di proteine, di grassi** (anche se vi era un maggior assorbimento proporzionale). L'elimenazione di **carboidrati non era significativamente differente**. Non vi erano differenze significative nel tempo di transito. Gli autori ipotizzano che l'aumento dell'escrezione di proteine e acqua possa essre determinato da un aumento della secrezione di enzimi pancreatici.

TABLE II *Wet and dry weights, nutrient and water contents of ileostomy evacuates*

	High fat	*Low fat*	*p value*
Protein (g)	11·6 (1·2)	8·8 (0·9)	<0·001
Carbohydrate (g)	3·9 (0·5)	3·7 (0·3)	>0·05
Fat (g)	6·8 (0·8)	2·6 (0·3)	<0·001
Wet weight (g)	532 (35)	397 (22)	<0·001
Dry weight (g)	60·0 (3·7)	47·9 (2·6)	<0·001
Water content (g)	472 (38)	349 (19)	<0·001

Results are expressed as mean (SEM).

TABLE III *Gastrointestinal transit times on low and high fat diets*

	High fat	*Low fat*	*p value*
First solid marker (h)	15·1 (1·8)	12·2 (0·8)	>0·05
Second solid marker (h)	15·7 (1·1)	12·3 (1·7)	<0·05
Polyethylene glycol (h)	12·2 (2·2)	12·6 (1·6)	>0·05

Results are expressed as the mean (SEM) of the half time for delivery of each marker.

Dr. Giovanni Ronzani
Specialista in scienze dell'alimentazione
e malattie dell'apparato digerente

Human gut microbiome adopts an alternative state following small bowel transplantation

Amber L. Hartman[a,b], Denver M. Lough[c], Dinesh K. Barupal[b], Oliver Fiehn[b], Thomas Fishbein[c,d], Michael Zasloff[c,d], and Jonathan A. Eisen[b,e,1]

[a]Department of Biology, The Johns Hopkins University, Baltimore, MD 21218; [b]Genome Center and [e]Department of Medical Microbiology and Immunology, Department of Evolution and Ecology, University of California, Davis, CA 95616; and [c]Department of Surgery and the Transplant Institute and [d]Department of Pediatrics, Georgetown University Medical Center, Washington, DC 20007

PNAS 106, 40; 17187-17192 . 2009

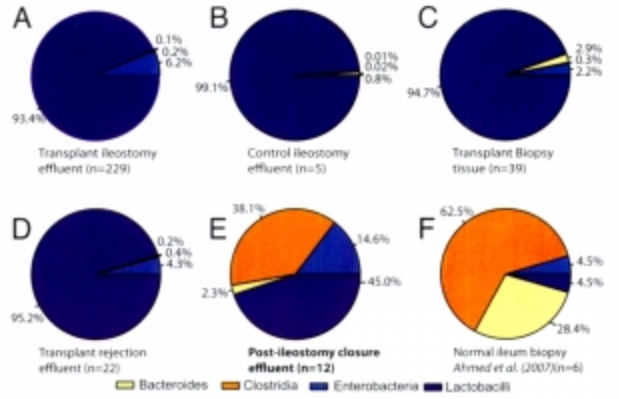

Fig. 2. Summary of the relative bacterial populations found under various clinical conditions. In each chart, the population of each of the four bacterial orders is shown as the geometric mean of its percentage of the total population. (*A*) Ileal effluent from transplant patients, ileostomy present. (*B*) Ileal effluent from nontransplant patients, ileostomy present (Fig. S4). (*C*) Biopsy samples from transplant patients, ileostomy present (Fig. 3). (*D*) Ileal effluent from transplant patients during transplant rejection, ileostomy present. (*E*) Ileal effluent from transplant patients, ileostomy closed. (*F*) Regraphed selected data from table 3 in ref. 17 from biopsies of the terminal ileum of six healthy subjects.

Il trapianto di intestino offre una eccezionale opportunità per studiare il microbioma dell'intestino tenue umano. Questo perché per una diagnosi precoce della graft reaction viene creata una ileostomia traverso cui controllare l'intestino e biopsiare la mucosa. In questo studio è stata utilizzata la PCR per Identificare la popolazione batterica di 17 pazienti sottoposti a trapianto del piccolo intestino.
Sono stati studiati anche pazienti ileostomizzati senza trapianto.

Mentre la **flora normale** mostra la prevalenza di **anaerobi stretti (Bacteroidi e Clostridi) la flora postrapianto e quella degli ileostomizzati** presenta una prevalenza degli **anaerobi facoltativi (Lattobacilli ed Enterobatteri)**. Dopo la **chiusura** dell'ileostomia nei pazienti trapiantati, il **microbioma ritorna alla sua composizione** abituale. L'ipotesi è che la **diversa ossigenazione** dell'ileo, in queste circostanze condizioni il microbioma residente.

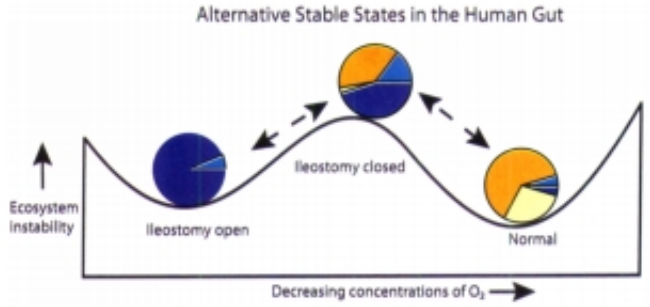

Fig. 5. Model of alternative stable states of the small bowel ecosystem. In this ball-in-cup diagram (26), the horizontal length represents all possible states of the ecosystem, the vertical length represents increasing ecosystem instability. The two valleys represent two alternative stable states of the small bowel microbiota: either dominated by strict anaerobes or by facultative anaerobes. The pie charts illustrating the microbial commmunity compositions are from Fig. 2*A*, *D*, and *E*.

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Metabolomica dell'effluente pre e post chiusura dell'ilostomia

E' stata trovata una differenza fra i campioni pre e post chiusura statisticamente significativa (p<0,1) per il 18,3% dei metaboliti.
21 metaboliti erano identificabili e 45 erano sconosciuti.
Significativo il fatto che numerosi metaboliti chiave del Ciclo di Krebs erano arricchiti nel campione prechiusura (piruvato, alfachetoglutarato, acido glutammico). Inoltre era molto rappresentato l'acido lattico segno della presenza di lattobacilli. Altri composti come Il levanbiosio e il il glicerol-3-galattoside non trovano al momento spiegazione. Nell'effluente postchiusura furono isolati molti composti sconosciuti simili ad amino acidi e zuccheri.

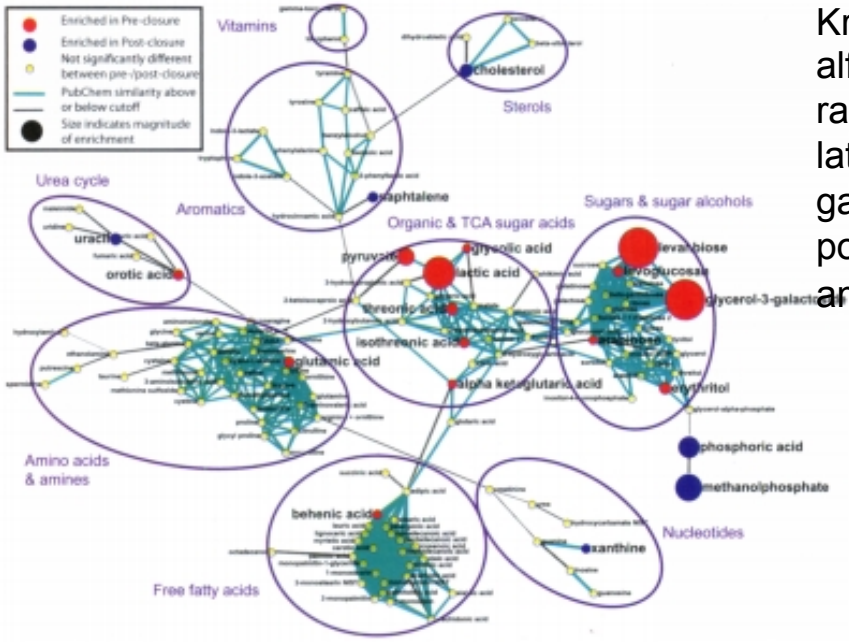


Fig. 4. Metabolomic network diagram of the 139 chemically identified metabolites. 62 metabolites (18.0%) showed significant enrichment in either preclosure or postclosure samples. Metabolites were mapped by structural similarity (see *SI Text* for details). Red, compounds enriched in preclosure samples; blue, compounds enriched in postclosure samples. Node size is proportional to the relative enrichment.

Lo studio dimostra che il microbioma diverso può giocare un ruolo importante per la salute del paziente ileostomizzato con risultati ancora sconosciuti

Dr. Giovanni Ronzani
Specialista in scienze dell'alimentazione
e malattie dell'apparato digerente

The effect of diet on ileostomy function

T. J. THOMSON, J. RUNCIE, AND A. KHAN
From the Gastrointestinal Unit, Stobhill and Ruchill Hospitals, Glasgow, and the University Department of Materia Medica, Stobhill Hospital, Glasgow

Gut, 1970, 11, 482-485

A questionnaire was sent to 5,100 members of the Ileostomy Association of UK and Ireland inviting the members to record their experiences in relation to the function of the ileostomy following on the ingestion of 29 named articles of diet. 952 people, 623 females (65.4 %) and 329 males (34.6 %), completed the questionnaire satisfactorily.

Time after Operation	*Males*	*Females*
Less than 6 months	15 (6·7%)	17 (23·5%)
Between 7 and 12 months	11 (0)	49 (22·4%)
Between 1 and 5 years	145 (7·6%)	298 (15·1%)
Between 5 and 10 years	94 (6·4%)	161 (11·2%)
Over 10 years	64 (15·6%)	98 (21·4%)

Table I *Difficulty in choosing diet in 28 males (8·5%) and 99 females (15·9%)*

ILEOSTOMY AND DIET

A. Age.....: Sex Male/Female Duration of Ileostomy....yrs.
B. Is your weight (a) rising (b) falling (c) steady?
C. Do you have any difficulty in choosing diet? Yes/No
D. Foods (and drinks) taken since date of operation.
The following list of items is to be considered. Please put a tick in columns (1) to (6) against each item of food (or drink) which has been taken since date of operation.
Columns (1) to (6) are explained below the list of items.
Columns (1) to (5) refer to items causing trouble and column (6) to items which cause no trouble.

Item	*1*	*2*	*3*	*4*	*5*	*6*
Apples						
Beans						
Beetroot						
Boiled Fish						
Cabbage						
Carrots						
Cucumber						
Fried Egg						
Fried Fish						
Grilled Fish						
Lettuce						
Mince						
Mushroom						
New Potatoes						
Onion						
Peaches						
Pears						
Peas						
Pineapple						
Potatoes						
Rhubarb						
Steak						
Tomatoes						
Turnip						
Alcohol (names):						
Sauces (names):						
Aerated waters (names):						
Soups (names)						
Cereals (names):						

Column 1 Causes watery flow
2 Upsets timing of bag filling.
3 Causes flatulence.
4 Causes pain.
5 Causes odour.
6 Agreeable. No trouble.

Il punto di vista del paziente

The fact that the **vast majority (97.5%) can maintain or increase their weight is ample evidence of the nutritious value of their diets**. It is not possible to state whether the loss in weight recorded by the few (2.5%) was causally related to the ileostomy or to independent factors. The overall difficulty in choosing a diet appeared to rise 10 years or more after the creation of the ileostomy . It is only possible to speculate what may cause this. Do patients tire of dietary restrictions ? Do they become more adventuresome and introduce items which they had previously avoided? Our data do not provide precise answers to these questions. **The ileostomy patient should take a mixed diet, its content being dictated by his personal choice**. He should **not accept advice** regarding the unsuitability of items of diet **without personally testing the effects** on the function of the ileostomy. He **should not omit any article (es.milk)** from his diet unless he has found that it repeatedly causes dyspepsia.

Ileostomy Diet

Purpose: The ileostomy diet is designed to avoid blockage of an ileostomy or a narrowed gastrointestinal tract and to reduce fecal output.

Use: The diet is designed for use post-surgically for a patient with an ileostomy or ileorectostomy. It may also be used when narrowing of the esophageal or intestinal lum… abdominal surgery in progre… liberal diet.

Adequacy: This diet restricts… plant cell material that is resi… This diet can be nutritionally… attention is given to selecting… However, strict reductions in… use will limit ascorbic acid and folate intake. Individual food use should be assessed and supplemented accordingly.

- ♣ Limitare le tipologie di frutta
- ♣ Limitare le tipologie di verdura
- ♣ Usare cereali raffinati
- ♣ Mangiare carne ben cotta e tenera
- ♣ Masticare bene il cibo
- ♣ Bere molto

General Guidelines:

1. **Limit fruits to the following:** Fruit juice; canned and skinless fruits; pureed fruits and ripe bananas. Avoid raw fruits and canned fruits that have skins or seeds.
2. **Limit vegetables to the following:** Vegetable juices; tender cooked vegetables limited to asparagus tips, beets, broccoli tips, carrots, peeled eggplant, peeled potatoes, peeled tomatoes, pumpkin and squash; other vegetables in pureed form are acceptable.

…ds and cereal products,

…der meat, poultry, fish, …heat and shellfish with …r gristle. Avoid meats …nd sausages.

…ly.

6. Drink plenty of liquids to avoid dehydration.
7. **Foods more likely to cause blockage include:**

Celery	Coconut	Coleslaw
Dried Fruit	Grapefruit	Corn
Popcorn	Salads	Nuts
Raw Carrots	Oranges	

Dr. Giovanni Ronzani
Specialista in scienze dell'alimentazione
e malattie dell'apparato digerente

Source: American Dietetic Association, 2011, and
United Ostomy Associations of America, 2011

Common intestinal reactions to certain foods

Gas	Beans, broccoli, Brussels sprouts, cabbage, cauliflower, carbonated beverages, beer, onions
Incomplete digestion	Apple peels, cabbage, celery, coconut, corn, dried fruit, mushrooms, nuts, pineapple, popcorn, seeds, skins from fruits, skins from vegetables
Thickened stool	Applesauce, bananas, cheese, pasta, rice, peanut butter (creamy), potato (without skin), tapioca
Thinned stool	Fried foods, grape juice, high-sugar foods, prune juice, spicy foods
Increased odor	Alcohol, asparagus, eggs, fish, garlic, onions
Reduced odor	Buttermilk, cranberry juice, parsley, yogurt

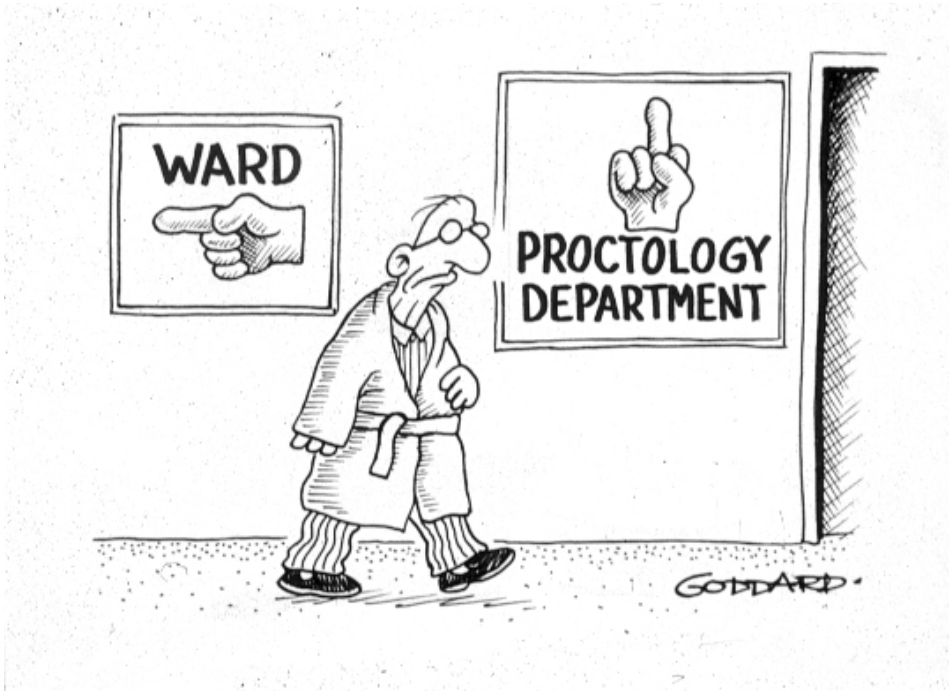
Recommended Foods

Note: If particular foods make you feel unwell, stop eating them and try again in 2 to 3 weeks. Everyone's tolerance to foods is different. Finding foods that are best for you may require some trial and error.

Food Group	Foods Recommended	Notes
Milk	Skim or low-fat milk Powdered milk Buttermilk Soy milk Yogurt Cheese Low-fat ice cream or sherbet	If you feel unwell after drinking milk or eating dairy foods, try lactose-free products.
Meat and other protein foods	Meats and poultry prepared without added fat Smooth nut butter Fish Eggs	When trying nuts, fish and eggs, start with small amounts. These foods may cause odors.
Grains	Bread, bagels, rolls, crackers, pasta, and cereal made with white or refined flour White rice	When you first start eating solid foods, avoid whole grains (they are high in fiber).
Vegetables	Well-cooked vegetables without seeds Lettuce Strained vegetable juice	Some vegetables may cause gas, blockages, or odors for some people. See Foods Not Recommended for more information.
Fruits	Pulp-free fruit juices (except prune juice) Ripe banana Avocado Orange or grapefruit without membrane Soft melons (watermelon or honeydew) Peeled or cooked apple Canned fruits (except pineapple)	Some fruits may cause blockages. See Foods Not Recommended for more information.
Fats	Any	Start with very small amounts. Fats may cause symptoms or discomfort.
Beverages	Decaffeinated coffee or tea Noncarbonated beverages Rehydration beverages	

eat right. Academy of Nutrition and Dietetics Foundation

Tutti i gruppi alimentari sono consigliati anche se con raccomandazioni particolari per ogni gruppo



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Vi ringrazio per l'attenzione

Dr. Giovanni Ronzani
Specialista in scienze dell'alimentazione
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Fibra viscosa?

Br J Nutr. 1992 Jan;67(1):115-22.

The effect of ingestion of guar gum on ileostomy effluent.

Higham SE, Read NW.

Centre for Human Nutrition, University of Sheffield, Northern General Hospital.

Randomized, paired studies were carried out on five healthy volunteers equipped with terminal ileostomies to investigate the effect of incorporating 15 g of the viscous polysaccharide guar gum in the normal diet on the volume, weight, composition and physical properties of ileostomy effluent. Subjects ate an identical diet during two 5 d study periods, which were separated by 2 d.
Outputs of fat, protein, sodium, potassium, dry weight and water were all increased during guar gum administration, but outputs of **carbohydrate, calcium and phosphorus were not significantly altered.**
Mouth-to-stoma transit was not significantly affected and, **surprisingly, the viscosity of the ileostomy effluent was reduced by guar gum.**
These results show that it is not always possible to predict what will happen to small intestinal function when guar gum is added to the diet from experiments carried out when guar gum is administered alone or with glucose.
While our findings show that guar gum will reduce fat absorption, the mechanisms involved are more sophisticated than hitherto envisaged.