The Aging Gut: Changes in Function and Strategies for Management

MARK H DELEGGE, MD

CAROL IRETON-JONES, PHD, RDN, CNSC, FASPEN, FAND

Disclosures

Mark H DeLegge, MD

- DeLegge Medical
- IQVIA
- Digestive Nutrition Group
  - www.digestivenutritiongroup.com - Founder

Carol Ireton-Jones, PhD, RDN

- Speaker's Bureau
  - Fresenius Kabi
  - Cardinal Health
- Digestive Nutrition Group
  - www.digestivenutritiongroup.com - Founder

Learning Objectives

Upon completion of this presentation, the learner will be able to:

1. Understand the impact of aging on the luminal gastrointestinal tract, hepatobiliary system, and gut microbiome.
2. Describe changes in the aging gut that may impact digestion and absorption, as well as bowel function, in order to plan nutrition strategies.
3. Assess digestive function and symptoms in an older patient based on understanding of changes in the gut and the gut microbiome resulting from aging, diseases, and their treatments.
4. Develop a nutrition care plan that considers structural disease related, and treatment related changes in the gastrointestinal tract and improves digestive symptoms and nutrition status.

Physiology of the Aging Gut

Clinical Care Implications

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The Elderly Population

The “old” (>65 years) and the “oldest” (>85 years) age groups are the fastest growing subpopulations in industrialized societies. They correspond to an increased-risk population with high rates of morbidity and mortality due to their susceptibility to degenerative and infectious diseases, which may be exacerbated by a poor nutritional status.

Saunier et al; Digest Liver Dis, 2002

Gastrointestinal Tract

Key Functions

- Nutrient Intake
- Digestion and Absorption
- Propulsion (Motility)
- Immunologic Defense

Aging and The GI Tract
Physiologic or Disease–Related Processes

Young Age **Middle Age** **Old Age**

Physiologic: Something that is normal, that is due neither to anything pathologic nor significant in terms of causing illness.

Examples of Impacting Co-Morbid Disease

Diabetes

Cardiovascular Disease

Cancer

Pulmonary Disease

Immobility or Reduced Mobility

Autoimmune Disease

Dementia

Co-Morbid Disease and the Elderly

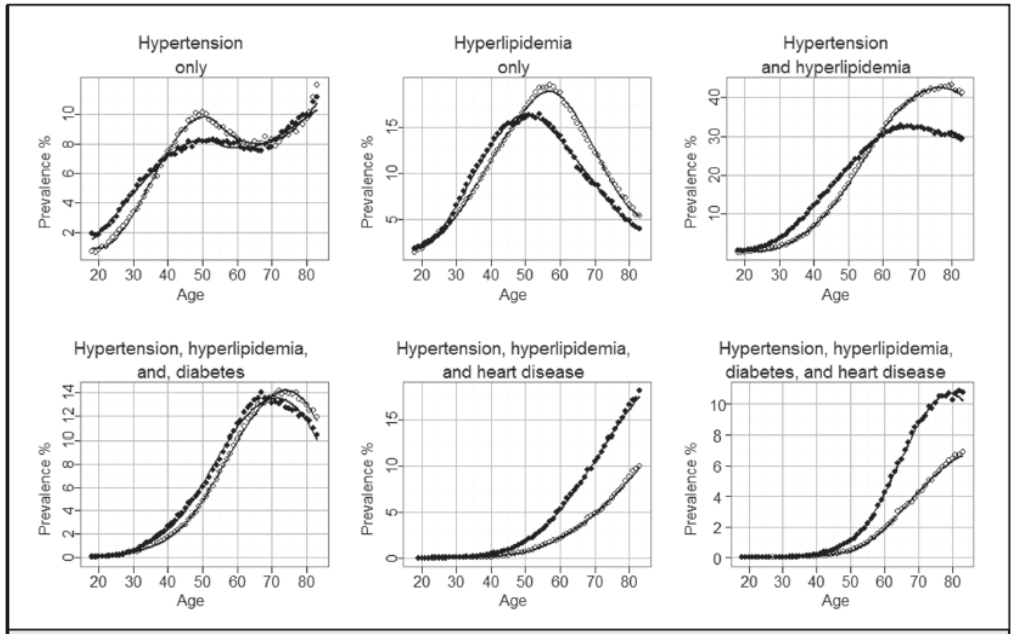
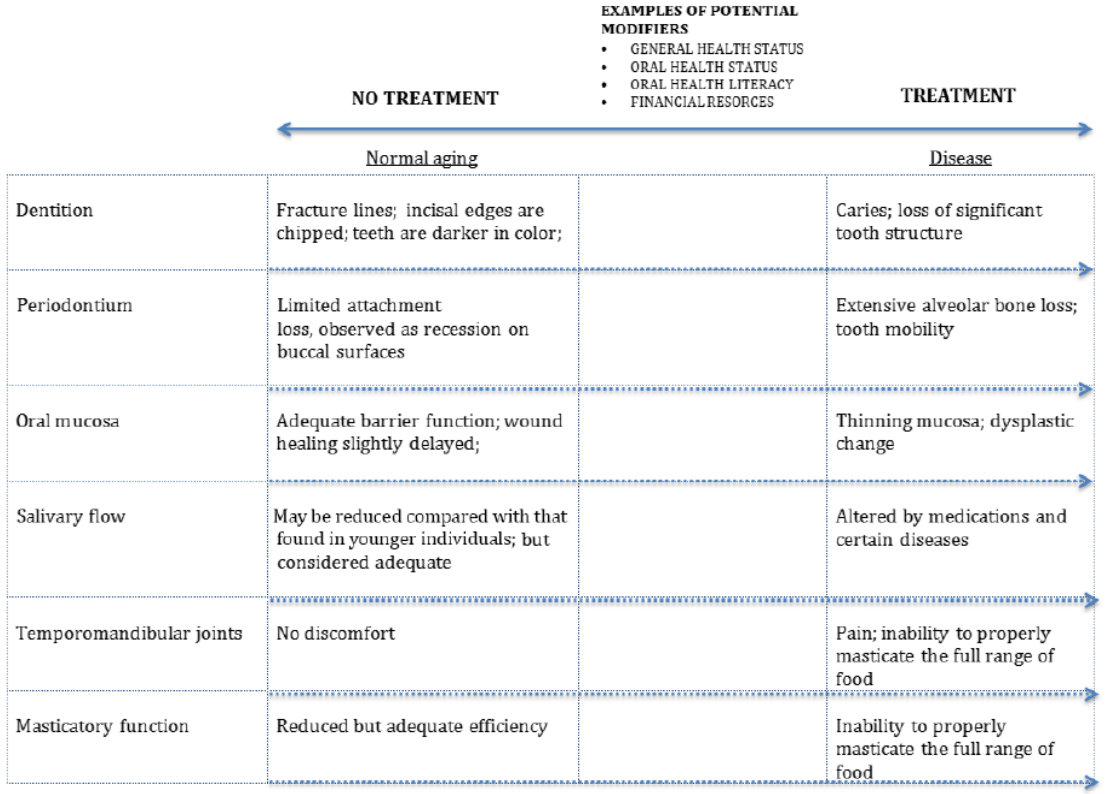


Figure 5. Prevalence by age and comorbid conditions for females (❐ – ❐) and males (■ – ■). The curves fit to the data had high R2 values ranging from 96.43 for patients with hypertension, hyperlipidemia, and heart disease to 99.91 for patients with hypertension and hyperlipidemia.

With age, the prevalence of co-morbid disease increases in the elderly

Davis JM, et al; Hawaii Med J, 2011

Mouth and Aging



EXAMPLES OF POTENTIAL MODIFIERS
- GENERAL HEALTH STATUS
- ORAL HEALTH STATUS
- ORAL HEALTH LITERACY
- FINANCIAL RESORCES

NO TREATMENT → TREATMENT

	Normal aging		Disease
Dentition	Fracture lines; incisal edges are chipped; teeth are darker in color;		Caries; loss of significant tooth structure
Periodontium	Limited attachment loss, observed as recession on buccal surfaces		Extensive alveolar bone loss; tooth mobility
Oral mucosa	Adequate barrier function; wound healing slightly delayed;		Thinning mucosa; dysplastic change
Salivary flow	May be reduced compared with that found in younger individuals; but considered adequate		Altered by medications and certain diseases
Temporomandibular joints	No discomfort		Pain; inability to properly masticate the full range of food
Masticatory function	Reduced but adequate efficiency		Inability to properly masticate the full range of food

Fig. 1. The continuum of change between normal oral aging and disease, in which the decision to provide treatment is modified by intrinsic and extrinsic factors.

Comparison of Elderly to Young Adults

Decrease saliva production

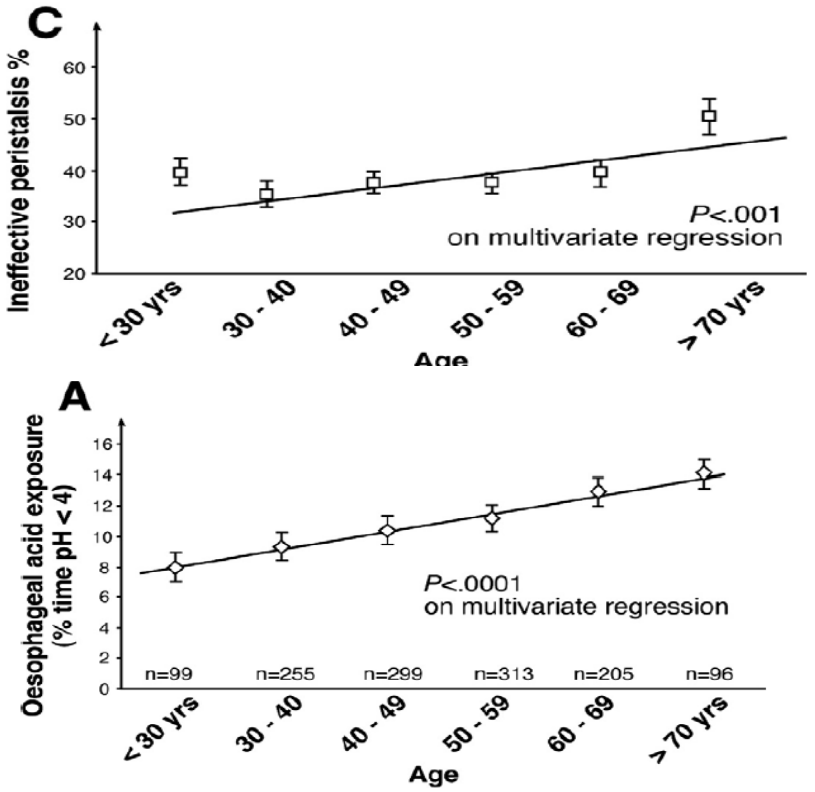
Increased taste alterations

Increased mastication cycles

No evidence to suggest these age-related changes alone have resulted in clinical consequences

Esophagus and Aging

Ineffective Peristalsis



Elderly Versus Younger Adults

Reduction in amplitude of peristaltic contractions

- No clinical significance of age-related changes

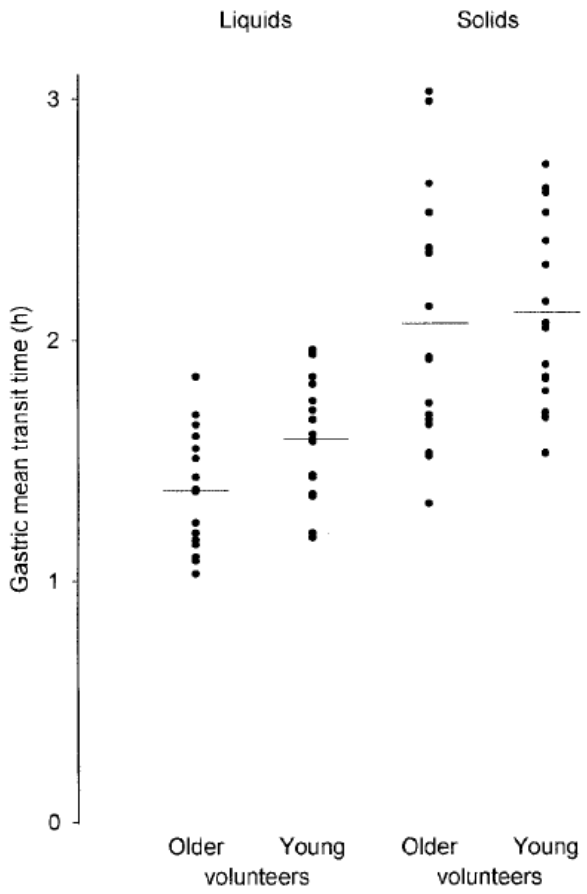
Reduced lower esophageal sphincter pressure (LES)

- Increased episodes of reflux
- Increased acid exposure is not related to increased reflux symptoms

Adamek AJ; Dig Dis Sci, 1994

LEE J, ET AL; CLIN GASTRO HEP, 2007

Comparison of Elderly Versus Younger Adults



Gastric Emptying

16 elderly, 16 younger adults

Madsen JL, Age Aging 2004

Stomach and Aging

Comparison of Elderly Versus Younger Adults

- No difference in gastric emptying
- Reduction in gastric blood flow
  - Without any correlative clinical significance of age-related changes
- Decreased mucin production
  - Without correlative clinical significance of age-related changes
- Increased presence of achlorhydria
  - May impact calcium, iron and vitamin B12 absorption
- Increased presence of H. pylori infection
  - Increased rate of peptic ulcer disease, gastric cancer
- Reduced stomach compliance
  - May impact satiety with age-related changes

Difrancesco et al; Gerontol Bio Sci Med, 2005; Grassi M, et al; Nutr Hosp 2011; D'Souza AL, et al; Post Grad med 2007; Britton E, et al; 2013; Gidal BE, Epilep Res; 2006.

GI pH and Aging

No Significant Differences Elderly to Young Adults

GI characteristics	Mean ± SD		
	Young	Adult	Elderly
pH	8-14 y (n=12)[1]	18-65 y (n=39)[2]	65-83 y (n=79)[3]
Stomach	1.6	1.5	1.1-1.6
Small intestine (SI)			
Duodenum	6.5	6.4	6.5
Jejunum	6.6	6.6	
Mid SI	7.0	7.0	
Distal SI	7.4	7.3	
Caecum	5.9	5.7	
Colon			
Ascending	5.6	5.6	
Transverse	5.5	5.7	
Descending	6.0	6.6	
Rectosigmoid	6.5	6.6	
Faeces	6.4	6.5	6.57[4]

Merchant HA, Int J Pharm 2016

Small Bowel and Cellular Structure

PEYER'S PATCHES

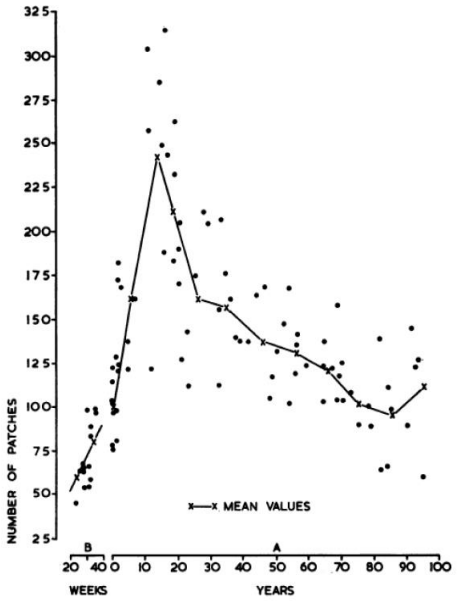
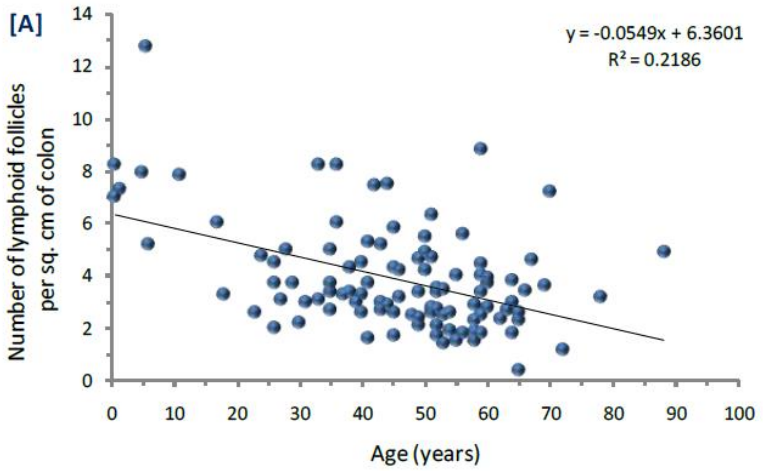


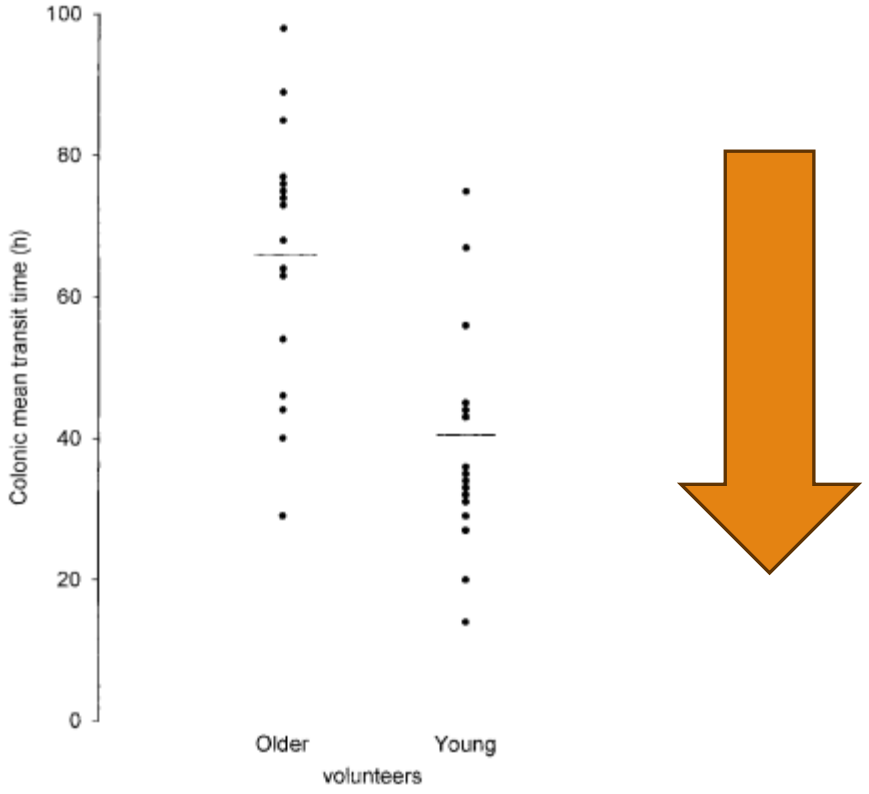
Figure 2. Effect of age on the number of Peyer's patches in human small intestine. B: before term (from 24 to 37 weeks gestation), A: after term (from birth to 95 years). Figure reproduced from (Cornes, 1965b).

LYMPHOID TISSUE



Merchant HA, Int J Pharm 2016

Colon Transit



Madsen JL, Age and Aging 2004

Colon and Aging

Changes in Elderly as compared to Younger Adults

- Reduced Colon Transit
  - Increased prevalence of constipation due to age-related changes
- Reduced myenteric plexus
- Reduced neurotransmitters and receptors
  - Increased prevalence of constipation

Pancreas and Hepatobiliary System and Aging

Table 1 *Studies assessing the changes in pancreatic volume and structure with age*

Conflicting Data

Author	Year	Country	Study settings	Number of subjects studied	Results
Kreel *et al.* [37]	1973	United Kingdom	RT at necropsy	120	Significant changes in the position of the papilla, calcification of blood vessels and changes in pancreatic duct diameter
Niederau *et al.* [29]	1983	Germany	US-guided study	915	Positive correlation between age and pancreatic size
Löhr *et al.*[26][a]	1987	Germany	Pathological study	26	Atrophy of the acinar parenchyma
Anand *et al.* [36]	1989	India	ERCP-guided study	55	Dilation of accessory pancreatic duct and main pancreatic duct
Migdalis *et al.* [35][a]	1991	Greece	CT-guided study	164	Decrease in pancreatic volume
Gilbeau *et al.* [34][a]	1992	Belgium	CT-guided study	57	Decrease in pancreatic volume
Ikeda *et al.* [38]	1994	Japan	US-guided study	130.951	Increased incidence of main pancreatic duct dilation and cystic lesions
Ogiu *et al.* [2]	1997	Japan	Pathological study	4667	No change in pancreatic volume
Chantarojanasiri *et al.* [41]	2001	Japan	EUS-guided study	n/a	Abnormal findings similar to chronic pancreatitis
Geraghty *et al.* [30]	2004	USA	CT-guided study	149	No change in pancreatic volume
Rajan *et al.* [42]	2005	USA	EUS-guided study	120	Abnormal findings similar to chronic pancreatitis
Meier *et al.* [31]	2007	USA	CT-guided study	88	No change in pancreatic volume
Saisho *et al.* [32]	2007	USA	CT-guided study	1886	Decrease in pancreatic volume after age of 60
Petrone *et al.* [43]	2010	Italy	EUS elastography	2614	Pancreas becomes significantly harder
Li *et al.* [46]	2011	China	MRI-guided study	126	Increase in pancreatic fat fraction beginning in the fifth decade

Lohr, J-M: J Int Med 2018

Pancreas and Hepatobiliary System and Aging

Elderly Versus Younger Adults

Bile acid production (1.74 mmol/day young adults and 0.91 mmol/day elderly)

- Not correlated with clinical consequences due to age-related changes

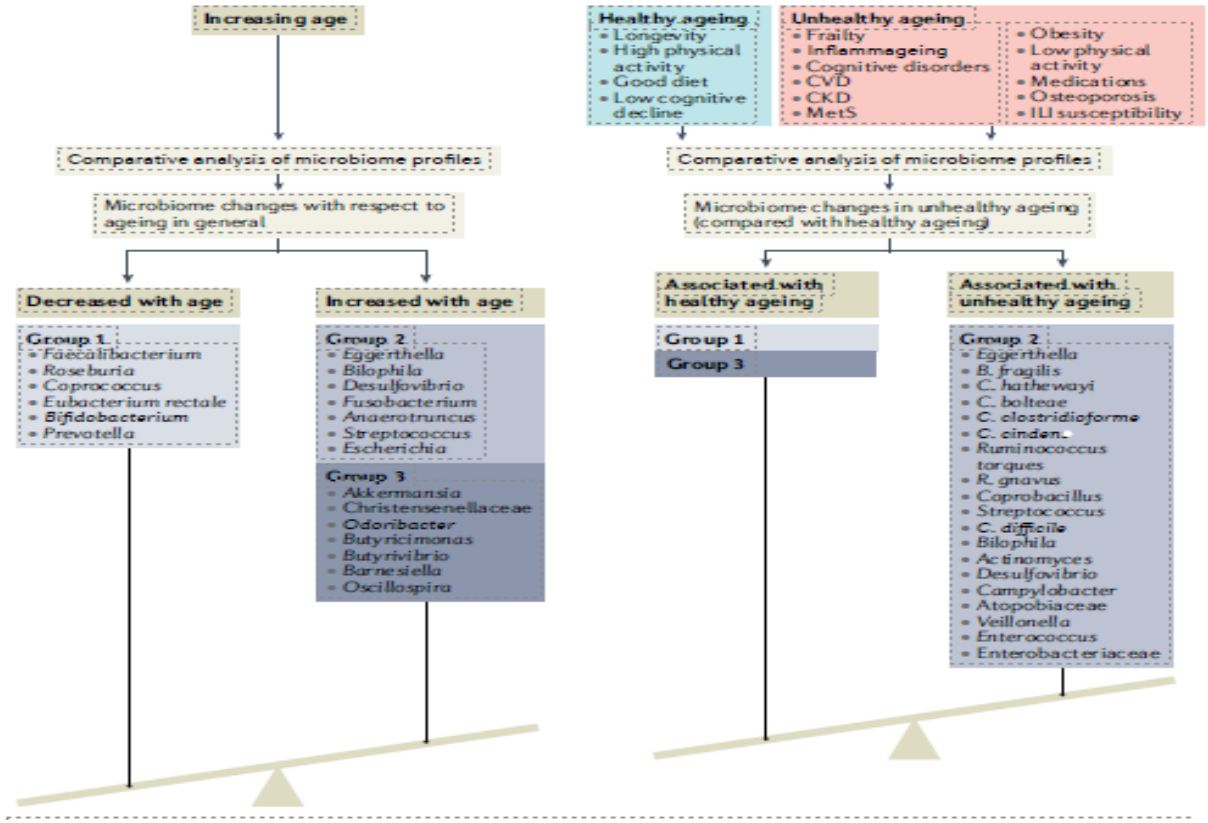
Decrease in pancreatic exocrine enzyme production

- Not correlated with clinical consequences due to age-related changes

3-5% of people over the age of 80 have fecal elastase < 100 ug/g

Einarsson K et al; NEJM 1985; Gullo et al; Pancreatol 2009

Gut Microbiome and Aging



Ghosh TS et al, Nat Rev; 2022

- Unclear if there is any clinical consequence of this microbiome change due to age

Hopkins MJ et al; Gut 2001; Claesson MJ et al; Proc Nat Acad Sci 2011

Microbiome in Various Age Groups

Table 3. Selected studies on the composition of the faecal microbiota in children, adults and the elderly*

Study population	Age	Total anaerobes	Bacteroides	Bifidobacterium	Enterobactria	Enterococci	Clostridia	Lactobacilli	Reference
Children	1 w		4.8 - 9.3	6.2 - 10.2	6.2 - 9.4	5.7 - 9.0	3.1 - 7.2	4.4 - 7.0	(Adlerberth and Wold, 2009)†
	5 w		6.0 - 10.1	4.3 - 11.3	6.1 - 9.6	4.5 - 9.6	3.0 - 8.1	5.0 - 9.1	(Adlerberth and Wold, 2009)†
	1 m		9.40 (5.74-10.36)	10.71 (6.84-11.56)			5.24 (2.70-9.57)	8.70 (7.92-10.73)	(Scheepers et al., 2015)
	16 m - 7 y	10.4 ± 0.2	9.9 ± 0.4	9.8 ± 0.3	8.0 ± 0.4	5.5 ± 0.5	7.2 ±0.8	6.6 ± 0.7	(Hopkins et al., 2002)
Adults	21 - 34 y	10.5 ± 0.1	10.0 ± 0.1	9.1 ± 0.2	5.9 ± 0.5	6.1 ± 0.7	6.6 ± 0.4	6.7 ± 0.6	(Hopkins et al., 2002)
	19 - 35 y		9.9 ± 0.1	9.5 ± 0.2	5.8 ± 0.6	6.5 ± 0.9	5.6 ± 1.0	6.3 ± 1.0	(Woodmansey et al., 2004)
	21 - 39 y	9.11	9.42	9.54					(Tiihonen et al., 2008)
Elderly	67 - 88 y	10.1 ± 0.2	9.6 ± 0.2	7.3 ± 1.0	6.7 ± 0.8	6.0 ± 0.8	6.9 ± 0.6	5.4 ± 1.0	(Hopkins et al., 2002)
	67 - 75 y		6.5 ± 2.1	8.1 ± 1.6	7.3 ± 0.4		5.3 ± 1,7	4.1 ± 1.8	(Woodmansey et al., 2004)
	> 62 y	10.3 ± 0.5		8.6 ± 1.0				6.0 ± 1.4	(Bartosch et al., 2005)
	69 ± 2 y	10.09 ± 0.07		8.5 ± 0.26	7.69 ± 0.21		3.25 ± 0.25		(Bouhnik et al., 2007)
	77 - 97 y		8.8	6.0	7.7	6.1	3.5	5.1	(Guigoz et al., 2002)
	68 - 84 y	9.29	9.59	9.59					(Tiihonen et al., 2008)

*Amounts are given as $\log_{10}$ number of bacteria/g fresh faecal weight, †Adapted from reference (Adlerberth and Wold, 2009), summarising studies on intestinal microbiota in children performed until 1990.

Merchant HA, Int J Pharm 2016

Table 1 | **Representative studies linking human conditions to the microbiome**

Condition or disease	Microbiome alteration	Potential or known mechanism	Comments	Refs
Obesity	Greater abundance of pathobionts and Firmicutes	Calorie harvesting, inflammation, modulating satiety, regulating adipogenesis	Controversial microbial links to complex, that is, multifactorial, disease	157
Type 2 diabetes	As for obesity, with signals related to *Prevotella copri* and *Akkermansia muciniphila*	Unclear; liver signalling, branched-chain amino acids?	Initial success with faecal microbiota transplantation not maintained in later studies	158
Inflammatory bowel disease	Reduced abundance of Christensenellaceae, *Coriobacteriaceae*, *Faecalibacterium prausnitzii*; higher abundance of Actinomyces, *Veillonella*, *Escherichia coli*	Products of colonic inflammation stimulate anaerobic respiration, driving microbiome further towards a pro-inflammatory type	Meta-analysis concedes lack of a unifying taxon signature for inflammatory bowel disease; once inflammation is triggered, the microbiome may be irrelevant for treating inflammatory bowel disease	159,160
Irritable bowel syndrome	*Ruminococcus gnavus* and Lachnospiraceae are more abundant, *Barnesiella intestinihominis* and *Coprococcus catus* depleted	Pathophysiology may involve a reduction of luminal pH by excessive fermentation and sensitization of the enteric nervous system by inflammation	Not all patients with irritable bowel syndrome have an altered microbiome; disruption of the diet–microbiome–metabolome connectivity is a feature of those who do	161,162
Colorectal cancer	Presence of *Fusobacterium nucleatum* and other oral biofilm-forming pathobionts is a feature of tumour microbiome	Inflammation, DNA breakage, mutagenesis	Microbiome alterations linked to colon cancer relate to known risk factors such as diet and inflammation; microbiome also influences the responsiveness of cancers to checkpoint immunotherapy	10
Cardiovascular disease	Bacterial taxa capable of generating trimethylamine from carnitine, choline and glycine betaine	Trimethylamine is a substrate for liver production of trimethylamine oxide, an atherogenic metabolite	Initial controversy due to inverse relationship between choline intake and cardiovascular disease but prospects for druggable targets	7,9,163
Cognitive function, behaviour and mood	Diverse observations and metabolites reported but a catalogue of gene products with neuroactive potential identified	Effects on neurodevelopment, neuroplasticity, degree of myelination, peptide binding to immune cells and vagus nerve endings, other brain signalling effects	Plausible leads but a paucity of compelling human studies	8,164

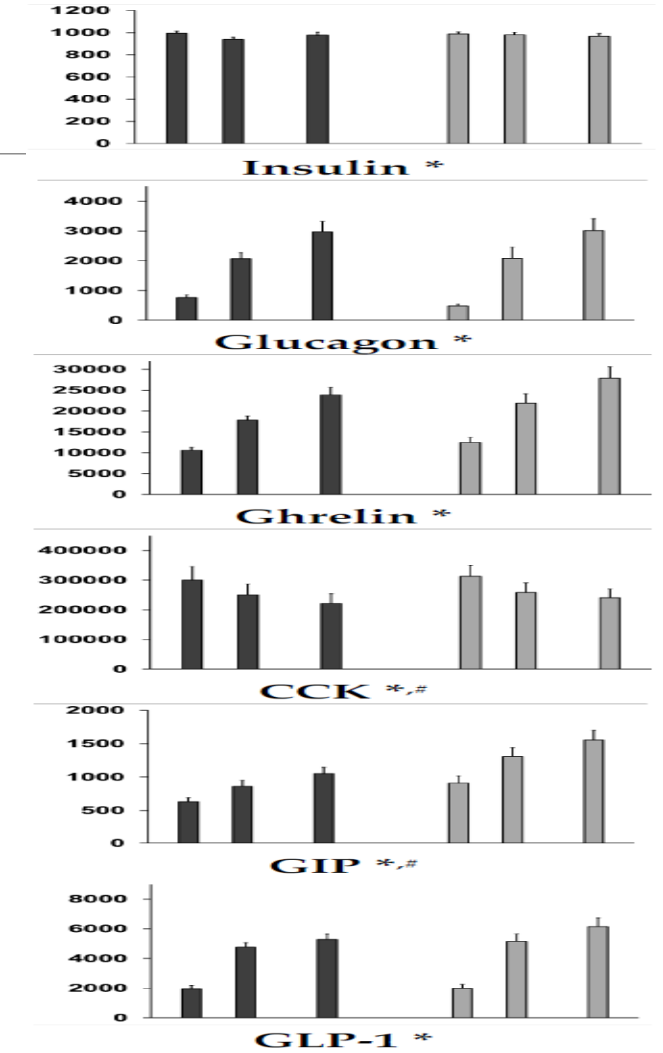
These studies represent selected examples of conditions or diseases in which the causality of the microbiome as a contributing or mediating factor was demonstrated. The studies and reviews provided are those that describe the mechanism, and the bacteria specified are those that show constant association across studies.

Ghosh TS et al, Nat Rev; 2022

Gut Hormones and Aging

Elderly Versus Young Adults

- **No significant change in production of ghrelin, peptide YY, GLP1, GIP, CCK, secretin, gastrin**



Geizenaar C et al, Nutrients; 2018

Katelaris Phet al, Gut; 1993; Serra-Pratt M, et al; Neurogast Motil 2013; McIntosh CG, Am J Clin Nutr; 1999; Reimond O et al, Oncotarget; 2015

Conclusion

There is limited evidence of age-related changes alone impacting mouth, esophageal, stomach and pancreaticobiliary function.

There is data suggesting that peristalsis does decrease with aging that can result in increased constipation.

There are microbiome-related changes in the elderly; these changes may or may not be related to health aging.

Gut hormone production does not vary between young and elderly adults.

There is an increasing prevalence of co-morbid disease in the elderly which does have impact on oral intake, digestion and absorption.

Nutrition Challenges: Aging, Appetite, Anomalies

CAROL IRETON-JONES, PHD, RDN

Nutrition focus:

1. Assess digestive function and symptoms in an older patient based on understanding of changes in the gut and the gut microbiome resulting from aging, diseases, and their treatments.
2. Develop a nutrition care plan that considers structural disease related, and treatment related changes in the gastrointestinal tract and improves digestive symptoms and nutrition status.

Key points for RDNs to consider:

No significant changes:

There is limited evidence of age-related changes alone impacting mouth, esophageal, stomach and pancreaticobiliary function.

There are microbiome-related changes in the elderly; these changes may or may not be related to health aging

Gut hormone production does not vary between young and elderly adults

Changes which occur:

There is data suggesting that peristalsis does decrease with aging that can result in increased constipation

There are microbiome-related changes in the elderly; these changes may or may not be related to health aging

- Physoiologic/motility
- Medications/chronic disease
- Diet related – especially a poor diet

There is an increasing prevalence of co-morbid disease in the elderly which does have impact on oral intake, digestion and absorption

Symptoms of GI Challenges

New? Lifetime?

Diarrhea/ Constipation

Abdominal Pain

Nausea/ Vomiting

Gas/ Distension

GERD

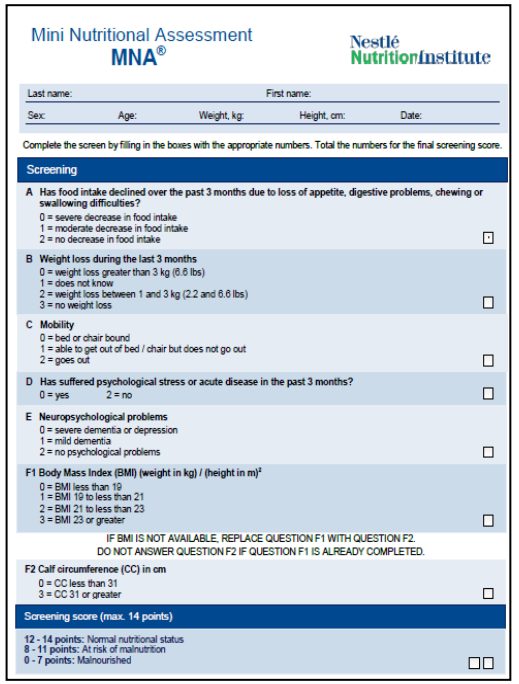
Lactose Intolerance

- Genetic
- Anatomical /surgical
- Psycho-social
- Associated with - DM, Renal, autoimmune, etc.

Created by C. Ireton Jones, photo from: File:Good Food Display - NCI Visuals Online.jpg - Wikimedia Commons

Nutrition Screening components

- Weight loss – time frame, amount, percentage of body weight
- Food intake - time frame, amount, reason for intake change:
  - Ability to obtain food
  - Loss of appetite
  - Digestive problems
- Activity time frame, amount, reason for change:
  - Bed or chair bound, non-mobile
- Psychological considerations:
  - Stress/ Depression
  - Acute disease
- Measurements:
  - BMI, Weight, Age



Mini Nutritional Assessment
MNA®

Nestlé Nutrition Institute

Last name: First name:

Sex: Age: Weight, kg: Height, cm: Date:

Complete the screen by filling in the boxes with the appropriate numbers. Total the numbers for the final screening score.

Screening

A Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?
0 = severe decrease in food intake
1 = moderate decrease in food intake
2 = no decrease in food intake

B Weight loss during the last 3 months
0 = weight loss greater than 3 kg (6.6 lbs)
1 = does not know
2 = weight loss between 1 and 3 kg (2.2 and 6.6 lbs)
3 = no weight loss

C Mobility
0 = bed or chair bound
1 = able to get out of bed / chair but does not go out
2 = goes out

D Has suffered psychological stress or acute disease in the past 3 months?
0 = yes 2 = no

E Neuropsychological problems
0 = severe dementia or depression
1 = mild dementia
2 = no psychological problems

F1 Body Mass Index (BMI) (weight in kg) / (height in m)²
0 = BMI less than 19
1 = BMI 19 to less than 21
2 = BMI 21 to less than 23
3 = BMI 23 or greater

IF BMI IS NOT AVAILABLE, REPLACE QUESTION F1 WITH QUESTION F2.
DO NOT ANSWER QUESTION F2 IF QUESTION F1 IS ALREADY COMPLETED.

F2 Calf circumference (CC) in cm
0 = CC less than 31
3 = CC 31 or greater

Screening score (max. 14 points)

12 - 14 points: Normal nutritional status
8 - 11 points: At risk of malnutrition
0 - 7 points: Malnourished

Nutrition Assessment

Diagnosis (es):DM, Cancer, IBS, GERD, IBD, Constipation

Review of Symptoms:
- Length of time, prevalence, type

Previous diet interventions:
- *Take a thorough diet history!*
- Food intake - time frame, amount, reason for intake change
  - Ability to obtain food
  - Appetite
  - Digestive problems

- Psychological considerations:
  - Stress/ Depression/Loneliness
  - Acute disease

Weight:
- Loss/Gain – time frame, amount, percentage of body weight

Labs

Nutrition-focused physical assessment

Medications

Other interventions
- Supplements
- Specialized testing?

Common diagnoses in my practice

What we think: Stroke/dysphagia

What I see:

GERD IBS Constipation/Diverticulitis/osis

IBD

- Crohn's disease / Ulcerative Colitis /Microscopic colitis

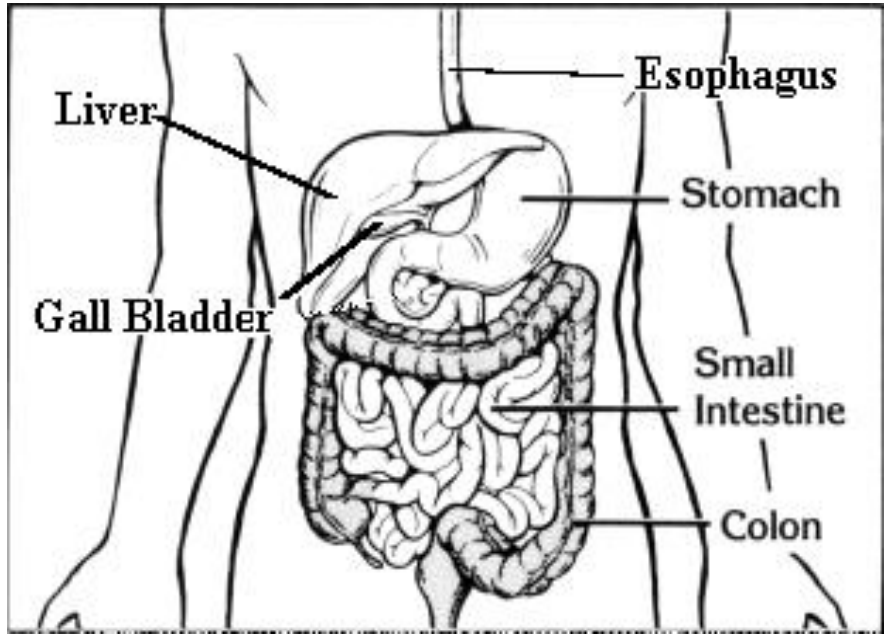
Celiac disease

Gastroparesis

- Gastric pacemaker/stimulator

Malabsorption

- SBS/ Dysmotility

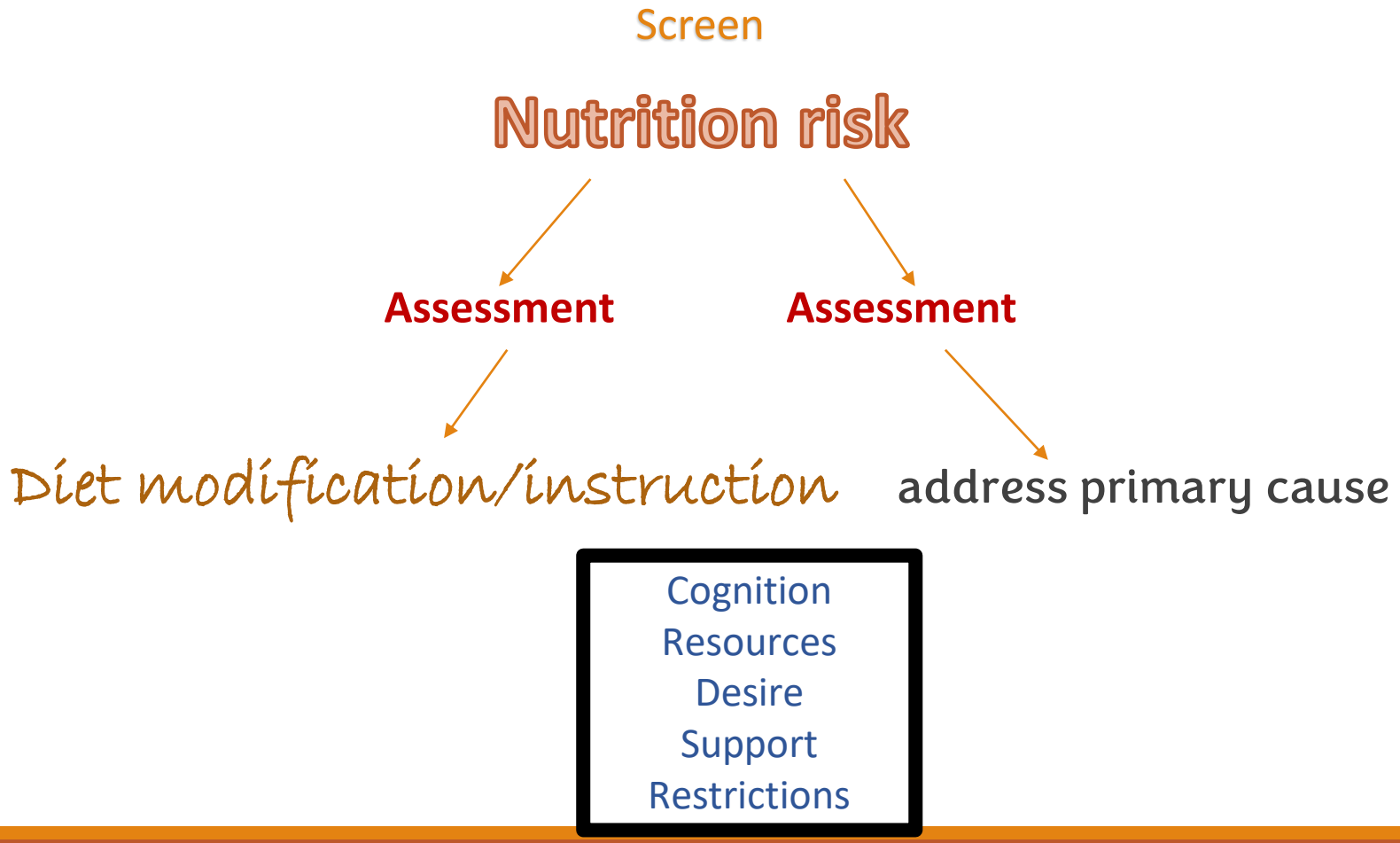


GI Nutrition Care

Focus on the RDN's expertise: "food" and nutrition

- Most patients come to you because no one else has this expertise.
- It is certainly more than a handout.
- Apply what you know about food and its properties to help patients manage their GI symptoms.
- Collaborate with specialized dietitians and clinicians.

Nutrition Care Planning



Disorders of gut-brain interaction (DGBI)
(formerly known as Functional GI Disorders)

Example

"Disorders of gut-brain interaction classified by GI symptoms related to any combination of motility disturbance, visceral hypersensitivity, altered mucosal and immune function, altered gut microbiota and altered central nervous system processing" https://www.iffgd.org/functional-gi-disorders.html

- Highly prevalent,>40% of individuals globally; affect quality of life and health care use (Gastroenterology 2021, 2023)
- Difficult to diagnose with usual GI tests
- No structural abnormalities or abnormal x-ray
- Identified by symptoms and ruling out other diagnoses

Sperber, et al Gastroenterology 2021;160:99–114; Knowles, et al Gastroenterology 2023;164:655–668

IBS – Three Subtypes

IBS – C (constipation) - stomach pain and discomfort, bloating, abnormally delayed or infrequent bowel movement, or lumpy/hard stool

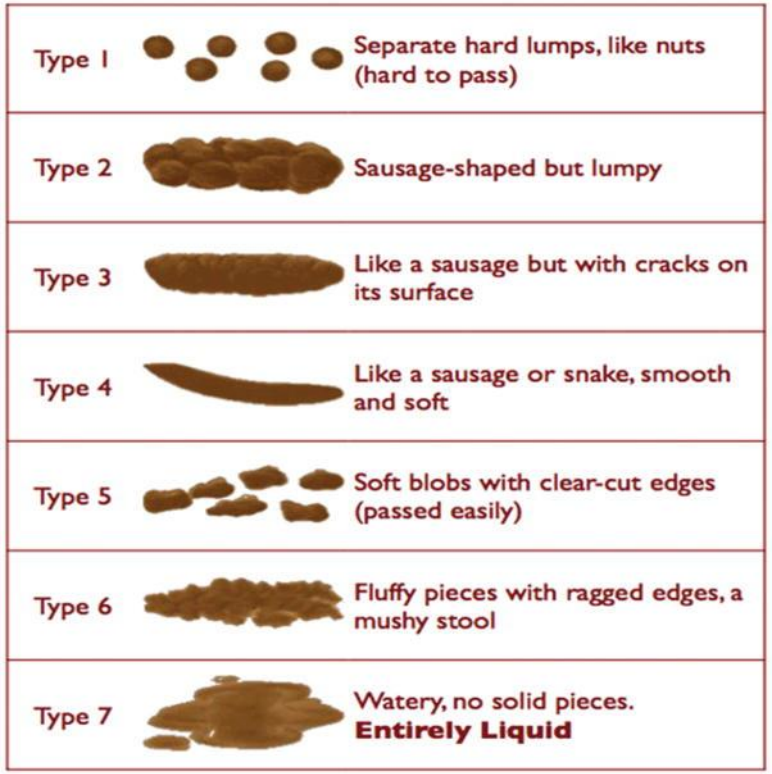
(25% BSFS 1 or 2 /< 25% BSFS 6 or 7)

IBS – D (diarrhea) - stomach pain and discomfort, an urgent need to move your bowels, abnormally frequent bowel movements, or loose/watery stool

(25% BSFS 6 or 7 / <25% BSFS 1 or 2)

IBS – M (alternating constipation and diarrhea)

(25% BSFS 1 or 2 ***and*** 25% BSFS 6 or 7)



Chumpitazi, et al. Neurogastroenterol Motil. 2016 Mar;28(3):443-8.

Treatment – Medications and Supplements

Symptom	Drug - brand name
Diarrhea	Imodium®, Lomotil®, Xifaxin®, Viberzi®, cholestyramine (Questran®) off label, EnteraGam®
Anti-spasmodic	Bentyl®, Levsin®, Pepogest®
Laxative	Linzess®, MiraLAX®, Amitiza®, Motegrity™, Trulance®
SSRI	Elavil®, ,et al and other antidepressants++
Fiber	Psyllium husk, Partially hydrolyzed guar gum (PHGG)
Multiple symptoms	IBGuard®, Iberogast® Probiotics

+Not all inclusive ++Ford AC, et al Am J Gastroenterol. 2019.
Ireton-Jones/Weisberg, NCP, 2020.

Diet: Short-chain Carbohydrates & IBS

Associated with symptoms; limiting one without the others is not as successful

2004, Monash coined Fermentable, Oligosaccharides, Disaccharides, Monosaccharides and Polyols – The FODMAP hypothesis

Research/confirmation – mode of action, food analysis, cut off levels

The FODMAP Elimination Diet:

- Is biologically feasible
- Has well-defined modes of action and diet interventions
- evidence-based and proven to be efficacious

Bellini M, et al. Nutrients. 2020
Dionne, et al. Am J Gastroenterol 2018
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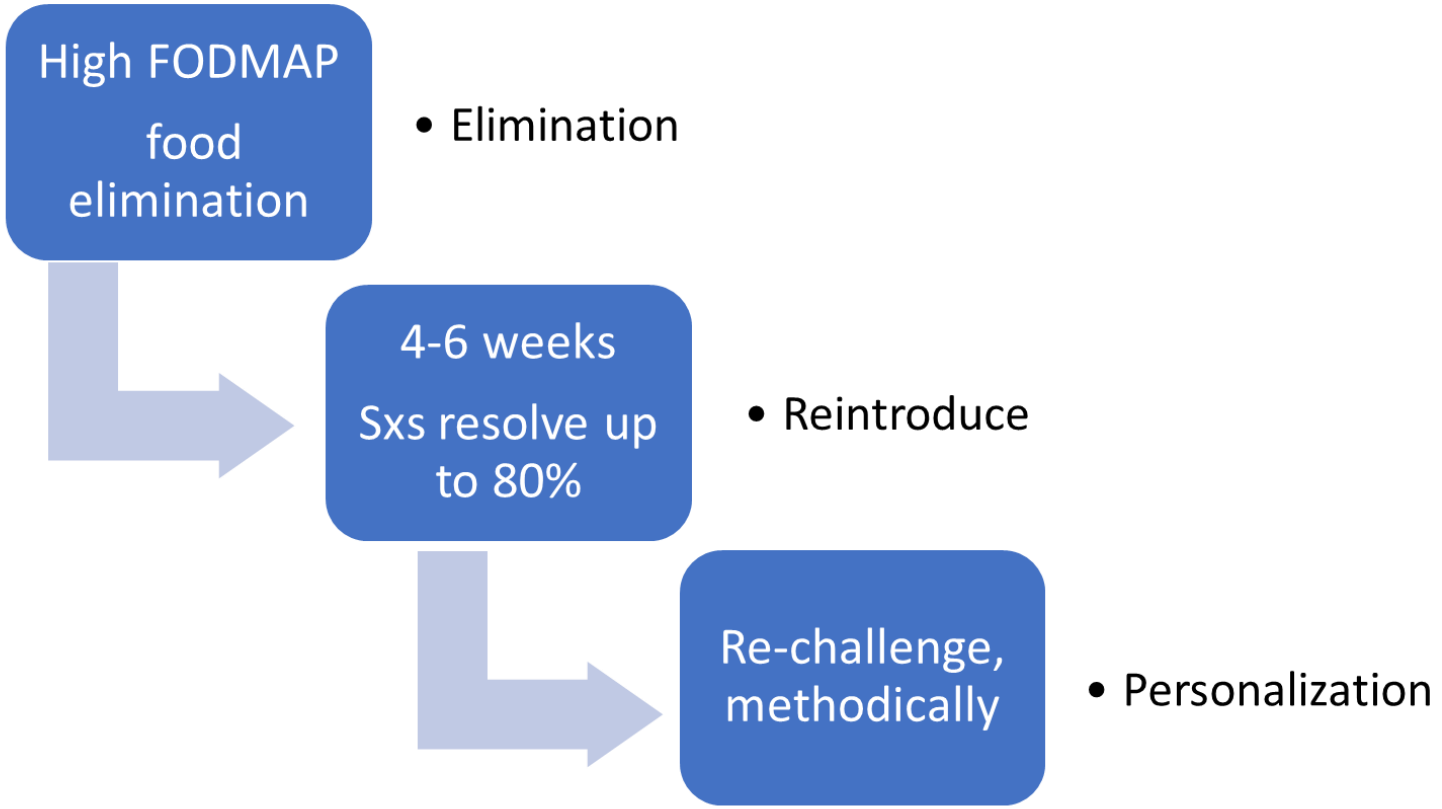
Application of the low FODMAP Diet: Requires expertise – it's complicated



Modifying the low FODMAP diet for your client

- Full elimination and re-introduction
- Food diary for high FODMAP food identification/elimination
- Modified high FODMAP elimination – top offenders

Cognition
Resources
Desire
Support
Restrictions

ACG Clinical Guidelines for IBS:

We recommend a limited trial of a low FODMAP diet in patients with IBS to improve global symptoms.

Conditional recommendation; very low quality of evidence.

…complexity of the low FODMAP diet, combined with the potential for nutritional deficiencies, and the time and resources required to provide proper counseling on the 3 phases of the plan, requires the services of a properly trained GI dietitian ….

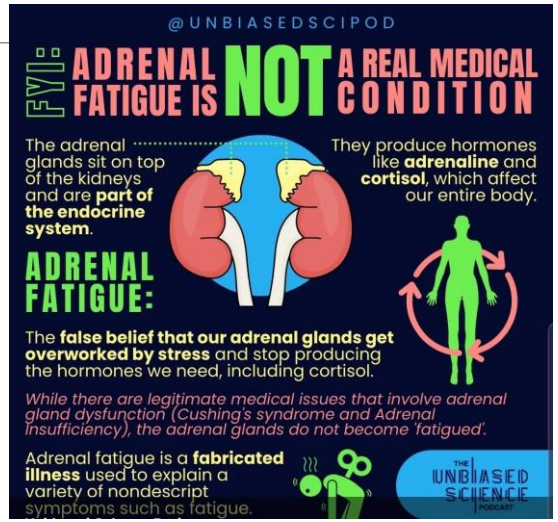
Constipation

- Prevalence - 30 % of the general population - elderly people and women predominately
- Chronic constipation impacts health expenses and quality of life similar to IBS and functional dyspepsia
- In the elderly, constipation is significantly associated with lower urinary tract symptoms which improve when constipation is alleviated. Associated with Alzheimer's and Parkinson's (neurodegenerative diseases).
- IBS-C, Colonic inertia

- Suggestions:
  - Diet, type of fiber and amount, supplements, laxatives used correctly, potty posture, fluids, activity
  - Pelvic floor therapy
  - Medications
  - Relaxation therapy

De Giorgio R, Ruggeri E, Stanghellini V, Eusebi LH, Bazzoli F, Chiarioni G. Chronic constipation in the elderly: a primer for the gastroenterologist. BMC Gastroenterol. 2015 Oct 14;15:130

Watch out for woo words & therapies



- Immune boosting – can't
- Leaky gut - nope
- Adrenal fatigue – not a real medical condition
- Gut microbiome testing - OK, then what?
- Food sensitivity testing – nope
- Enzyme deficiency – yes for CSID, lactase, exocrine pancreatic insufficiency

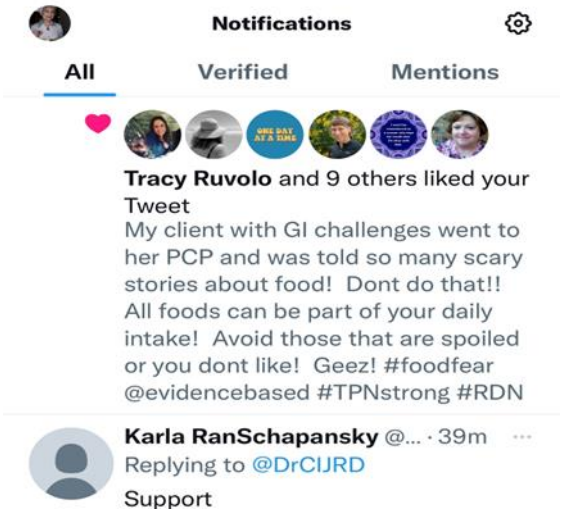
RDN response – recognize that they are trying – be empathetic, consider countering with a positive option

Leaky Gut? - made up word!

- Simplistic term reflecting intestinal permeability.
- Intestinal wall - many functional layer/elements
  - Intestinal permeability - alterations in the function of the intestinal barrier
  - Cause/causes – unknown – many factors
- Disease states that effect the lumen of the small and large bowel
  - Crohn's disease
  - Ulcerative colitis
  - Celiac disease
  - IBS – through diarrhea and constipation
- Treatment – treat GI symptoms; include fiber from various sources, adequate vitamin and mineral intake - Food!

Food fears in GI!

- Orthorexia is an unhealthy focus on eating in a healthy way.
  obsess about it to a degree that can damage your overall well-being.
- Disordered eating v. eating disorder.
- “Bad food”



Supplements!!!!
Probiotics, Digestive Enzymes, etc

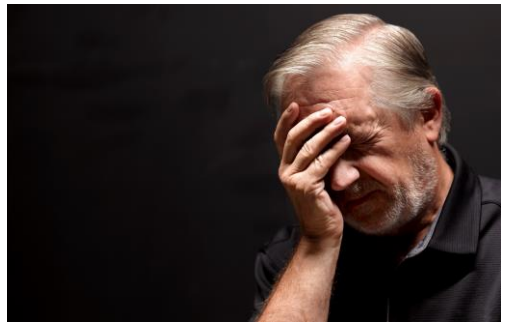
Quality of Life

Many definitions – health, happiness, finances, etc…

What interventions can your client manage to improve their *quality of life*?

Challenges

- Access
- Expertise – “healthy meal planning”/meal delivery vs MNT
- Reimbursement / Coverage
  - Medicare Part B (Medical Insurance)
    - covers medical nutrition therapy services if you have diabetes or kidney disease, or you’ve had a kidney transplant in the last 36 months, and your doctor refers you for services
    - USPTF
      - overweight/obesity preventive services
  - Private insurance – denial/resubmit



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Practice Applications

- While there is limited evidence of age-related changes alone impacting mouth, esophageal, stomach and pancreaticobiliary function, there is an increasing prevalence of co-morbid disease in the elderly which does have impact on oral intake, digestion and absorption.
- People of all ages may have new or long-standing GI issues that involve symptoms from minimal to debilitating. *You can help!*
- Nutrition intervention can be as simple or as multifaceted as fits with your patient.
- Use your expertise in food and nutrition to make a difference!
- “Do not underestimate the knowledge and ability of your aging patient”

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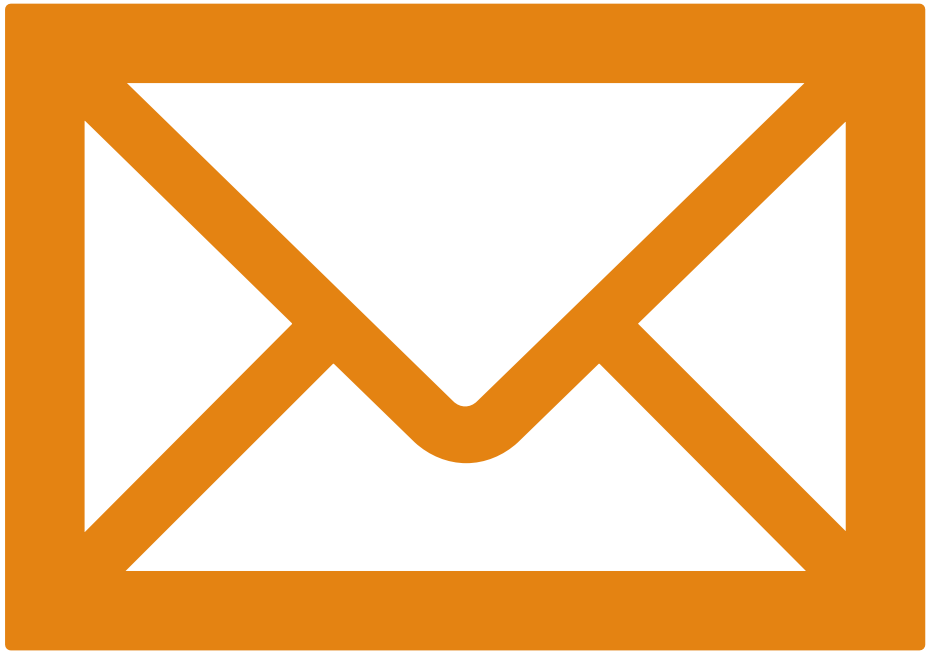

Thank you!!

Carol Ireton-Jones
drcijrd@gmail.com

Mark DeLegge

drmark@deleggemedical.com