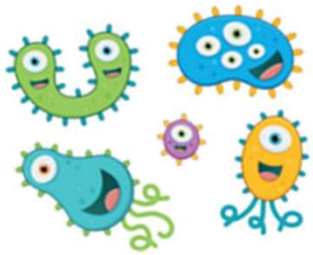
DiabetesEd Services | ONLINE UNIVERSITY



Exploring the GI System or "Gut to the Butt"

Advanced Level & Specialty Topics | Level 5| 2026

Beverly Thomassian, RN, MPH, BC-ADM, CDCES
Pronouns: She, her, hers
www.DiabetesEd.net

Land Acknowledgment

- We acknowledge and are mindful that Diabetes Education Services stands on lands that were originally occupied by the first people of this area, the Mechoopda, and we recognize their distinctive spiritual relationship with this land, the flora, the fauna, and the waters that run through this area.

Happy Diabetes Month & Diabetes Day

Miracle of Insulin



Patient J.L., December 15, 1922



February 15, 1923



The Nobel Prize in Physiology or Medicine 1923



Frederick Grant Banting
Prize share: 1/2



John James Rickard Macleod
Prize share: 1/2



The Nobel Prize in Physiology or Medicine 1923 was awarded jointly to Frederick Grant Banting and John James Rickard Macleod *"for the discovery of insulin"*

November 14th, World Diabetes Day Celebration

We are Here to Help!



Bryanna Sabourin
Director of Operations

If you have questions, you can chat with us at www.DiabetesEd.net
or call 530 / 893-8635 or email at info@diabetesed.net

Diabetes Education Services Inclusion Statement

Based on the IDEA Initiative inspired by CDR

- Inclusion
- Diversity
- Equity
- Access

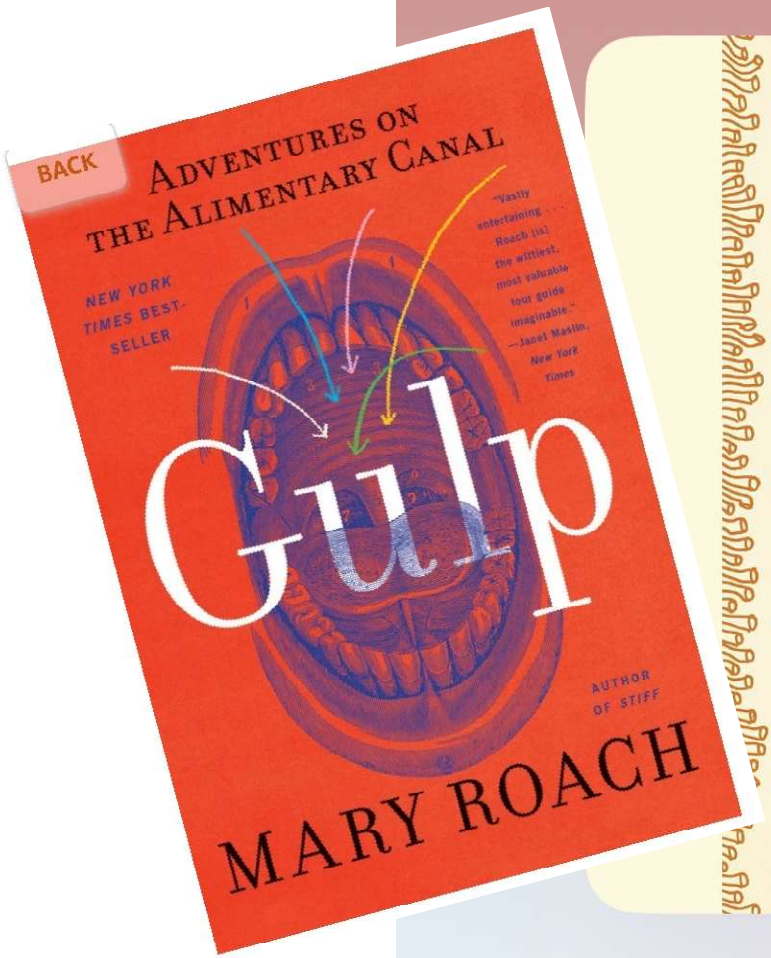


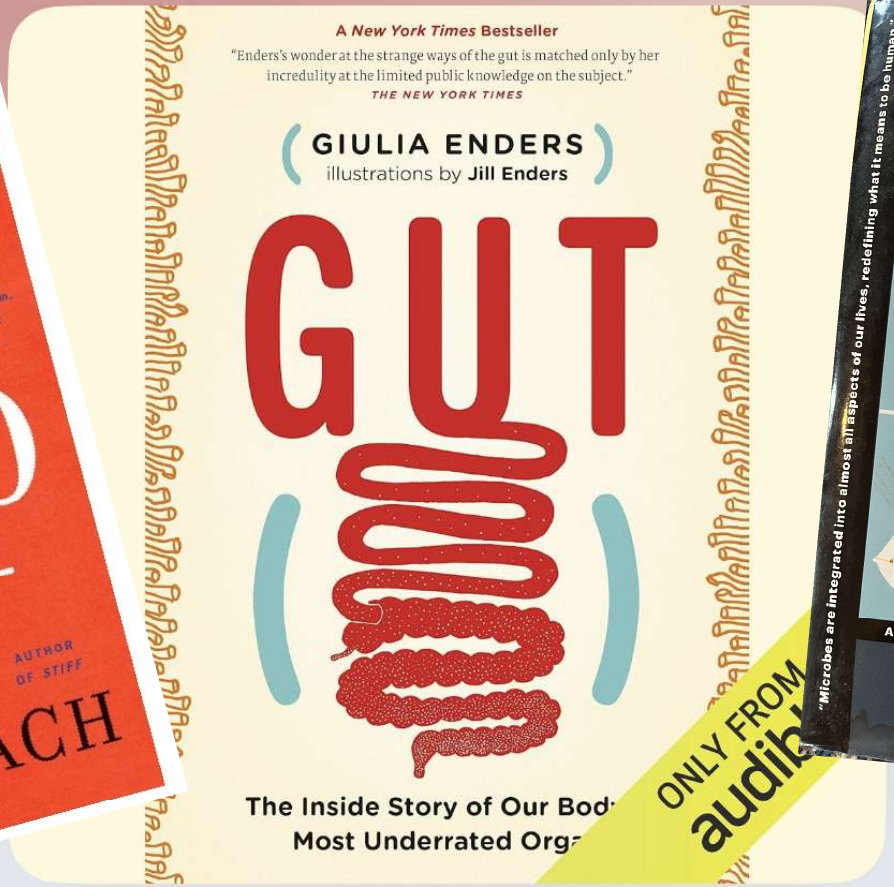
- We are committed to promoting diversity and inclusion in our educational offerings.
- We recognize, respect, and include differences in ability, age, culture, ethnicity, gender, gender identity, sexual orientation, size, and socioeconomic characteristics.
- Our goal is to promote equity and access, acknowledging historical and institutional inequities.
- We are committed to practicing cultural humility and cultivating our cultural competence.
- We wish to create a safe space within our community where one's beliefs, experiences, identity, and differences in ability, age, size, socio-cultural/socioeconomic characteristics, and political affiliations are considered and respected.

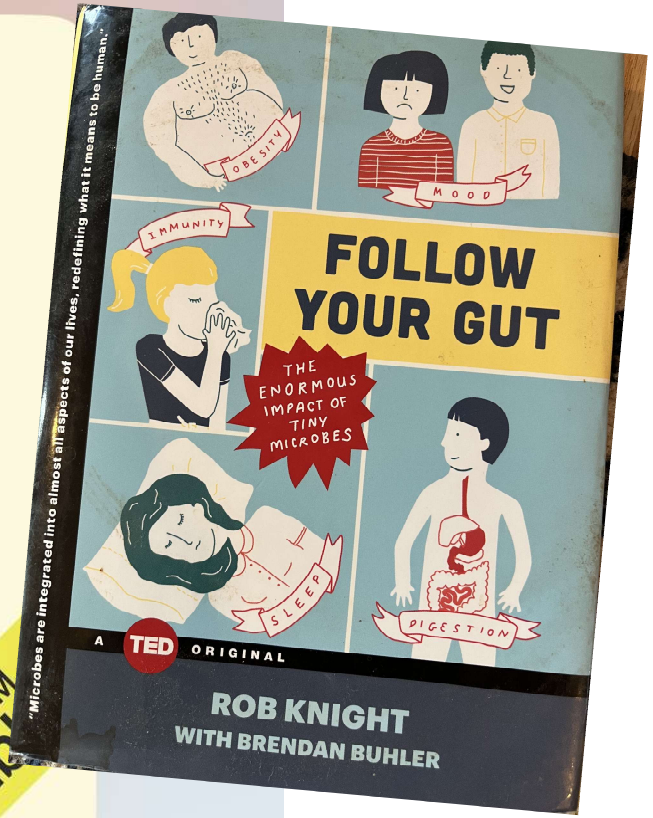
Coach Bev has no Conflict of Interest

- She’s not on any speaker's bureau
- Does not invest or have any financial relationships with diabetes related companies.
- Gathers information from reading package inserts, research and articles
- The ADA Standards of Medical Care is main resource for course content

Books


BACK
ADVENTURES ON THE ALIMENTARY CANAL
NEW YORK TIMES BEST-SELLER
"Vastly entertaining . . . Roach [is] the wittiest, most valuable tour guide imaginable."
—Janet Maslin, New York Times
Gulp
AUTHOR OF STIFF
MARY ROACH


A New York Times Bestseller
"Enders's wonder at the strange ways of the gut is matched only by her incredulity at the limited public knowledge on the subject."
THE NEW YORK TIMES
GIULIA ENDERS
illustrations by Jill Enders
GUT
The Inside Story of Our Bod
Most Underrated Orga
ONLY FROM
audib


"Microbes are integrated into almost all aspects of our lives, redefining what it means to be human."
OBESITY
MOOD
IMMUNITY
FOLLOW YOUR GUT
THE ENORMOUS IMPACT OF TINY MICROBES
SLEEP
DIGESTION
A TED ORIGINAL
ROB KNIGHT
WITH BRENDAN BUHLER

Learning Objectives Exploring the GI Tract

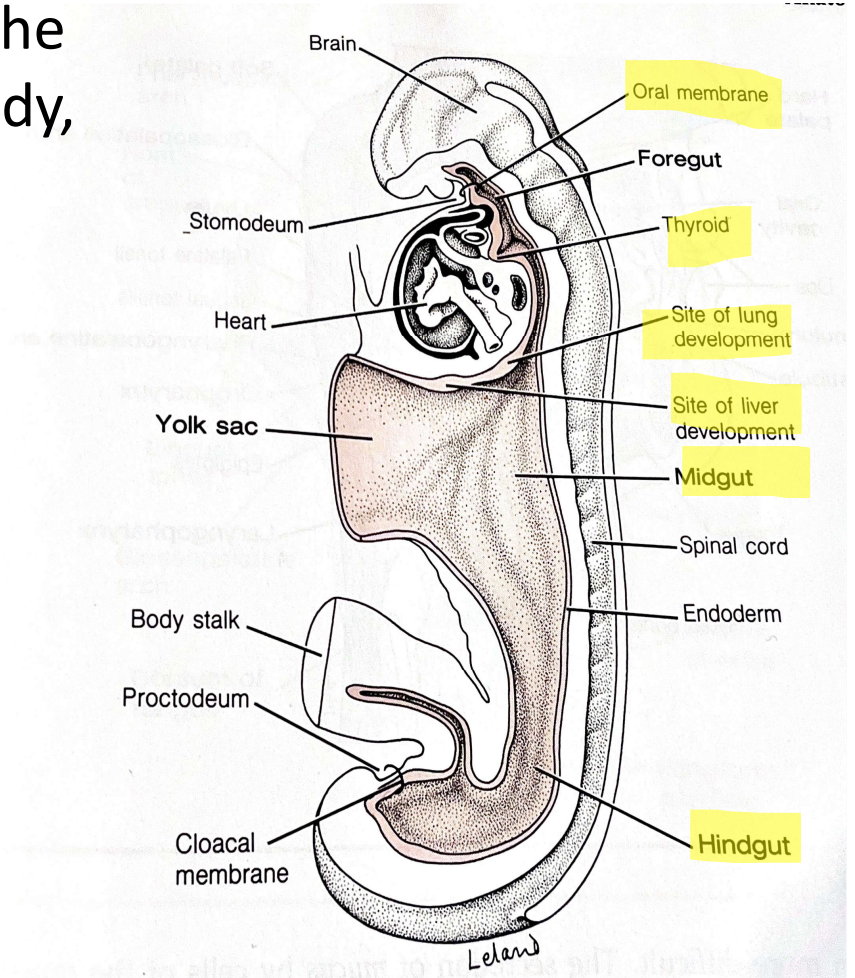
1. Identify complications of the GI System from the mouth to intestines including periodontal disease, gastroparesis, steatosis, pancreatic endocrine and exocrine disorders and infections.
2. Examine the relationship between gut health, microbiome, diabetes and inflammation.
3. Apply effective strategies to improve gut microbiota and intestinal health.



- Enjoy a state of WONDER.

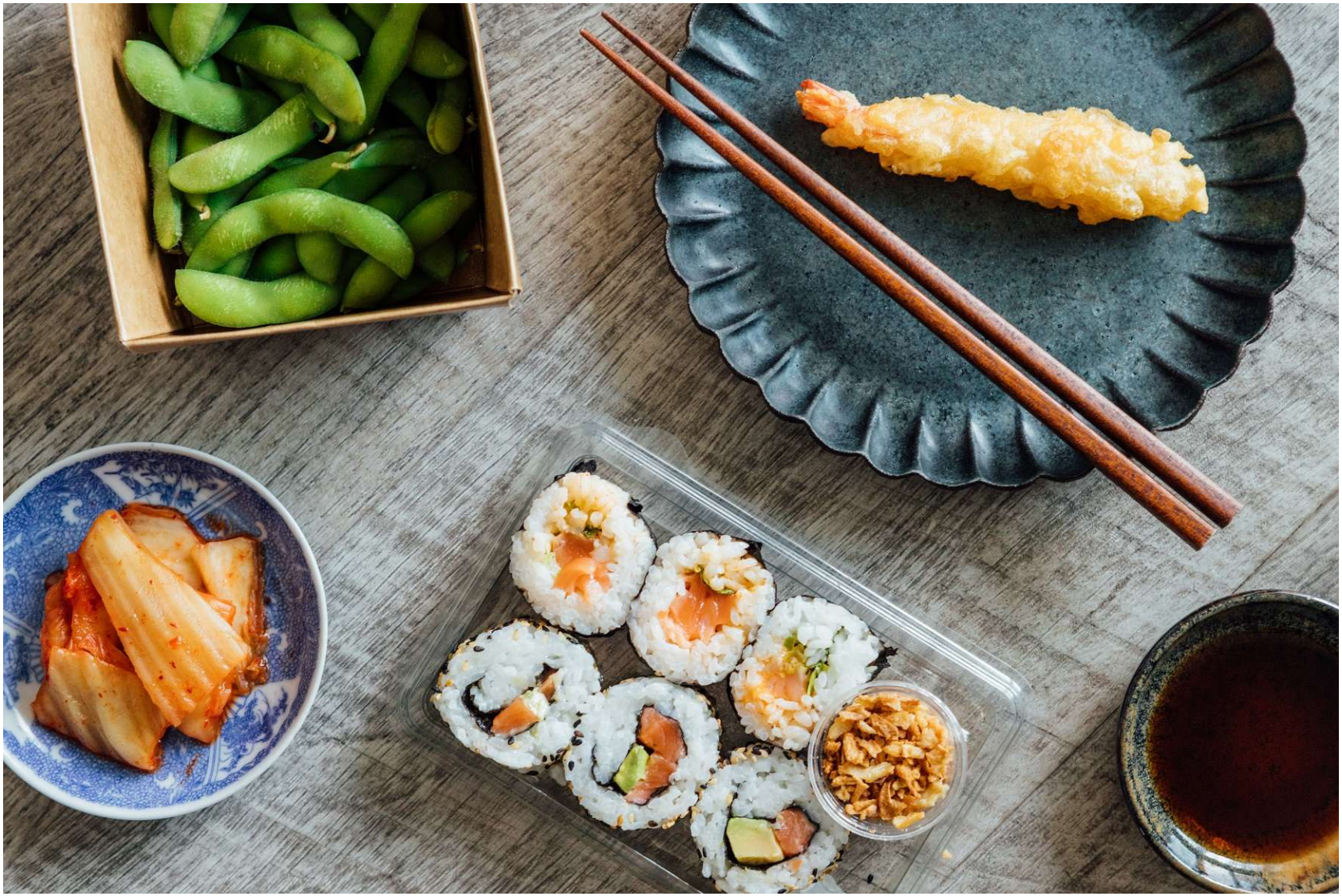
Gut Tube -Embryonic Starting Point

- Embryonic endoderm develops into the interior linings of two tubes in the body, respiratory *and*
- **Digestive Tube**
  - Salivary glands
  - Esophagus
  - Stomach
  - Small and Large Intestine
  - Liver
  - Gallbladder
  - Pancreas
- Thyroid gland
- Parathyroid glands
  - Lose connection with gut before birth to become endocrine organs



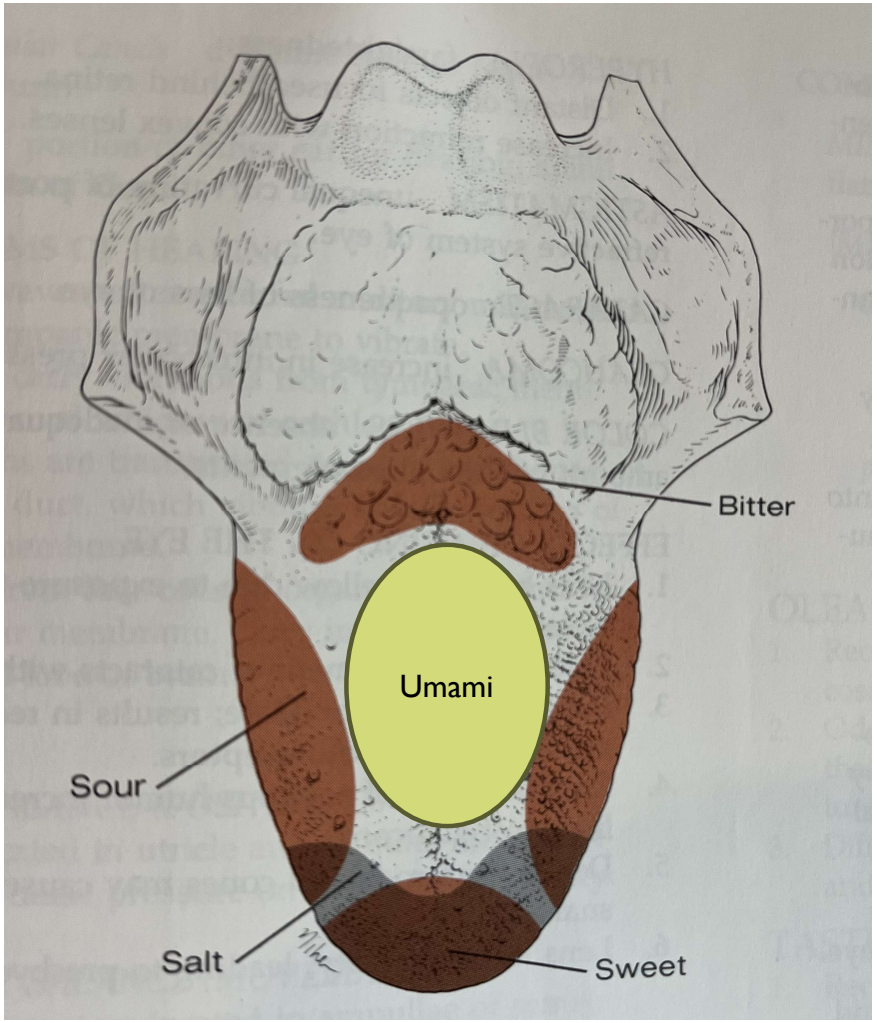
Basic Human Anatomy, A. Pense, 1982

Eating Starts with the Eyes



5 or 6 types of Flavor Detection

- Sweet
- Sour
- Bitter
- Salty
- Umami (savory)
- Tongue might also detect ammonium chloride (USC recent discovery) to avoid harmful substances?



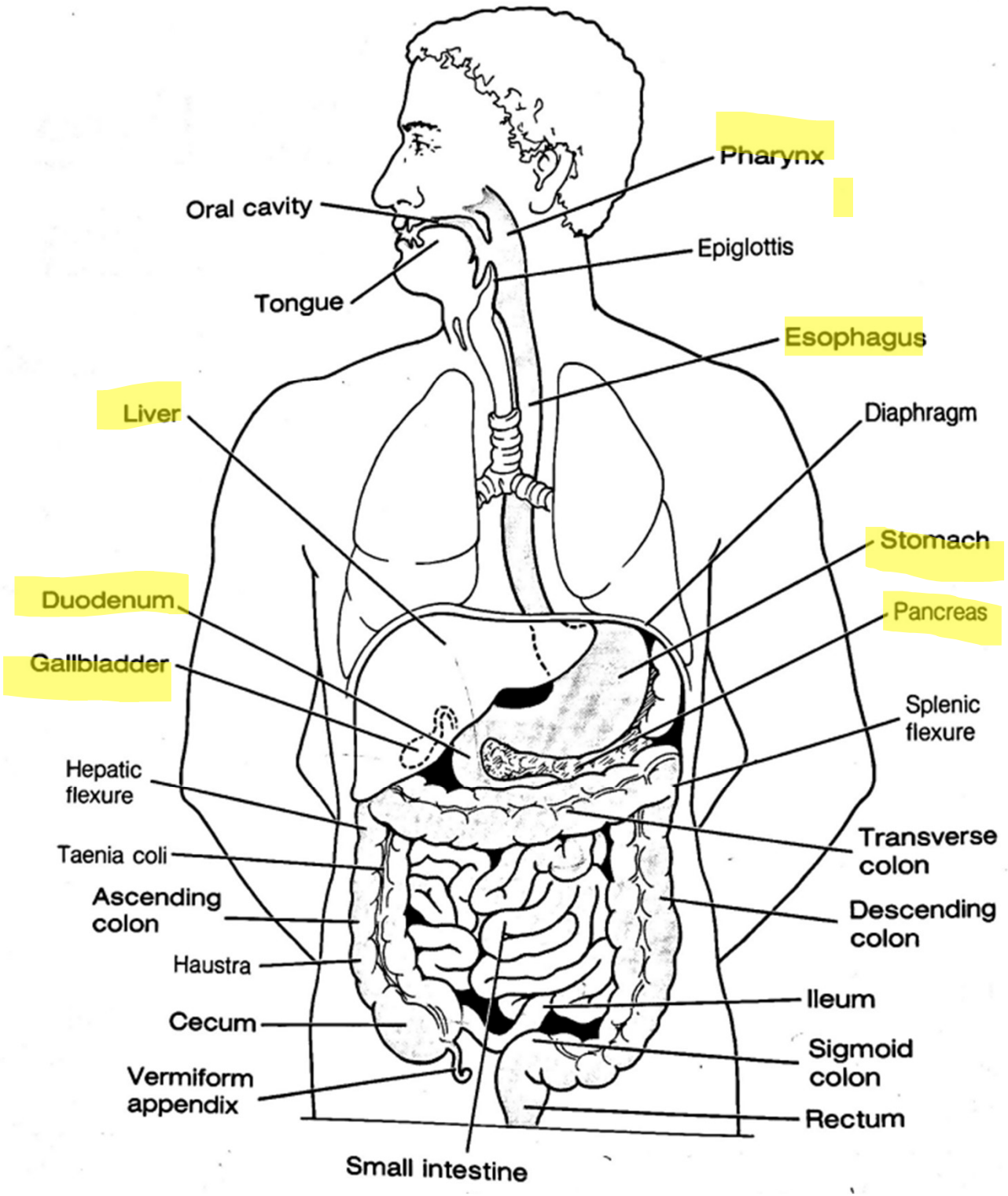
Digestion Gets Started

- Eyes see food and make an appraisal of how to best prepare for incoming load.
- Glands secrete saliva to prepare for chewing.
- Salivary enzymes (amylase) help with initial digestion
- Creates bolus.
- Upper pharynx and esophagus under conscious control, the rest involuntary.
- Esophagus smooth muscle, controlled by brain.
- Lower esophageal sphincter gateway from esophagus to stomach.
  - Prevents reflux of gastric contents



Alimentary Canal

Buckle up!



Quick Question 1

- Diabetes is associated with an increased risk of oral disease. Which of the following statements is true?



a. People with diabetes benefit from vinegar gargles to decrease bacterial load
b. People with diabetes are at greater risk for tongue cancer.
c. 1 in 5 cases of tooth loss is linked to diabetes
d. Diabetes is associated with increased tonsillitis.

Salivary Dysfunction and Xerostomia (dry mouth) in DM

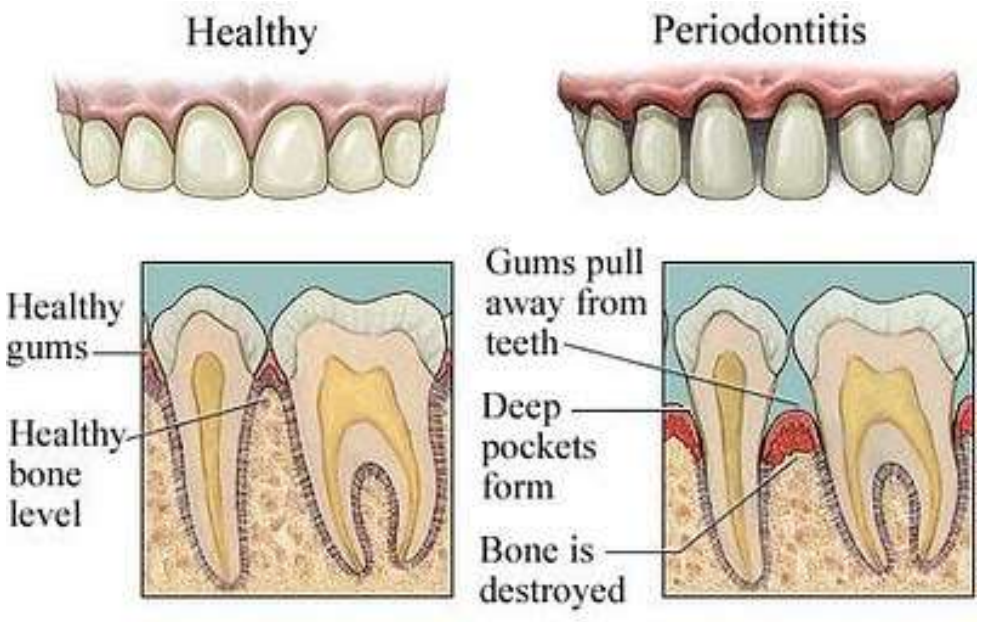
- Less saliva uptake and excretion = less protection against bacteria
- Hyperglycemia increases glucose levels in saliva, providing medium for bacterial growth- also promotes dry mouth
- Dry mouth increases risk o infection and can alter nutritional intake (due to chewing, swallowing difficulties)



Periodontal Disease

- More severe and prevalent with diabetes and elevated A1c levels.
  - periodontal treatment associated with better glycemic control

    (A1C 8.3% vs. 7.8%)
  - Benefits lasted for 12 mo's

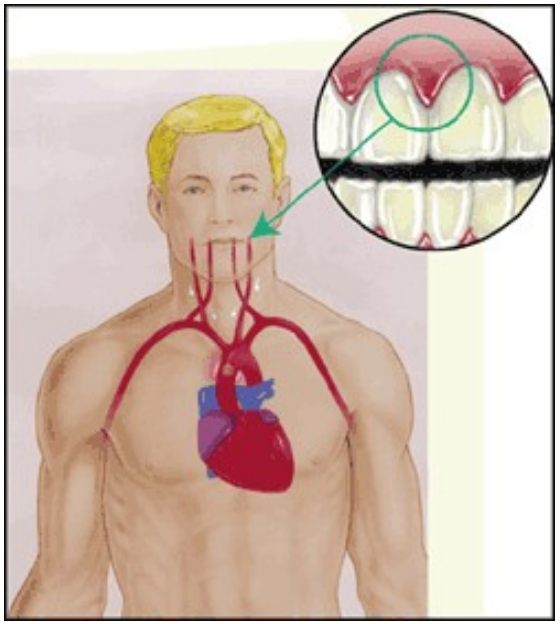


- People with periodontal disease have higher rates of diabetes.
- Bidirectional

Oral Care Matters

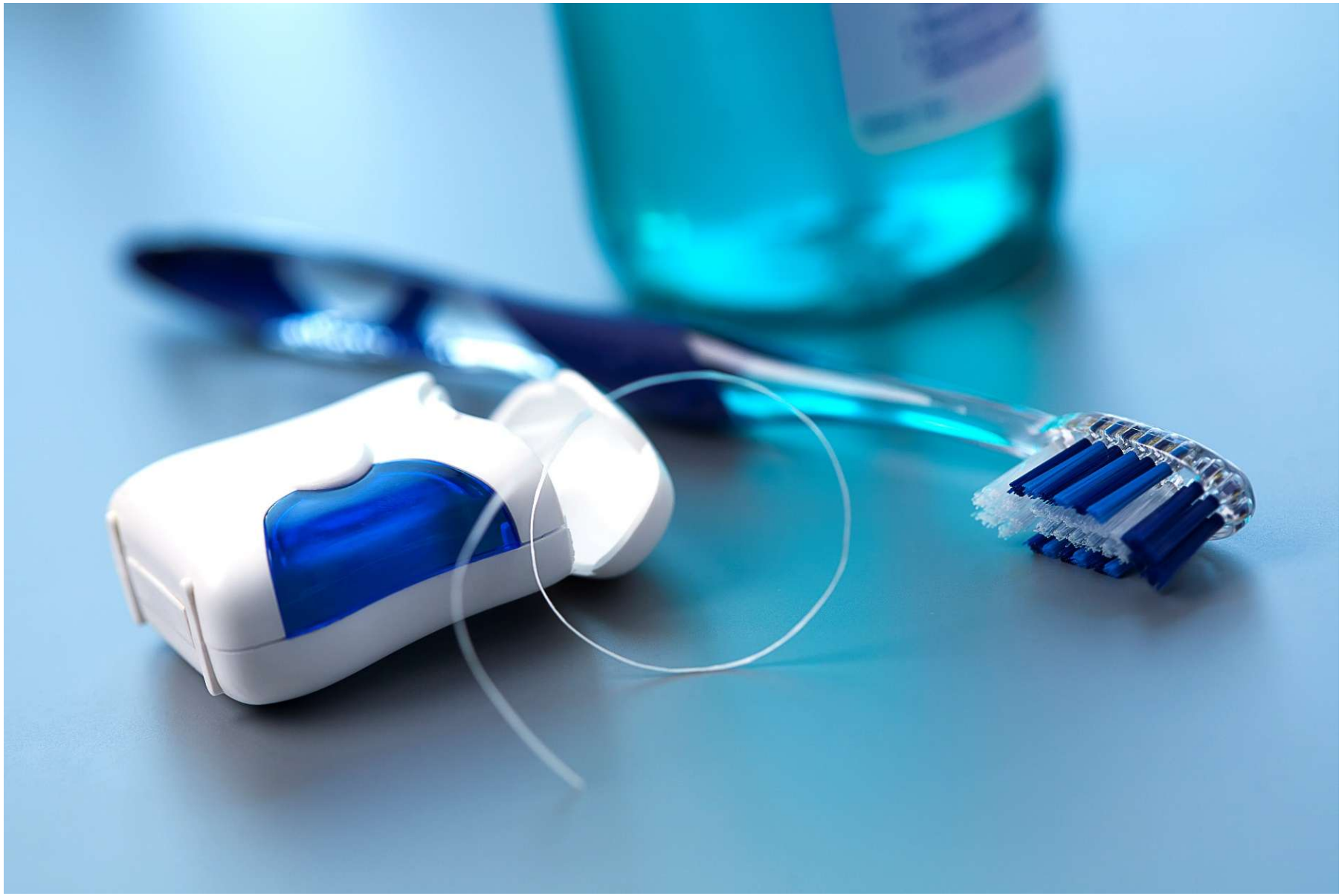
- See dentist at least yearly
- Dental hygienist twice yearly
- Brush twice daily
- Floss daily

Periodontal disease and Heart Disease



- Heart disease link:
  - oral bacteria enter the blood stream, attach to fatty plaques in coronary arteries increasing clot formation
  - inflammation increases plaque build up, which may contribute to arterial inflammation
- Hyperglycemia = Gingivitis = Heart Disease

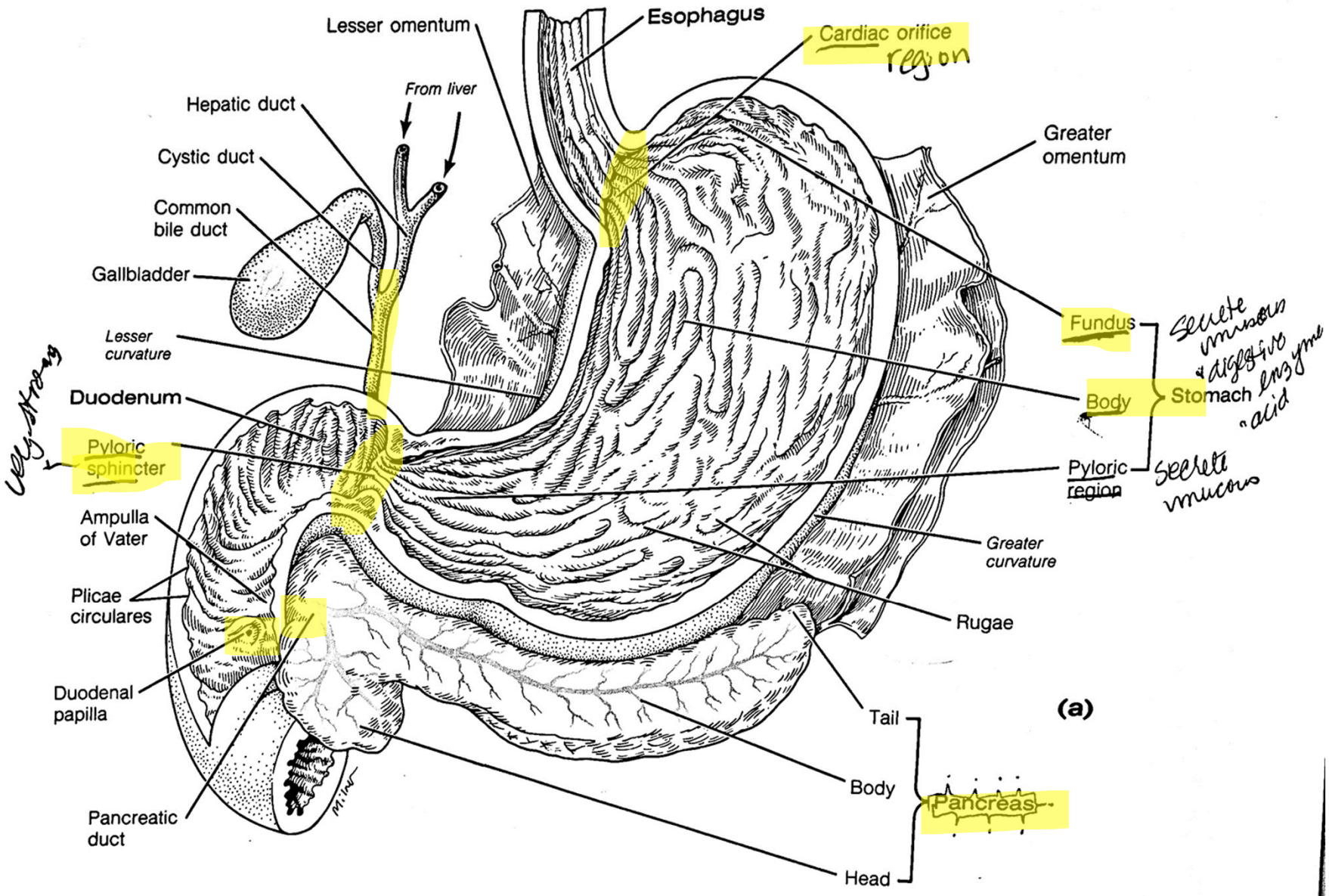
Best $10 You Will Ever Spend



Stomach & Beyond



Stomach


Lesser omentum
Esophagus
Cardiac orifice
region
From liver
Hepatic duct
Cystic duct
Common bile duct
Gallbladder
Greater omentum
Lesser curvature
Fundus
Body
Stomach
Duodenum
Pyloric sphincter
Pyloric region
Ampulla of Vater
Greater curvature
Plicae circulares
Rugae
Duodenal papilla
Tail
Body
Pancreas
Pancreatic duct
Head
(a)

Bonus Question 2

Best definition for borborygmi is:

- A tropical fruit used for nausea
- Stomach rumbling
- Gastric reflux
- Treatment for constipation



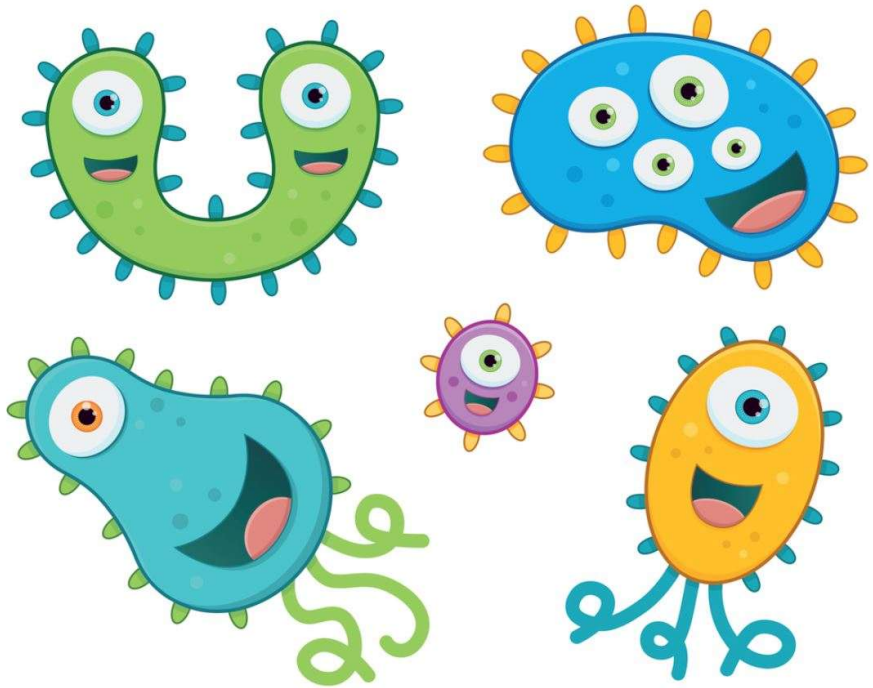
What Happens in Stomach?

- Food in fundus – serves as a holding and mixing area
- Gastric juice start breaking down larger particles.
- Bolus moved to lower regions and broken into smaller particles through stomach acid and motility.
- Gurgling and stomach rumbling is audible reflection of movement.
- Usual meal takes about 4 hours to pass through or 1-4 kcals per minute.
- Carbs take a few hours to pass through.
- Protein/fatty meals can take up to 6 hours.

Digestion Time based on Calories

- 400 cals
  - 4 cals a minute
  - 100 minutes or
  - 1 hour 40 minutes to digest
- 1000 cals
  - 4 cals a minute
  - 250 minutes or
  - 4 hours and 10 minutes

Stomach Issues

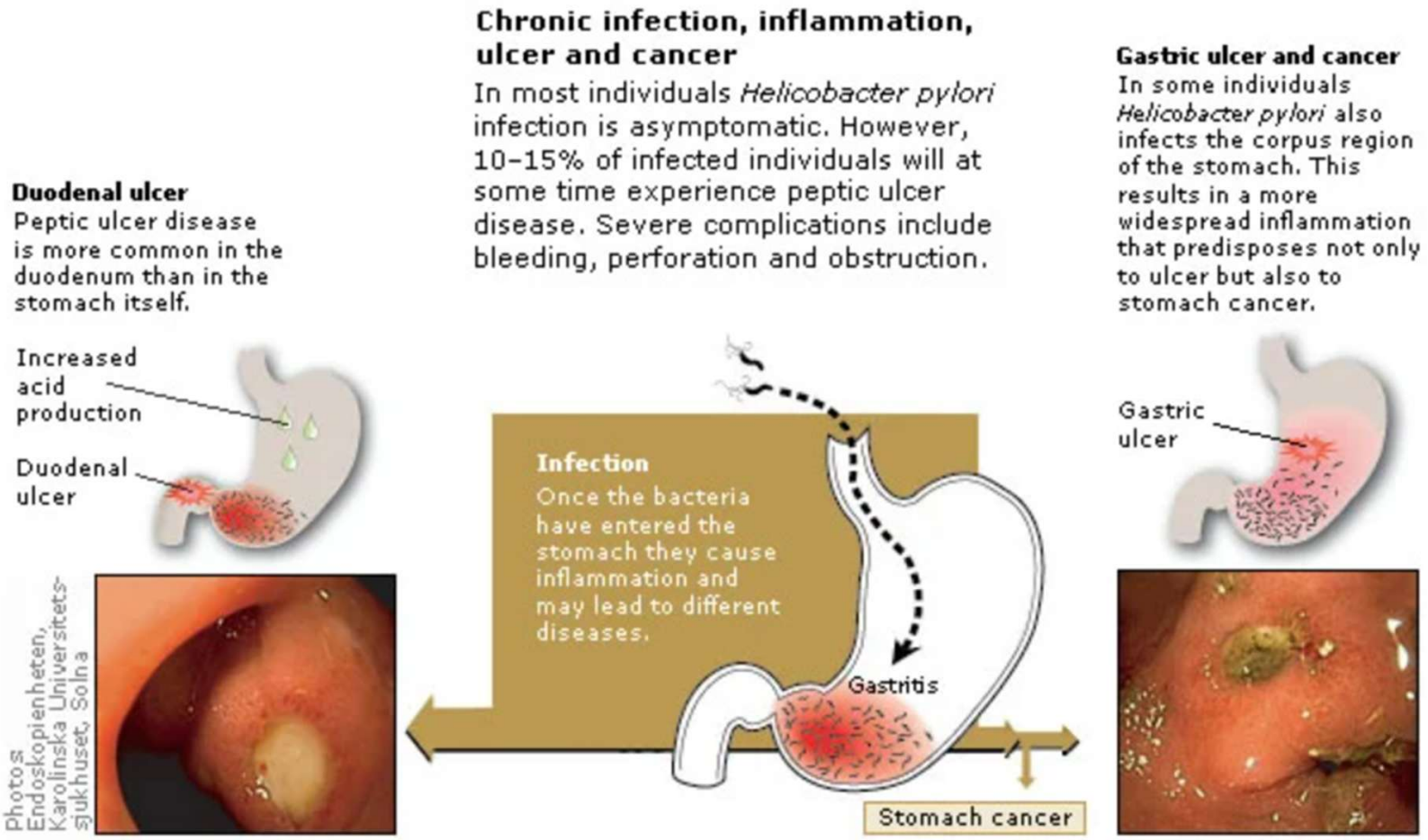


- H. Pylori infection
- Gastroparesis
  - G-POEM
- Metabolic surgery

Nobel Prize for Link Between H. Pylori and Gastric Ulcers (Took 20 Years)

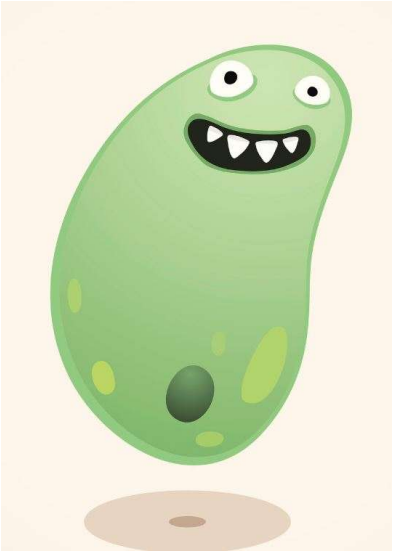
The Nobel Prize in Physiology or Medicine 2005

The Nobel Prize In Physiology Or Medicine



H. Pylori Infection Symptoms

- 50% of world's population co-exist with H. Pylori
  - Causes inflammation in a small percentage of people
- Main Symptom - An aching or burning pain in abdomen which may be worse with an empty stomach.
- H. pylori infection symptoms include:
  - Feeling of fullness or bloating with fluid and solid food
  - Hunger and empty feeling in the stomach, often 1 to 3 hours after meal
  - Mild nausea that may go away with vomiting
  - Loss of appetite
  - Weight loss without trying
  - Burping
  - Bloody or dark, tarry stools or bloody vomit
- About 10% to 15% of people infected with *H pylori* develop peptic ulcer disease.
- About 1-3% develop stomach cancer



People with diabetes at risk for H. pylori and vice versa.

Quick Question 3: Bloating & Post Meal Hypo



- JR has lived with type 1 diabetes for over 30 years and has been complaining that they feel full and bloated after eating and experiencing more post-meal hypoglycemia.
- **Based on this information, what is the most appropriate recommendation for JR?**

a. Evaluate transglutaminase levels.
b. Encourage small, frequent, low fiber meals.
c. Suggest a consult for a gastric pacemaker.
d. Recommend they try avoiding foods with gluten for a few weeks to see if they feel better.

Gastroparesis



- Gastroparesis: affects 20 – 30% of individuals with longstanding diabetes
- Delayed emptying of stomach contents due to nerve damage
- S/S include early satiety, fullness, postprandial hypo, vomiting
- Diagnosis: gastric emptying studies, post-prandial hypoglycemia
- Tx: improve BG, small, low fat & fiber meals & meds

Nutrition for Gastroparesis

- Dietary changes are a high priority in treatment
- Consider the following dietary modifications:
  - Decrease fiber (may lead to bezoar formation)
  - Evaluate fat intake
    - Fat is a good/high source of calories so limit only after other measures are exhausted
    - Liquid fats may be tolerated better



Nutrition for Gastroparesis

- Consider dietary modifications:
  - Multi supplement if intake is insufficient
  - Small and frequent meals
  - Liquid/pureed calories
    - May need to try liquid calories later in the day
  - Chew foods well
  - Sit up for 1-2 hours after eating



Gastric peroral endoscopic myotomy or G-POEM

- The gateway from the small intestine to the duodenum is the pylorus.
- Food knocks of the pyloric sphincter for admission to duodenum
- Doors usually easily open, with limited resistance.
- With gastroparesis, pyloric sphincter is stiff and closed shut.

https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/peroral-endoscopic-myotomy

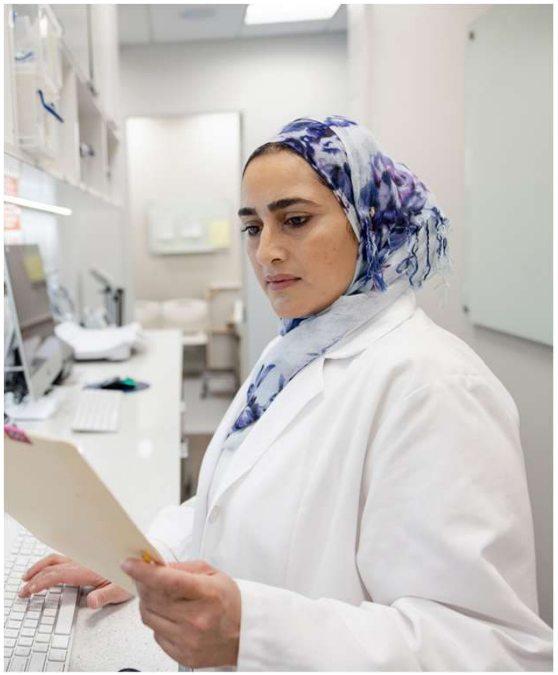


- This endoscopic G-POEM procedure cuts the muscles near the pyloric sphincter (a myotomy).
- Helps to permanently relax the sphincter, so food can empty freely.

Gut Hormones

- **Gut hormones**
  - a. **incretins (GLP-1)** released by **L** cells of small intestine and colon → **DECREASES** → Enhances Insulin, Slows Gastric Emptying
  - b. **GIP** found in **K** cells in duodenum and some in small intestine → **DECREASES** → Enhances Insulin Response

- People with type 2 make about 50% less gut hormones, but new study shows that people with type 1 may benefit from GLP-1 therapy early in diagnosis.
- Can slow peristalsis down too much, and lead to an intestinal blockage – Ozempic warning.



GLP-1 & GIP Hormones

Glucagon-like Peptide-1 Receptor Agonism

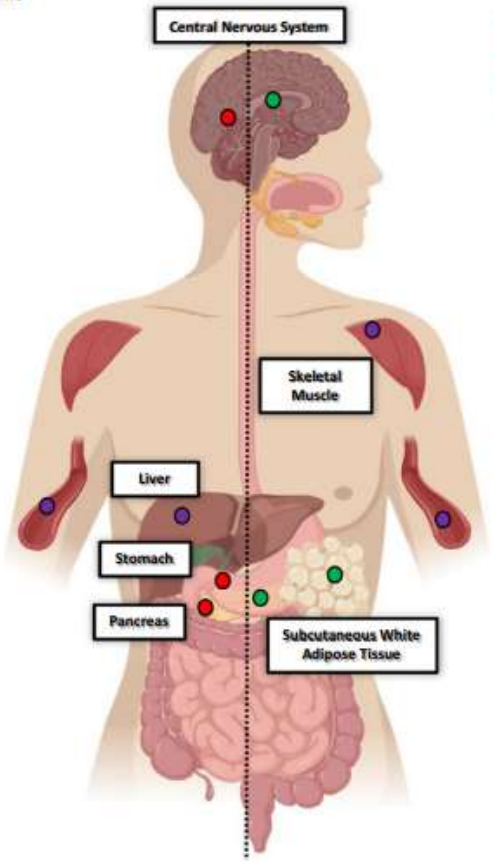
Central Nervous System
- ↑ Satiety
- ↓ Food Intake
- ↑ Nausea
- ↓ Body Weight

Pancreas
- ↑ Insulin
- ↓ Glucagon

Stomach
- ↓ Gastric Emptying

Systemic
- ↓ Hyperglycemia

Liver
- ↑ Insulin Sensitivity
- ↓ Hepatic Glucose Production
- ↓ Ectopic Lipid Accumulation



Glucose-dependent Insulinotropic Polypeptide Receptor Agonism
Glucagon-like Peptide 1 Receptor Agonism
Indirect Action

Glucose-dependent Insulinotropic Polypeptide Receptor Agonism

Central Nervous System
- ↓ Food Intake
- ↓ Nausea
- ↓ Body Weight

Pancreas
- ↑ Insulin
- ↑ Glucagon

Subcutaneous White Adipose Tissue
- ↑ Insulin Sensitivity
- ↑ Lipid Buffering Capacity
- ↑ Blood Flow
- ↑ Storage Capacity
- ↓ Proinflammatory Immune Cell Infiltration

Systemic
- ↓ Hyperglycemia
- ↓ Dietary Triglyceride

Skeletal Muscle
- ↑ Insulin Sensitivity
- ↑ Metabolic Flexibility
- ↓ Ectopic Lipid Accumulation

Samms RJ, Coghlan MP, Sloop KW. How May GIP Enhance the Therapeutic Efficacy of GLP-1? Trends Endocrinol Metab. 2020 Jun;31(6):410-421.

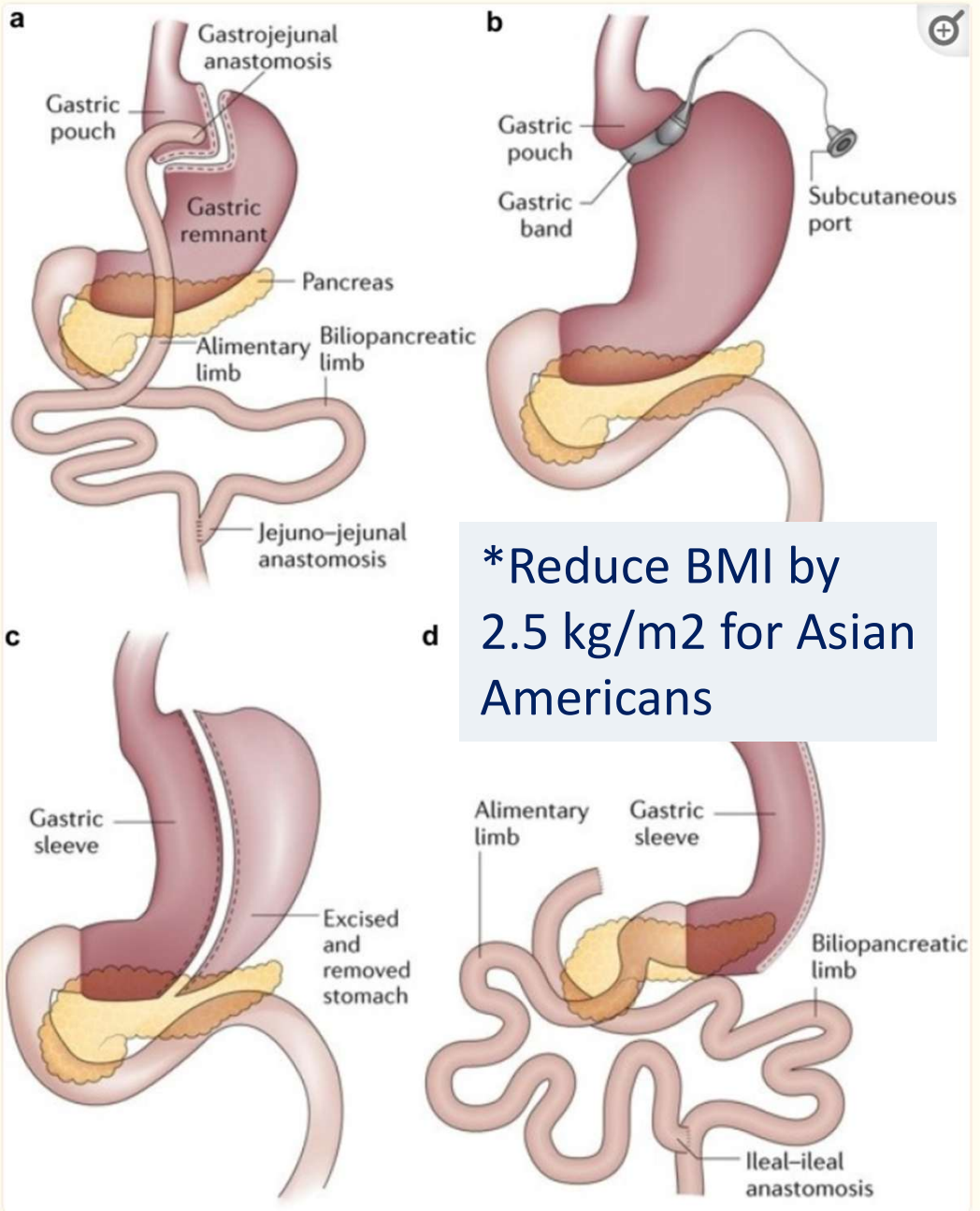
Pocket Card: GLP-1 & GIP RA

GLP-1 & GIP for Diabetes & Weight Loss

Class/Action	Generic Name	Diabetes Version Dose & Indications	Wt loss Version Max Dose & Indications	Considerations
GLP-1 RA - Glucagon Like Peptide Receptor Agonist **"Incretin Mimetic"** • Increases insulin release with food • Slows gastric emptying • Promotes satiety • Suppresses glucagon	exenatide 2x day injection	exenatide 5 and 10 mcg		**Side effects:** N/V, wt loss. Report signs of pancreatitis or ileus, stop med. **Black box warning:** Avoid if family history medullary thyroid tumor. FDA approved to reduce Major Adverse CV Events; MI, Stroke, Death (except exenatide, Saxenda). †Approved for peds 10-17 yrs ††Approved for Peds 12-17 years Lowers A1C ~ 0.5 - 1.6% Wt loss: 4-9% (Diabetes versions)
	liraglutide 1x day injection	Victoza† 0.6, 1.2, 1.8mg	Saxenda†† - 3.0mg	
	dulaglutide 1x week injection	Trulicity† 0.75, 1.5, 3.0, 4.5mg		
	semaglutide 1x week injection	Ozempic 0.25, 0.5, 1.0, 2.0mg Tx for CKD	Wegovy†† - 2.4mg High Dose - 7.2mg Tx for MASH	
	semaglutide Daily Oral - fasting w/ H20	Oral Ozempic 1.5, 4, 9 mg Rybelsus 3, 7, 14 mg	Wegovy - 25mg Oral tablet	
GLP-1 & GIP Receptor Agonist Activates receptors for GLP-1 (see above) & Glucose-dependent Insulinotropic Polypeptide (GIP).	tirzepatide 1x week injection. Single dose prefilled pen or vial. Gradually adjust dose based on shared decision, individual goals.	Mounjaro† 2.5, 5.0, 7.5, 10, 12.5, 15 mg. Reduces Major Adverse CV Events; MI, Stroke, Death	Zepbound Max dose 15mg Tx for sleep apnea	**Side effects:** N/V, wt loss. Report pancreatitis or signs of ileus, stop med. **Black box warning:** Avoid if family hx of medullary thyroid tumor. †Approved for peds 10-17 yrs Lowers A1C ~ 1.8 - 2.4% Wt loss: 7-14% (Diabetes versions)

Metabolic Surgery for Weight Loss

- **Considered* as an option to treat T2DM for screened surgical candidates with:
  - BMI 30 – 34.9 kg/m^2 for those who don't achieve wt. loss w/ nonsurgical methods
- **Recommended* as an option to treat T2DM for screened surgical candidates with:
  - BMI ≥ 40 kg/m^2
  - BMI 35 - 39.9 kg/m^2 for those who don't achieve wt. loss w/ nonsurgical methods



*Reduce BMI by 2.5 kg/m2 for Asian Americans

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC634

atus%20after%20bariatric%20surgery,is%20achieved

Metabolic Surgery for Weight Loss

Advantages in T2DM

- Diabetes remission in 30-63% of those with RYGB.
  - 35-50% of those who go into remission experience recurrence, but median disease-free period is 8.3 years.
- Many with diabetes will sustain glycemic improvement for 5-15 years.
- Additional health benefits



Disadvantages

- Costly (but likely cost effective)
- Long-term concerns: dumping syndrome, anemia, osteoporosis, severe hypoglycemia, nutrient deficiency.
- Increased risk of substance use, new-onset depression/anxiety

Metformin helps gut microbiota in diabetes

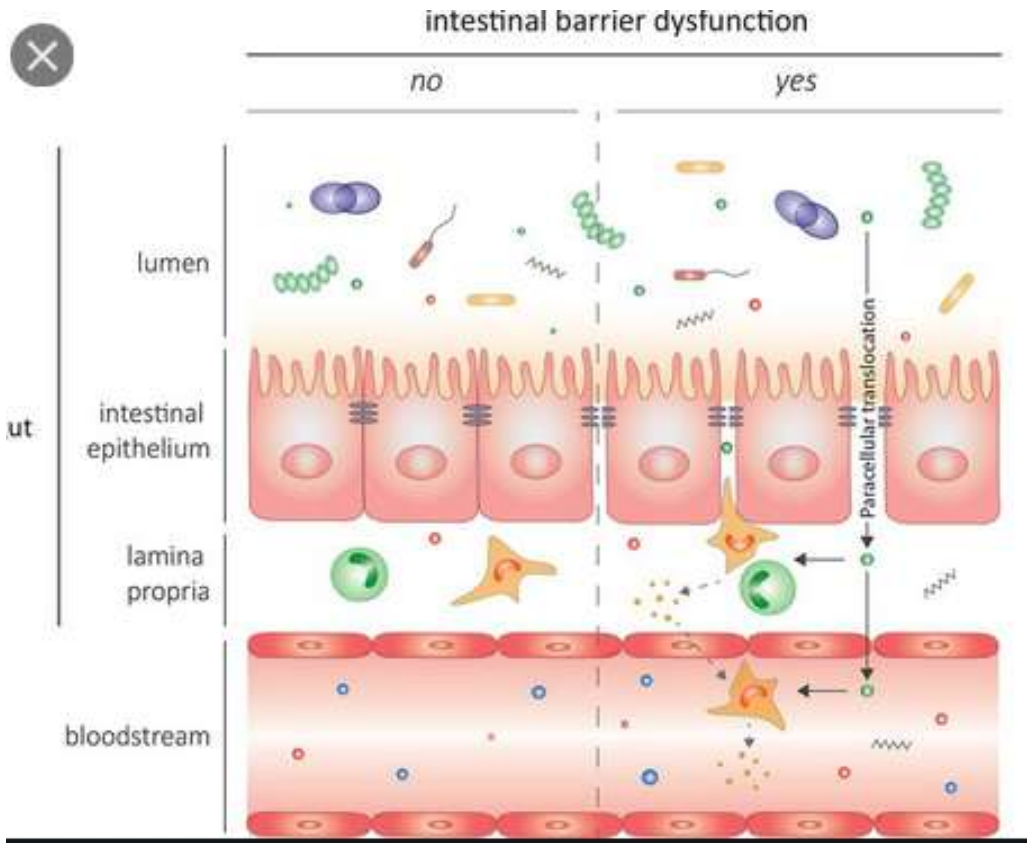


Especially increases Akkermansia and Bifidobacterium.

- Induces GLP-1 secretion
- Changes in *Bacteroidetes/Firmicutes* ratio
- Capacity to induce mucin expression similar to *Akkermansia* muciniphila
- Improves the metabolic profile by lowering tissue inflammation in the presence of extra weight

https://www.frontiersin.org/journals/endocrinology/articles/10.3389/fendo.2021.626359/full

Akkermansia Muciniphila



A. muciniphila in our mucus lining is inversely correlated with obesity and diabetes in both mice and humans.

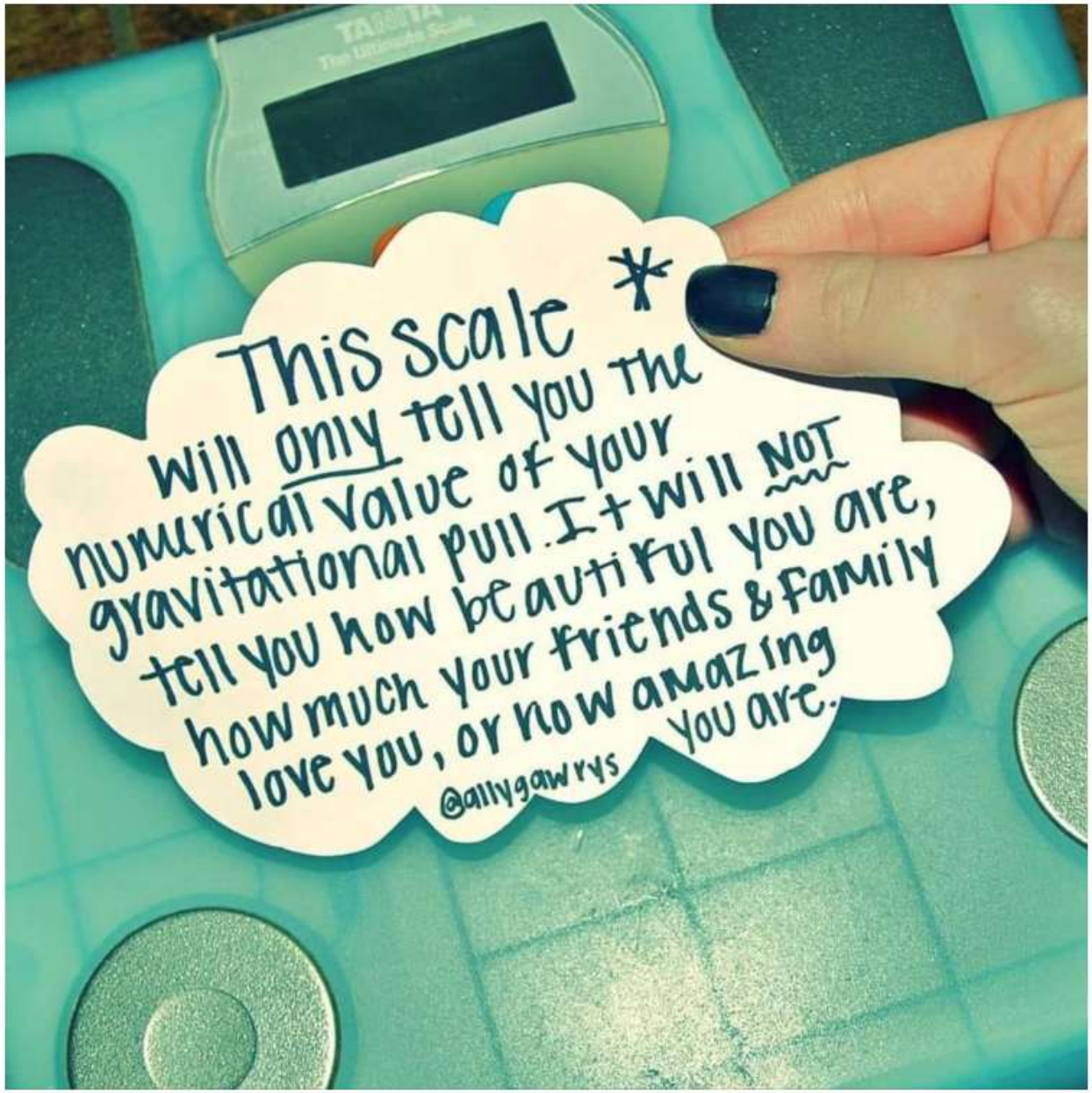
Mucus lining protector and increases presence of short chain fatty acids.

High levels of A. muciniphila is associated with improved health.

"AKK" is associated with enhanced intestinal barrier function and incretin secretion from intestinal endocrine cells. Together, these actions suppress obesity, insulin resistance, and intestinal inflammation.

Depommier C, Everard A, Druart C, et al. Supplementation with *Akkermansia muciniphila* in overweight and obese human volunteers: a proof-of-concept exploratory study. *Nat Med*. 2019. doi: 10.1038/s41591-019-0495-2.

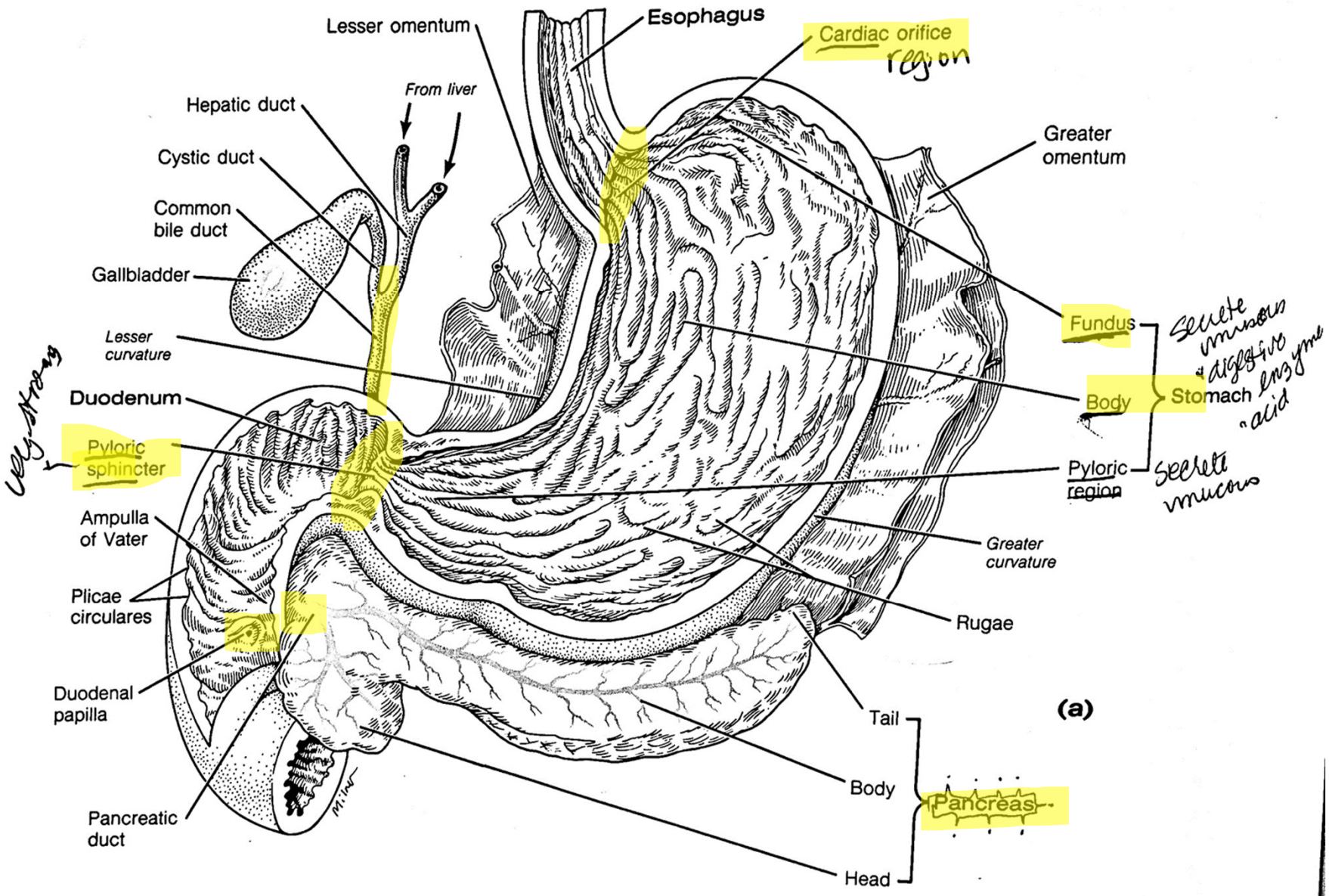
Weight is a Heavy Issue



Now to the Duodenum



Duodenum, gallbladder, pancreas



Type 3c Diabetes (Pancreatogenic)

- Includes both structural and functional loss of insulin secretion in the context of exocrine pancreatic dysfunction.
- About 5-10% of diabetes, often misdiagnosed as type 2 diabetes.
- Insulin sensitive
- Assess wt loss, fatty stools – indications may need pancreatic enzyme replacement therapy (PERT).

- The diverse set of etiologies includes:
  - pancreatitis (acute and chronic) ~70%
  - trauma or pancreatectomy
  - neoplasia
  - cystic fibrosis
  - hemochromatosis
  - fibrocalculous pancreatopathy

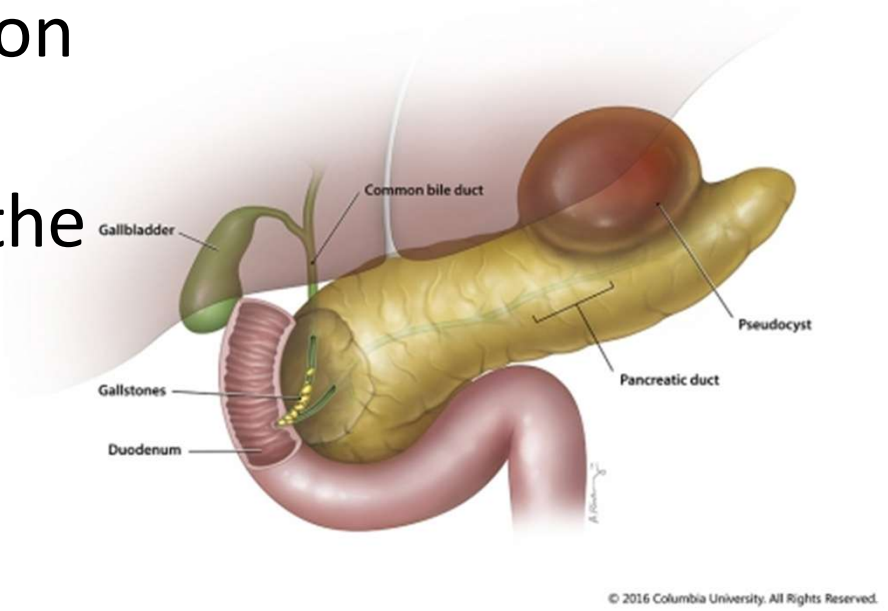
Screen for diabetes within 3-6 months of pancreatitis & annually.

2. Diagnosis and Classification of Diabetes: Standards of Care in Diabetes—2026 FREE

American Diabetes Association Professional Practice Committee for Diabetes*

Pancreatitis

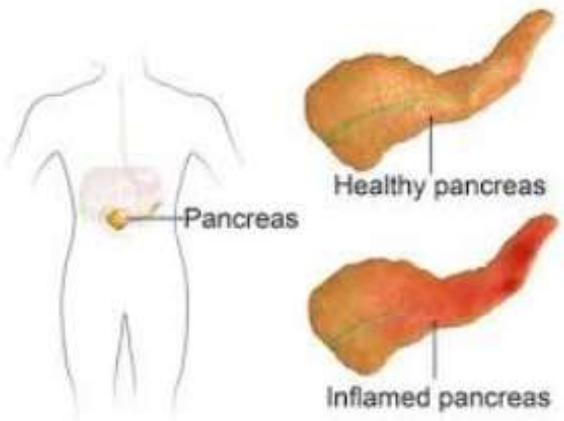
- Pancreatitis caused by digestion of the organ from pancreatic enzymes normally carried to the SI through pancreatic duct.
- Detected through elevated Amylase levels & pain
- Causes:
  - HIV meds and other meds
  - Alcohol ingestion
  - Gallstones blocking pancreatic enzyme flow to small intestine
  - Elevated triglycerides
  - Cancer, injury and other



© 2016 Columbia University. All Rights Reserved.

Pancreatitis

- People with diabetes 2xs risk of acute pancreatitis
- After episode of pancreatitis, one third of people will get prediabetes or diabetes
  - About 25% to 80% of people with chronic pancreatitis develop Type 3c diabetes.
- Pancreatitis is an exocrine dysfunction:
  - Disrupts global architecture or physiology of pancreas
  - Results in both exocrine and endocrine dysfunction.



Healthy Pancreas vs Pancreatitis

2. Diagnosis and Classification of Diabetes: Standards of Care in Diabetes—2026 FREE

American Diabetes Association Professional Practice Committee for Diabetes*

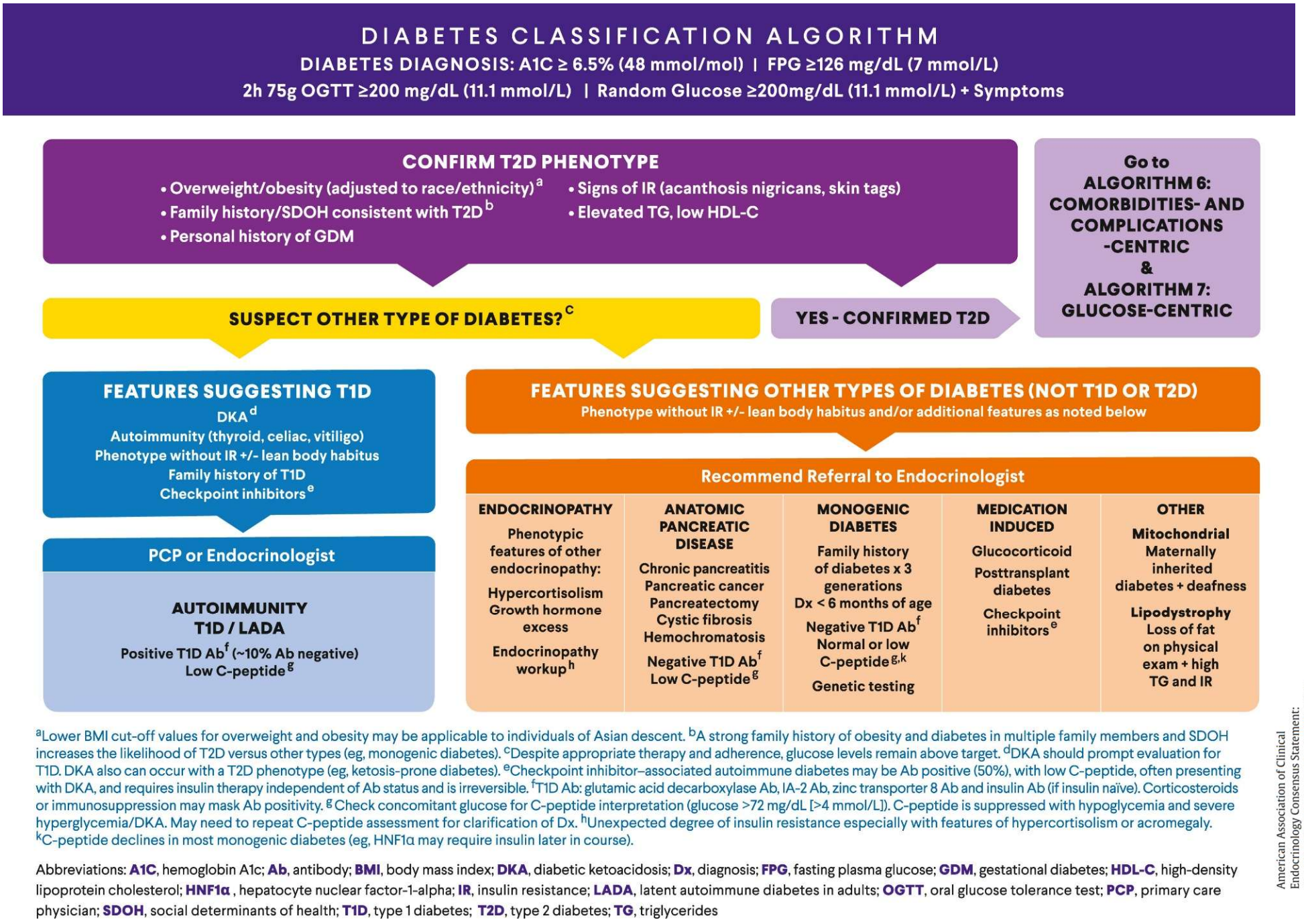
Screen people for diabetes within 3–6 months following an episode of acute pancreatitis and annually thereafter

Exocrine Pancreatic Insufficiency

- Fatty stools
- Abdominal pain especially after high fat meals
- Can happen with both type 1 & 2 diabetes
- May need to take fat soluble vitamins, enzymes
- Avoid smoking, excess alcohol to protect pancreas.
- Cystic fibrosis
- Often associated with Type 3c diabetes



AACE 2026 Classification Algorithm



[a]Lower BMI cut-off values for overweight and obesity may be applicable to individuals of Asian descent. [b]A strong family history of obesity and diabetes in multiple family members and SDOH increases the likelihood of T2D versus other types (eg, monogenic diabetes). [c]Despite appropriate therapy and adherence, glucose levels remain above target. [d]DKA should prompt evaluation for T1D. DKA also can occur with a T2D phenotype (eg, ketosis-prone diabetes). [e]Checkpoint inhibitor–associated autoimmune diabetes may be Ab positive (50%), with low C-peptide, often presenting with DKA, and requires insulin therapy independent of Ab status and is irreversible. [f]T1D Ab: glutamic acid decarboxylase Ab, IA-2 Ab, zinc transporter 8 Ab and insulin Ab (if insulin naïve). Corticosteroids or immunosuppression may mask Ab positivity. [g]Check concomitant glucose for C-peptide interpretation (glucose >72 mg/dL [>4 mmol/L]). C-peptide is suppressed with hypoglycemia and severe hyperglycemia/DKA. May need to repeat C-peptide assessment for clarification of Dx. [h]Unexpected degree of insulin resistance especially with features of hypercortisolism or acromegaly. [k]C-peptide declines in most monogenic diabetes (eg, HNF1α may require insulin later in course).

Abbreviations: **A1C**, hemoglobin A1c; **Ab**, antibody; **BMI**, body mass index; **DKA**, diabetic ketoacidosis; **Dx**, diagnosis; **FPG**, fasting plasma glucose; **GDM**, gestational diabetes; **HDL-C**, high-density lipoprotein cholesterol; **HNF1α** , hepatocyte nuclear factor-1-alpha; **IR**, insulin resistance; **LADA**, latent autoimmune diabetes in adults; **OGTT**, oral glucose tolerance test; **PCP**, primary care physician; **SDOH**, social determinants of health; **T1D**, type 1 diabetes; **T2D**, type 2 diabetes; **TG**, triglycerides

American Association of Clinical Endocrinology Consensus Statement: Algorithm for Management of Adults With Type 2 Diabetes – 2026 Update



The American Cancer Society's estimates for pancreatic cancer in U.S. for 2023 are:

- About 64,050 people will be diagnosed with pancreatic cancer.
- About 50,550 people will die of pancreatic cancer.
- Pancreatic cancer accounts for about 3% of all cancers in the US and about 7% of all cancer deaths.

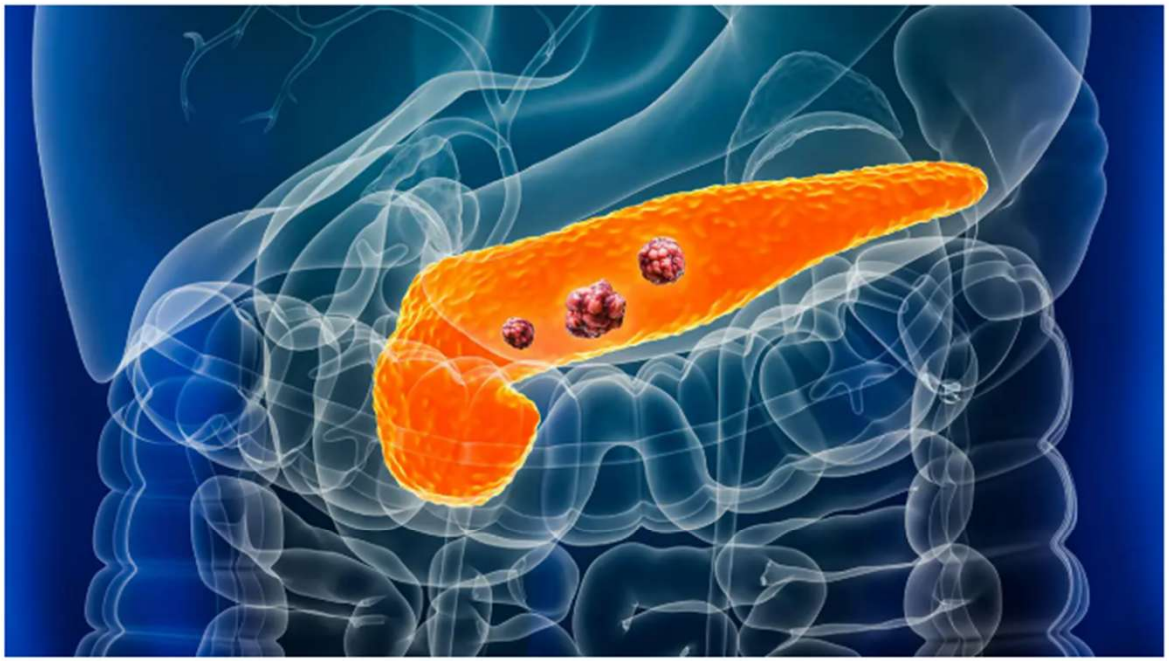
https://pancan.org/

'Grand Slam' Pancreatic Cancer Drug Wins FDA App

— RAS inhibitor daraxonrasib doubled survival outcomes in second-line trial

by Charles Bankhead, Senior Editor, MedPage Today

August 26, 2026 · 2 min read Add MedPage Today on Google



The FDA approved the first-in-class RAS inhibitor daraxonrasib for metastatic pancreatic ductal adenocarcinoma (PDAC), the most common form of pancreatic cancer.

The approval stipulates use in adults with PDAC previously treated with at least one prior systemic regimen or that is ineligible for multiagent systemic therapy. The oral drug targets multiple isoforms of RAS, a driver mutation for most patients with PDAC.

"This drug showed unprecedented results in an area of high unmet need," said Angelo de Claro, MD, the director of FDA's Oncology Center of Excellence, in a statement. "The approval was granted 6.5 months before the user fee deadline, demonstrating the FDA's commitment to accelerating the approval of

Metabolic dysfunction–associated steatotic liver disease (MASLD)

- Recent studies estimate that MASLD is prevalent in >70% of adults with type 2.
- 50% of people with MASLD have MASH (Metabolic Associated Steatohepatitis)
  - MASH = 5% plus hepatic steatosis with inflammation and hepatocyte injury (hepatocyte ballooning), with or without evidence of liver fibrosis
- Screen for liver fibrosis using FIB 4 Index
  - Uses liver enzymes (ALT & AST), platelet count plus age
  - If positive, (FIB ≥ 1.3) follow-up with imaging or ultrasound



Join our Level 2 Critical Assessment of People with Diabetes

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026 FREE

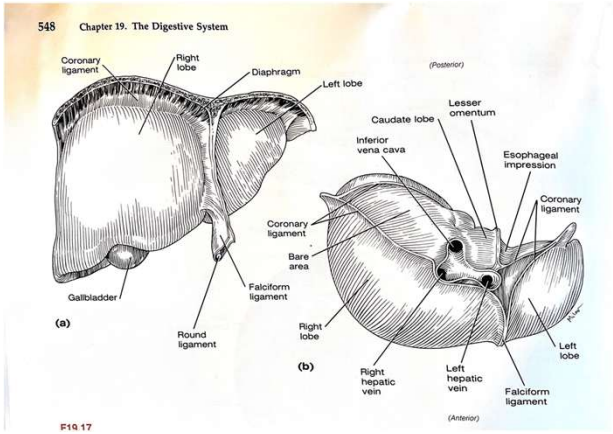
American Diabetes Association Professional Practice Committee for Diabetes*

Quick Question 3: Detecting Steatosis

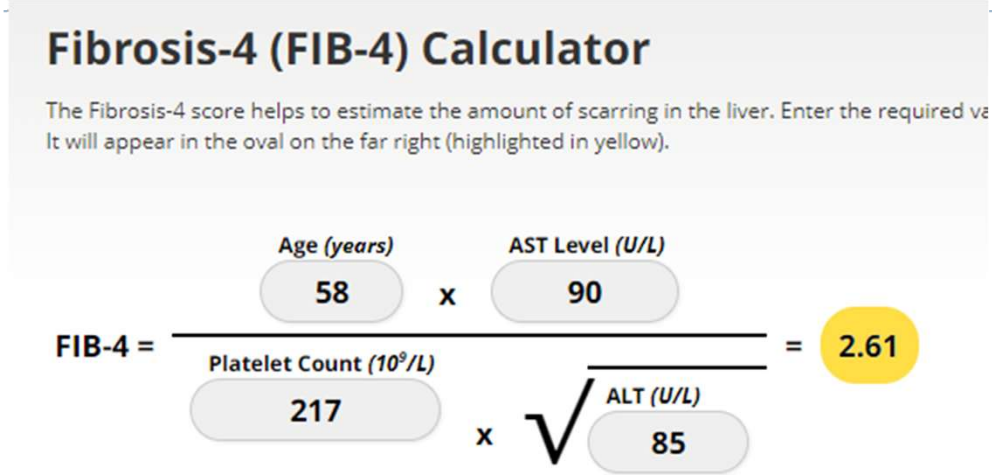
EV is 58 years old with type 2 diabetes and a BMI of 33. In addition, EV has hypertension and hyperlipidemia, with elevated liver enzymes (ALT and AST). To determine if EV is at risk for liver fibrosis and cirrhosis, which of the following would provide a risk calculation?

A. UACR
B. FIB-4
C. GAD or ICA
D. Weight in (kg) divided by the square of height in meters (m2)





Screening for NASH – FIB-4



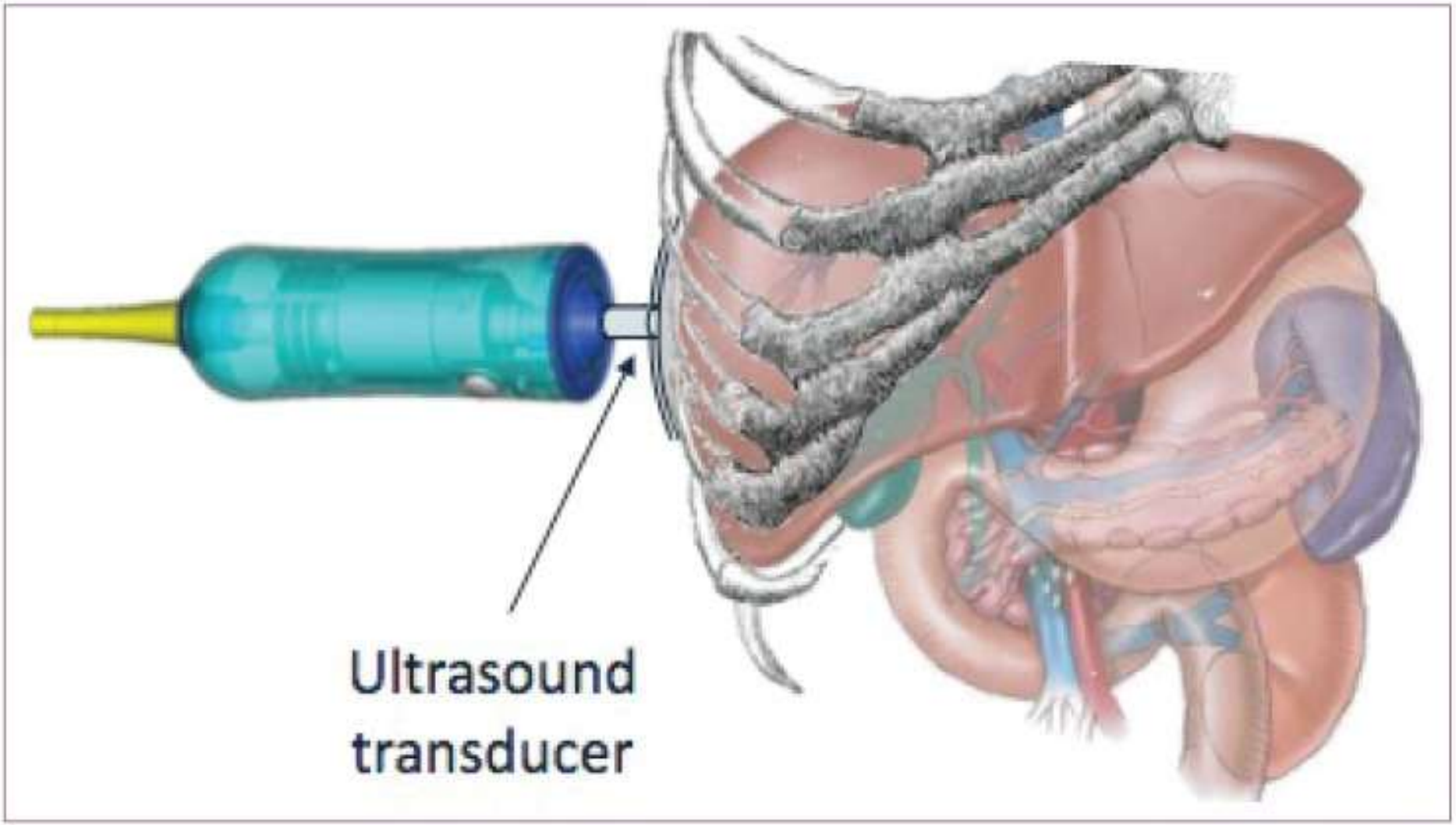
- The American College of Gastroenterology considers Upper limit of normal ALT levels:
- 29–33 units/L for males
- 19–25 units/L for female individuals

(mdcalc.com/calc/2200/fibrosis-4-fib-4-index-liver-fibrosis).

FIB-4 estimates risk of hepatic cirrhosis (age 35+):

- Calculated by imputing:
  - Age
  - plasma aminotransferases (AST and ALT)
  - and platelet count
- FIB-4 Risk Levels
  - Lower risk is <1.3
  - Intermediate 1.3 to 2.67
  - High risk >2.67
    - considered as having a high probability of advanced fibrosis (F3–F4).

Liver Elastography or FibroScan



https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3594956/

Actions To Decrease Steatosis

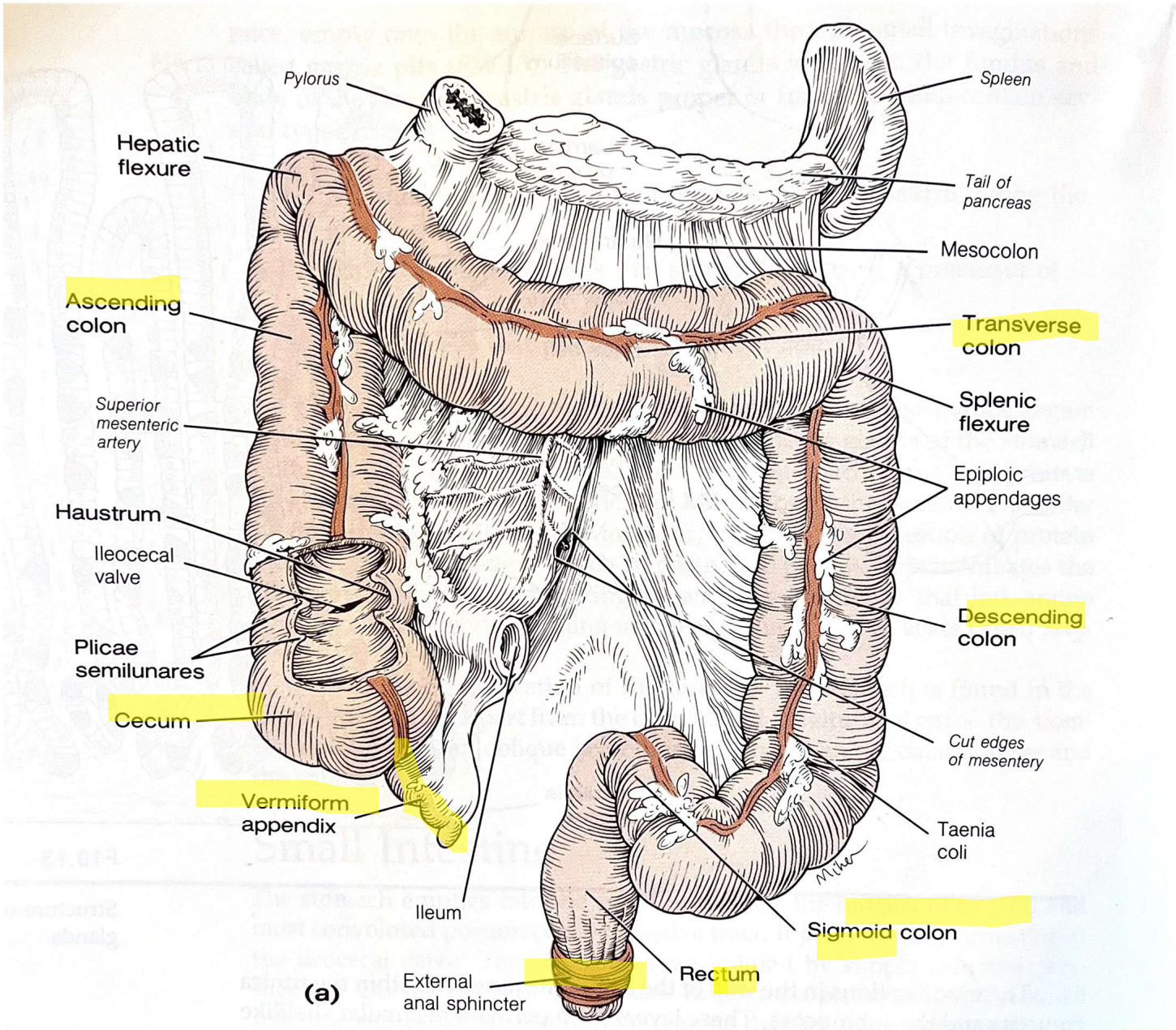
- Increase activity
  - Strength training
  - Yoga or Thai Chi
  - Walking & aerobics
- Thoughtful eating
  - More fiber
  - Less processed foods & less added sugar
  - Avoid alcohol



- Treatment
  - Pioglitazone
  - GLP-1/GIP, esp semaglutide & tirzepatide
  - Resmetirom - thyroid hormone receptor-β agonist for F2 or F3 liver fibrosis
  - Statin
- Prevention
  - Cancer Screenings
  - Decrease inflammation

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026 FREE
American Diabetes Association Professional Practice Committee for Diabetes*

Almost There – Ileum to Anus



Ileum to Anus

- Ileum last 2 meters of intestine. To move from the ileum to the cecum (first part of large intestine), food passes through the ileocecal valve.
- The appendix hangs out near this juncture. It traps harmful bacteria and contains lymphoid cells similar to tonsils. If appendix gets blocked with bacteria and white blood cells, can lead to appendicitis
- Large intestine – The bacterial party center of your GI Tract
  - Ascending
  - Transverse
  - Descending
  - Sigmoid colon makes and Sideway S as it enters the iliac fossa
  - Then the rectum
  - Anus – 2 sphincters internal and external
  - External sphincter anal skeletal muscle under voluntary control and internal anal muscle not

Bowel Issues - Diarrhea

Defined and Treatment

- 3 or more bowel movements a day
- **Treat & Determine Cause**
  - Improve glucose levels
  - Eat whole foods — including whole grains and fiber.
  - Drink plenty of water.
  - Get regular exercise.
  - Quit smoking and using tobacco products.
  - Limit alcohol.
  - Take medications as necessary.

- **Possible Causes**
  - Elevated glucose
  - Autonomic neuropathy
  - Metformin
  - GLP-1 RA's
  - Celiac disease
  - Bacterial /yeast infection
  - Exocrine pancreatic insufficiency
  - Irritable bowel syndrome
  - Sugar free foods
  - Other

Bowel Issues - Constipation

- Defined as less than 3 bowel movements a week.
- More common in diabetes
- GLP-1 RA can contribute
- Treatment
  - Get glucose to target
  - Increase fiber, activity, H2O
  - Bulking agents (psyllium)
  - Laxatives or other agents
  - Bathroom habits review



Look at your Poop – Stool Chart

CLINICAL SIGNS & SYMPTOMS OF COLORECTAL CANCER



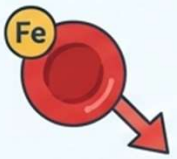
Change in Bowel Habits

Persistent constipation, diarrhea, or narrowing of stool caliber (e.g., (e.g., pencil-thin).



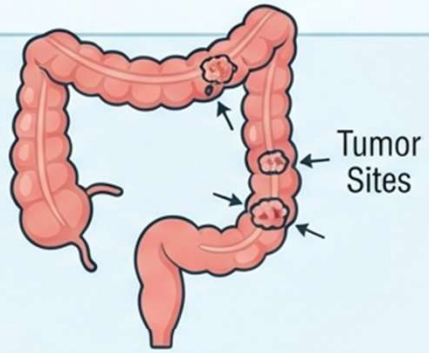
Gastrointestinal Bleeding

Visible rectal bleeding (hematochezia) or dark, tarry stools (melena). Occult blood possible.



Unexplained Anemia

Iron-deficiency anemia, often presenting with fatigue, weakness, and pale, especially in right-sided tumors.





Abdominal Discomfort

Persistent abdominal pain, cramps, bloating, or a feeling of fullness.



Unintentional Weight Loss

Significant, unexplained weight loss and loss of appetite (cachexia).



Tenesmus & Incomplete Evacuation

A constant urge to have a bowel movement, feeling that the bowel does feeling that the bowel does not empty completely (common in rectal cancer).

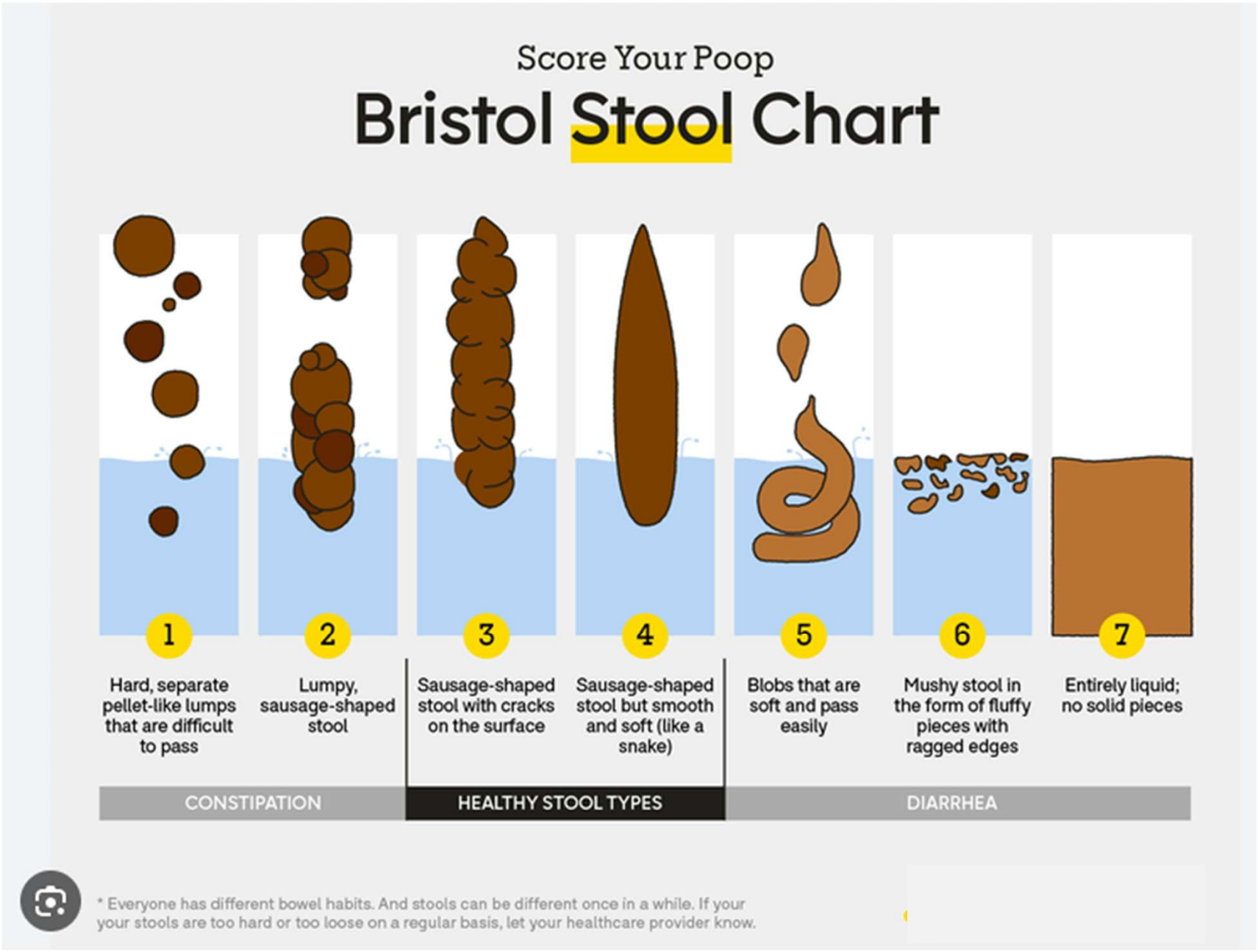
*Note: Early-stage CRC may be asymptomatic. Screening is crucial.

GI.org

Graphic generated with AI tool Gemini 3.5 Flash

* Everyone has different bowel habits. And stools can be different once in a while. If your your stools are too hard or too loose on a regular basis, let your healthcare provider know.

Look at your Poop – Stool Chart



Colorectal Cancer Screening Recommendations 2026

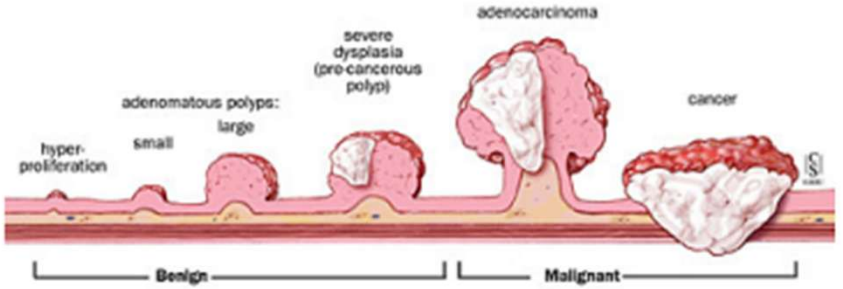
- All people at age 45 need screening for colon cancer



PHYSICIANS FROM THE AMERICAN COLLEGE OF GASTROENTEROLOGY want you to know that screening Colonoscopy can find growths in the colon called polyps so they can be removed before they turn into Colorectal Cancer.



https://gi.org/topics/colorectal-cancer/



Promoting Colon Health

- Nourish gut bacteria
- Get enough sleep
- Keep active
- Drinking enough fluids
- Consider alcohol intake
- Quit smoking
- Go outside
- Thoughtful antibiotic use
- Meditation may enhance helpful gut bacteria



Fiber – the New "F" Word



- Goal:
  - 14 gms / 1000 calories ~ 30 gms a day
- How?
  - Whole, intact grains, beans, fruits, veggies, nuts, avocados
- Why?
  - Associated with lower mortality for people with type 2.
  - Fiber intake inversely associated with type 2 diabetes
- Avoid highly processed foods
  - If label says 0-2gms of fiber per serving, low fiber food.

Nutrition Facts

99% Fat Free Vegetarian Chili with Beans

Serving Size 1.00 cup(247g)

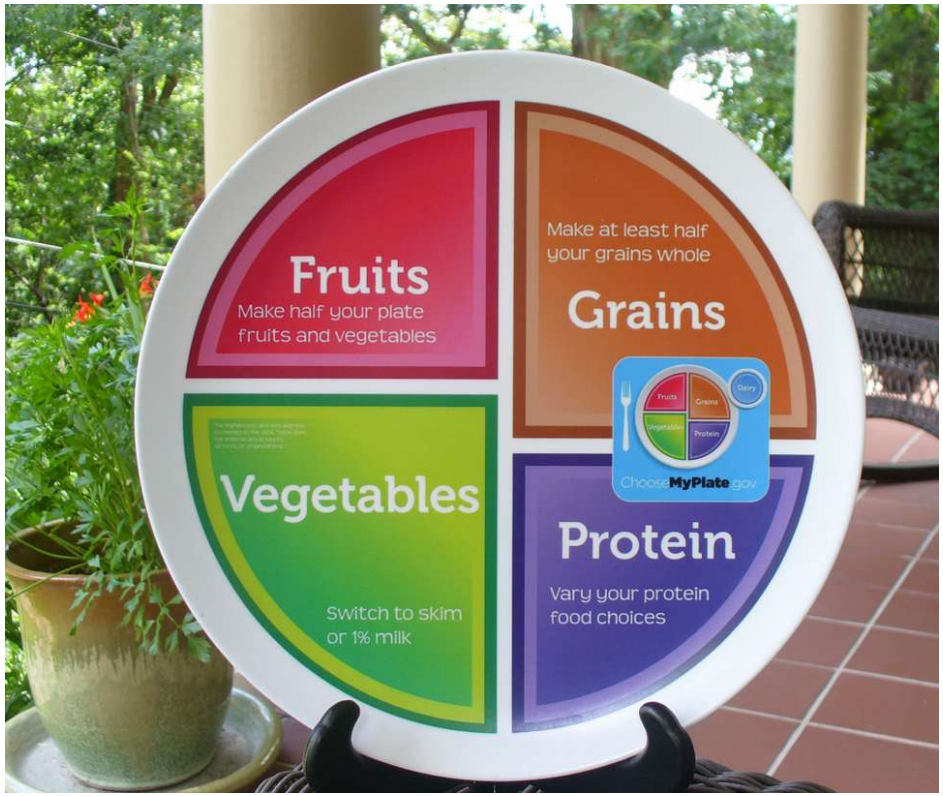
Serving Per Container about 2

	Amount Per Serving	
Calories		190
Calories from Fat		10
		%DV
Total Fat	1g	2%
Saturated Fat	0g	0%
Trans Fat	0g	
Cholesterol	0mg	0%
Sodium	780mg	33%
Total Carbohydrate	35g	12%
Dietary Fiber	10g	40%
Sugars	6g	
Protein	11g	
Vitamin A 25%		Vitamin C 0%
Calcium 6%		Iron 15%

*Percentage Daily values are based on a 2,000 calorie diet.Your Daily values may be higher or lower depending on your calorie needs

GET Lots of Diverse Fiber Foods
Goal is 25 – 30 gms day

American Food Project



Full Plate Diet

- Helps increase fiber in usual meals

Fiber is suddenly hip. Grandma, it turns out, was just ahead of her time.

—*Health & Nutrition Letter*
Tufts University
February 2009



Kefir – Fermented Milk

From the Turkish word *keyif*, which means “feeling good” after eating





Getting to Better Gut Bacterial Health

Eat more PREbiotics

- Foods with indigestible fibers that nourish the good bacteria:
  - High fiber foods like, whole grains, fruits, veggies, nuts
  - High in prebiotic fibers include: Jerusalem artichokes, onions, kale, Brussels sprouts, bananas, dandelion greens & more

PRObiotics

- These foods contain healthy bacteria like *Bifidobacterium* and *lactobacillus.*
  - Yogurt, Kefir – look for "live or active cultures"
  - Fermented foods like: Sauerkraut, Kimchi, Miso soup, kombucha

100 Trillion Friends to Call Your Own

From way back when, to current time
man and bacteria have been intertwined.

Start with your head, it's a happening place,
there's staphylococcus all over your face.

Next up is gums, teeth and mouth,
You'll find streptococcus inside and out!

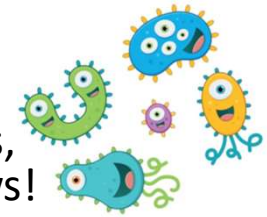
Now to your stomach, to keep the pH,
H. pylori is on the case!

Inside the intestines, 30 feet of tube,
3 pounds of bacteria digesting your food.

From Bacteroidetes to keep you lean,
to Firmicutes, a junk food digesting machine!

Prevotella another bug on the scene,
breaks down fiber, veggies and beans!

Lactobacillus is a newborn's friend,
lining birth canal from tip to end.



Down to your feet, in-between the toes,
that's where lots of pseudomonas grows!

Short chain fatty acids, you wanna keep them around
Protects gut mucous lining from breakin' down

So here's my message, always nourish your gut
With fresh fruit, grains, veggies, beans and nuts

More kefir, miso, sauerkraut, kimchi
Less sugar and fast foods to keep away disease

Breast feed, get dirty, limit antibiotic use
Let newborns come out through the natural shoot

Be reassured that you're never alone
You've got 100 trillion friends to call your own!

Copyright Diabetes Education Services© May not be used without written permission. **www.DiabetesEd.net**

100 Trillion Friends to Call Your Own by Beverly Thomassian, RN, MPH, CDE, BC-ADM to the tune "Yeah" in the style of Usher.

Thank You



Diabetes Education SERVICES 25 years

- Questions?
- Email info@diabetesed.net
- Web www.DiabetesEd.net
- Phone 530-893-8635