

## Exploring the GI System or “Gut to the Butt”

Specialty Topics | Level 5 | 2025

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Pronouns: She, her, hers

[www.DiabetesEd.net](http://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 14<sup>th</sup>, World Diabetes Day Celebration



# We are Here to Help!



Bryanna Sabourin  
Director of Operations



Astraea Ballinger  
Brand Ambassador  
Customer Happiness  
Advocate

If you have questions, you can chat with us at [www.DiabetesEd.net](https://www.DiabetesEd.net)  
or call 530 / 893-8635 or email at [info@diabetesed.net](mailto:info@diabetesed.net)

# Diabetes Education Services Inclusion Statement

Based on the IDEA Initiative inspired by CDR

- ▶ Inclusion
- ▶ Diversity
- ▶ Equity
- ▶ Access

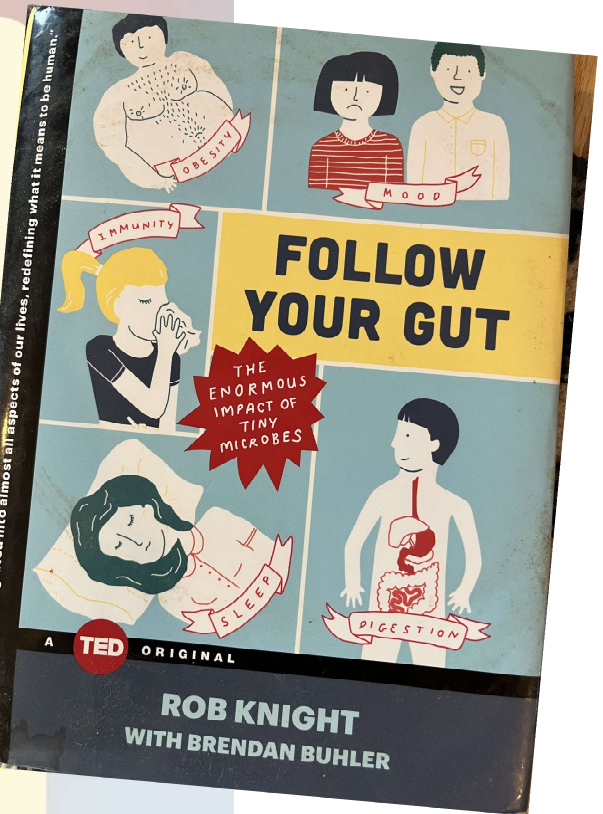
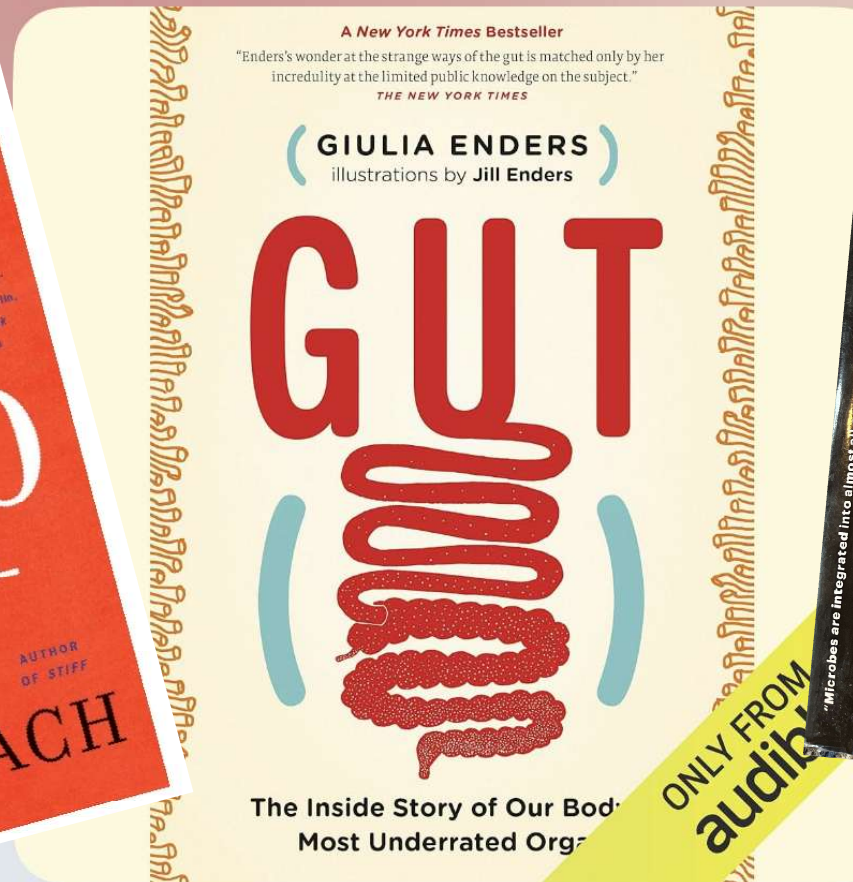
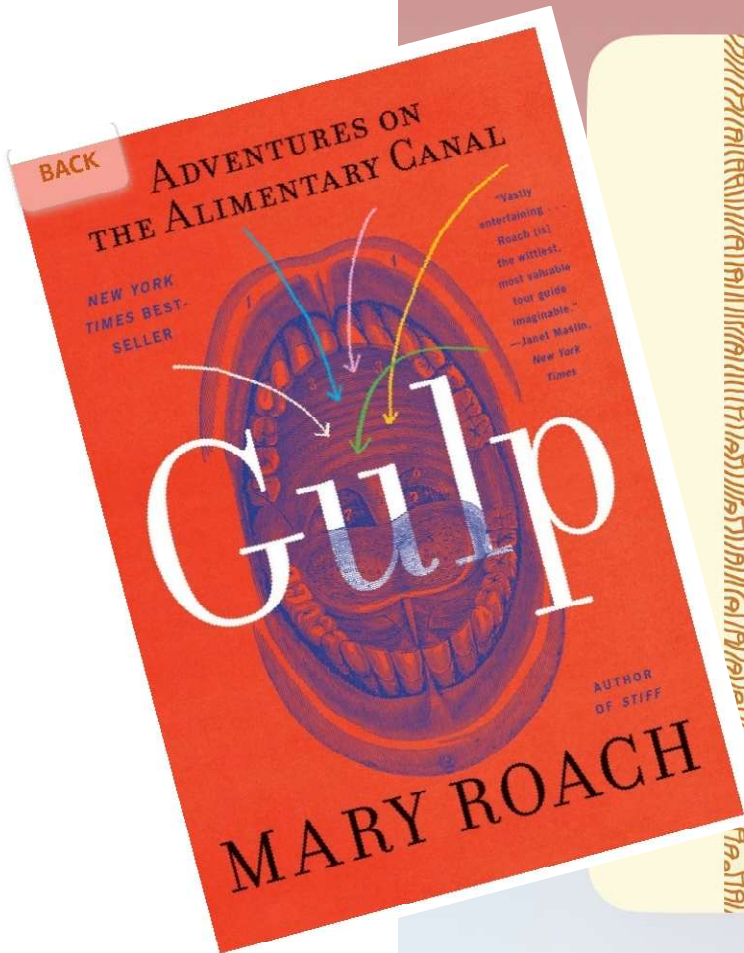


- ▶ We are committed to promoting diversity and inclusion in our educational offerings.
- ▶ We recognize, respect, and include differences in ability, age, culture, ethnicity, gender, gender identity, sexual orientation, size, and socioeconomic characteristics.
- ▶ Our goal is to promote equity and access, 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



# 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.

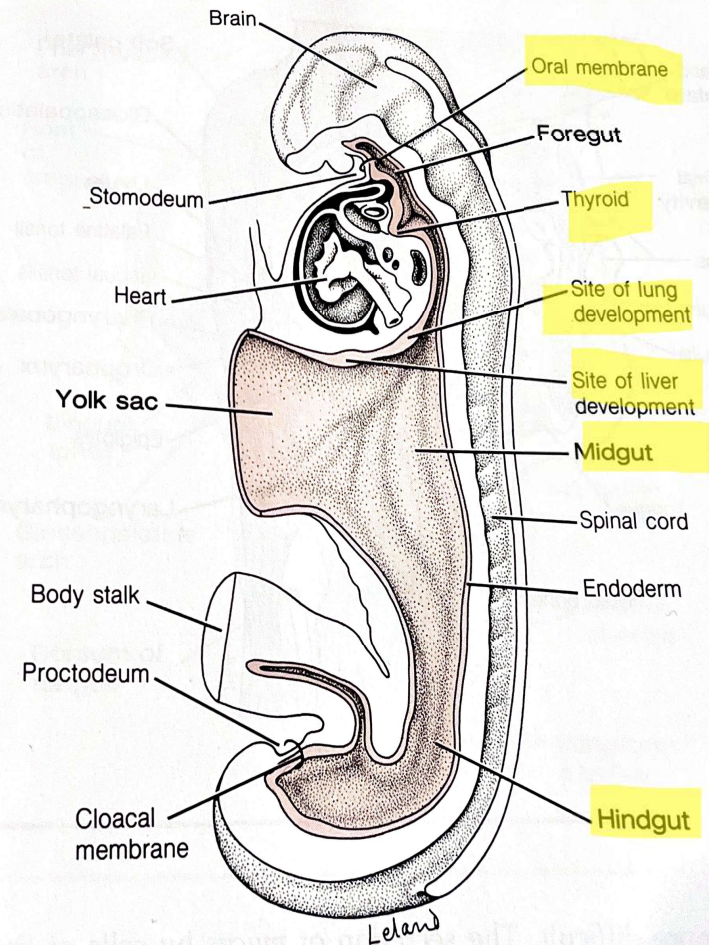


# Gut Tube -Embryonic Starting Point

- ▶ 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



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JR thinks that their ability to taste food has diminished recently.

They ask you, what are the five confirmed basic tastes of the tongue? Which of the following lists describes the best answer?

# What are the 5 flavors?

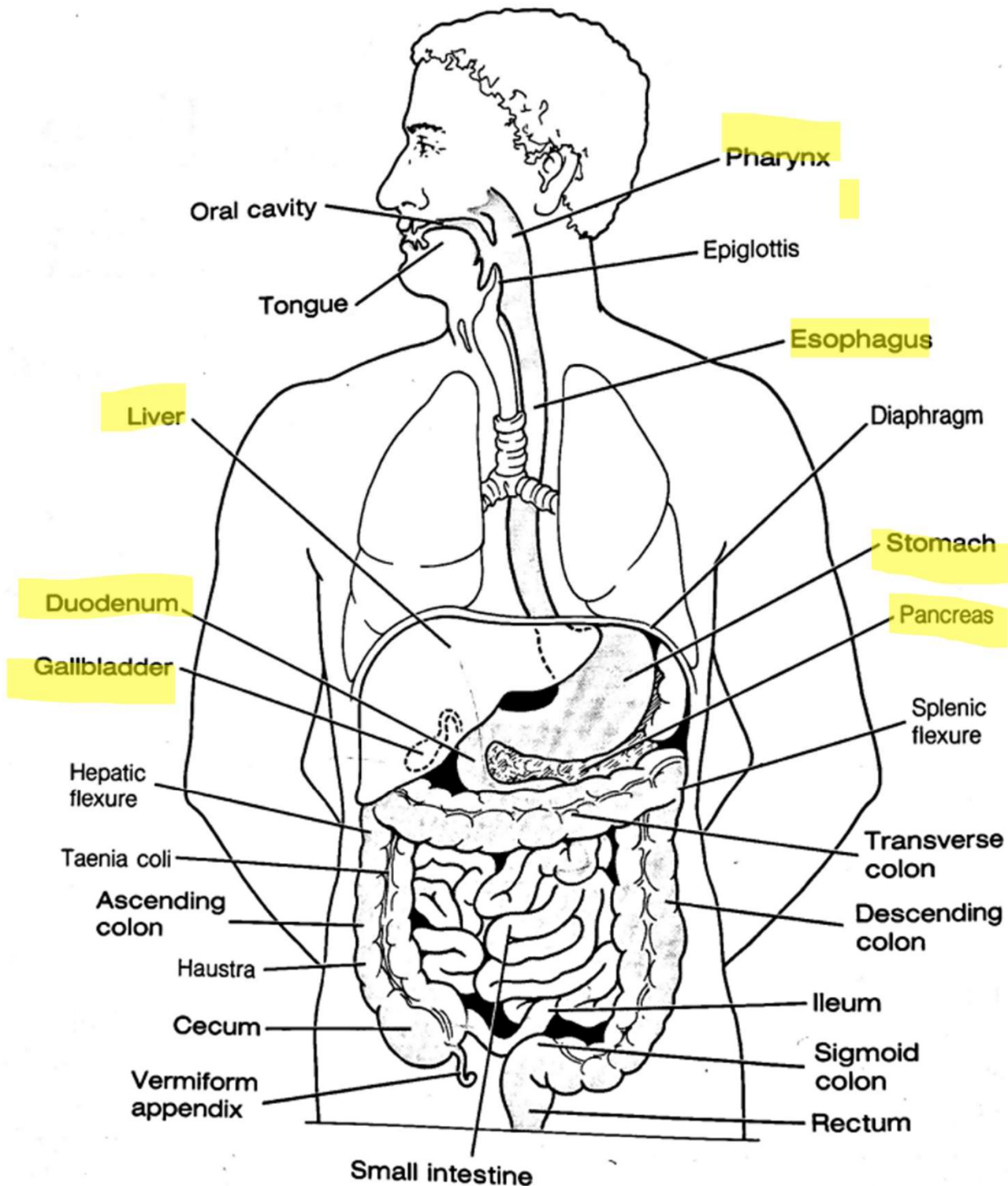
# Digestion Gets Started

- ▶ 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.



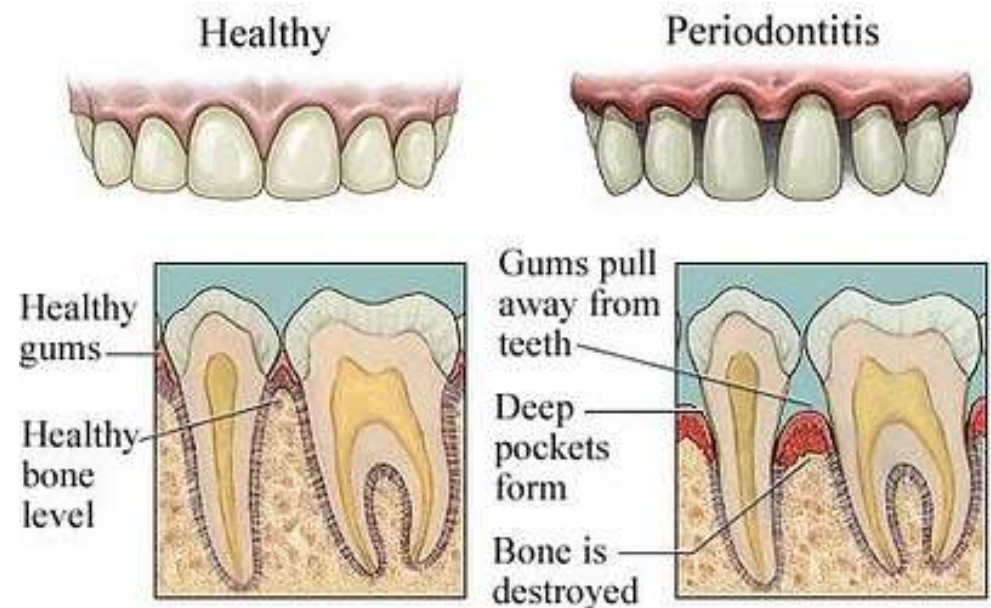
# Salivary Dysfunction and Xerostomia (dry mouth) in DM

- ▶ 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 of 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

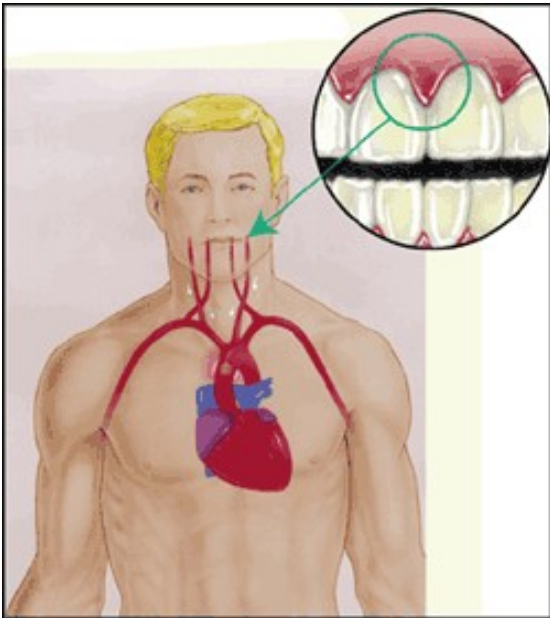


## Oral Care Matters

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

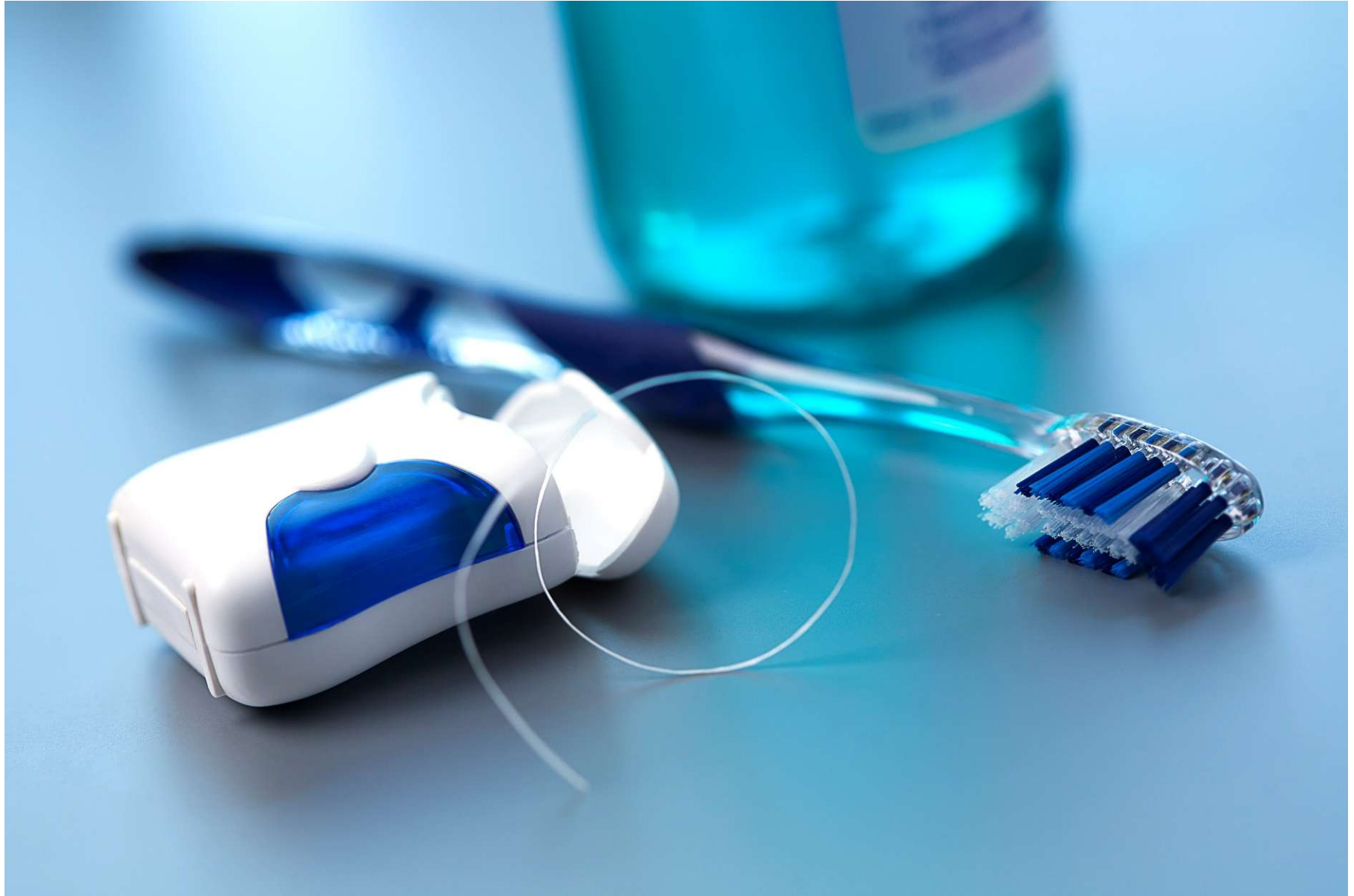
# Periodontal disease and Heart Disease

- 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

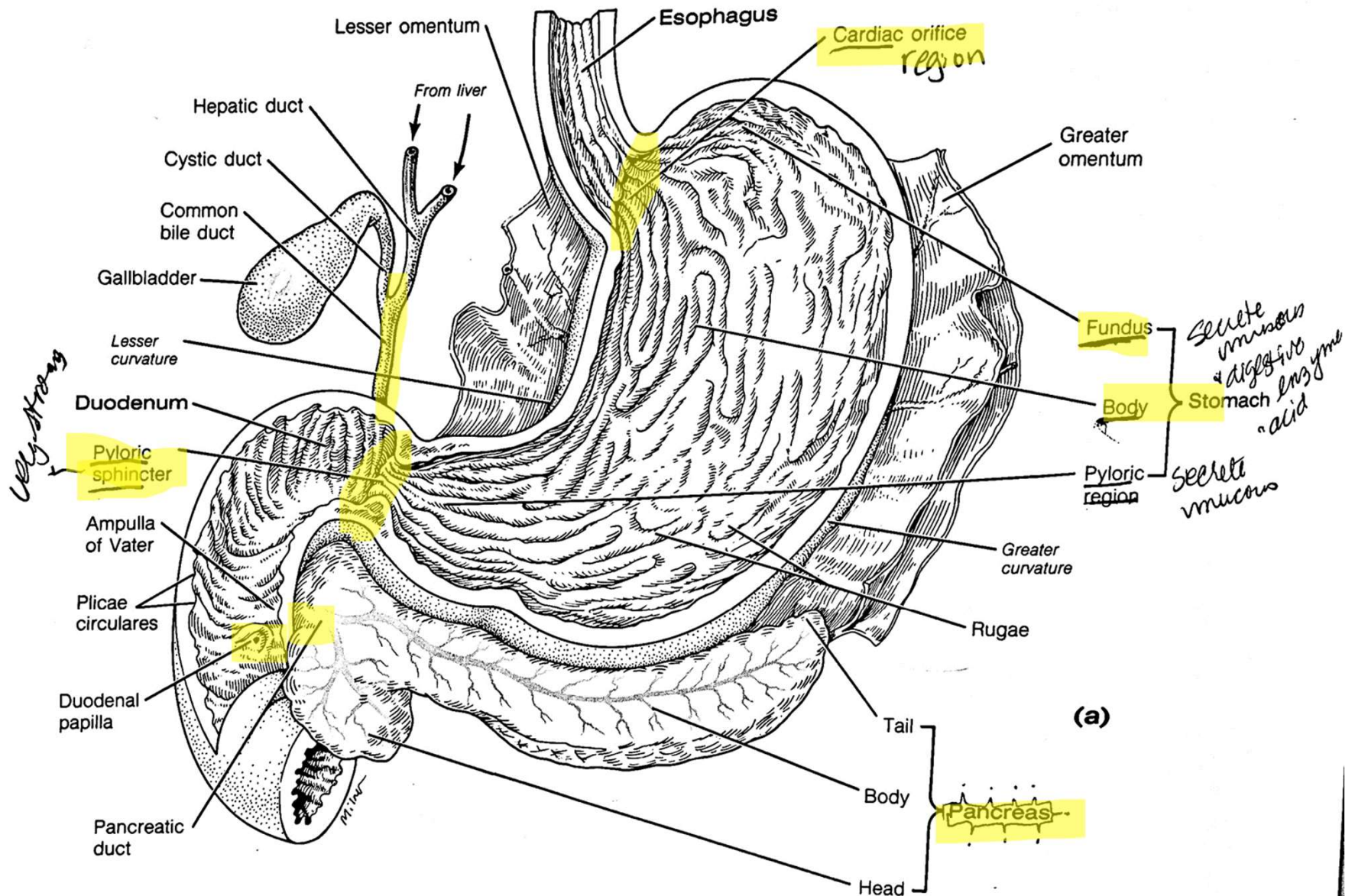
# Best \$10 You Will Ever Spend



# Stomach & Beyond



# Stomach



## 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

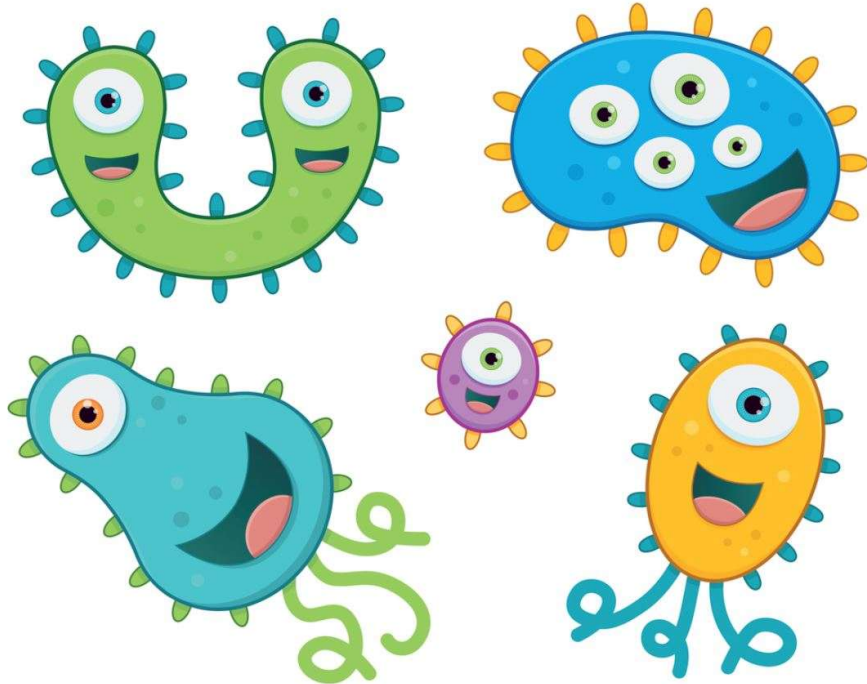
## ▶ 400 cals

- ▶ 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

## Chronic infection, inflammation, ulcer and cancer

In most individuals *Helicobacter pylori* infection is asymptomatic. However, 10–15% of infected individuals will at some time experience peptic ulcer disease. Severe complications include bleeding, perforation and obstruction.

## Gastric ulcer and cancer

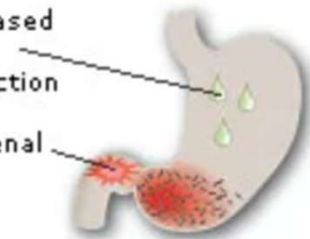
In some individuals *Helicobacter pylori* also infects the corpus region of the stomach. This results in a more widespread inflammation that predisposes not only to ulcer but also to stomach cancer.

### Duodenal ulcer

Peptic ulcer disease is more common in the duodenum than in the stomach itself.

Increased acid production

Duodenal ulcer

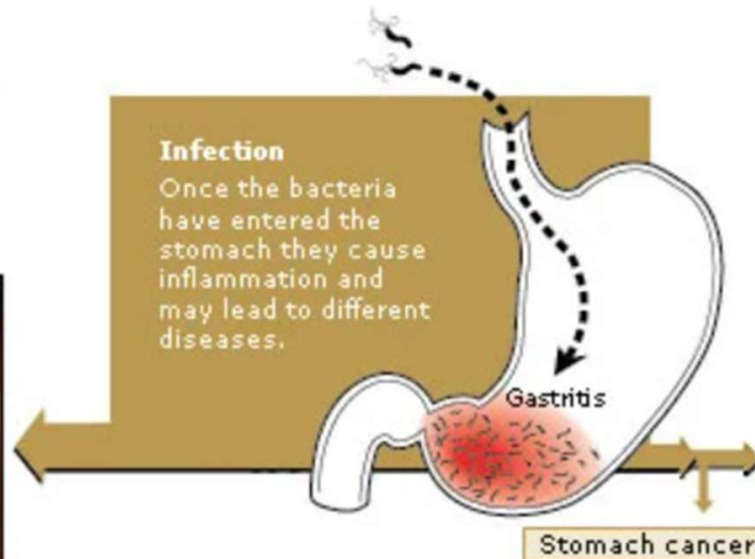


Photos  
Endoskopienheten,  
Karolinska Universitets-  
sjukhuset, Solna

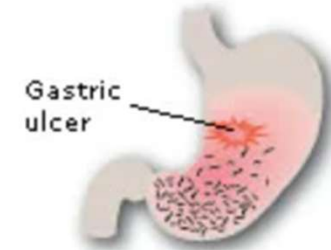


### Infection

Once the bacteria have entered the stomach they cause inflammation and may lead to different diseases.



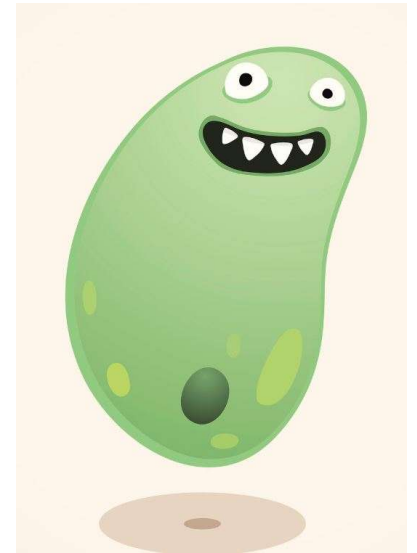
Gastric ulcer



Stomach cancer

# 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.

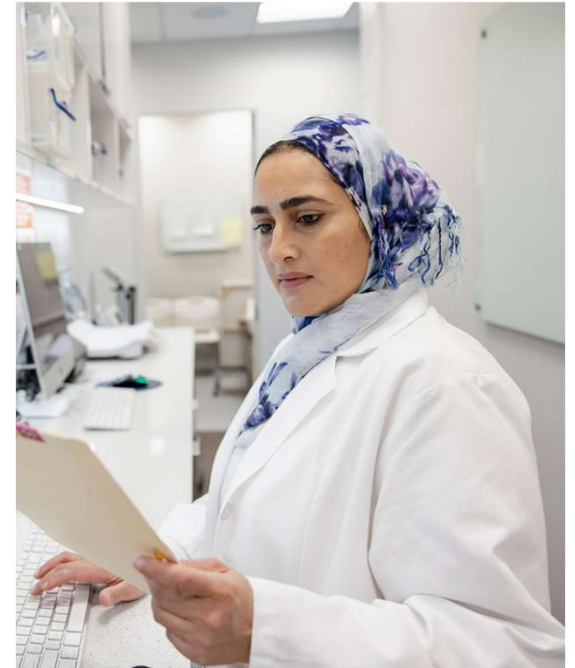
<https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/peroral-endoscopic-myotomy>



- ▶ 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

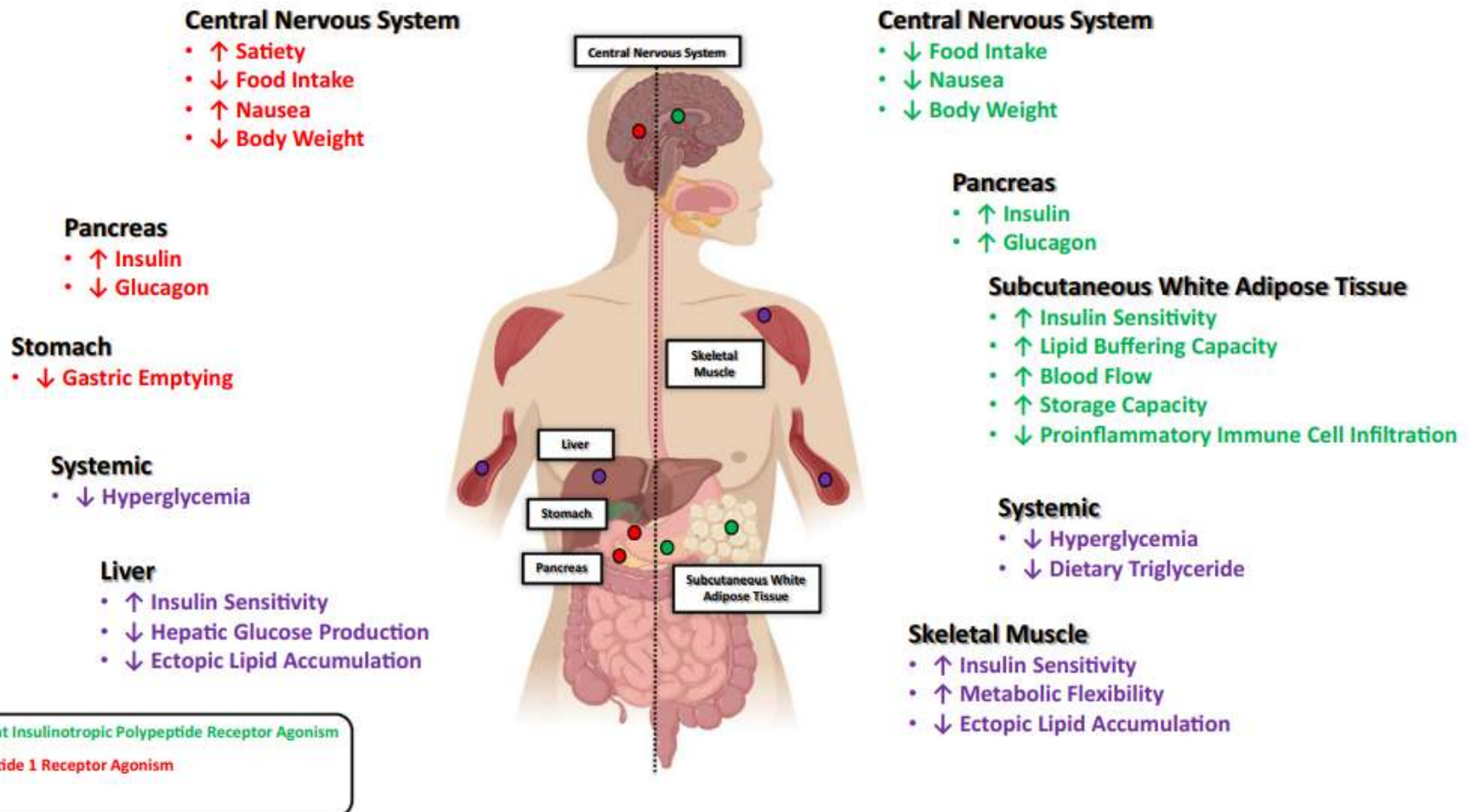
- ▶ Gut hormones secreted by the L-cell of the intestine. Some in the small intestine, but more the larger intestine.
- ▶ People with type 2 make about 50% less gut hormones, but new study shows that people with type 1 may benefit from GLP-1 therapy early in diagnosis.
- ▶ Can slow peristalsis down too much, and lead to an intestinal blockage – semaglutide (Ozempic) warning.



# GLP-1 & GIP Hormones

## Glucagon-like Peptide-1 Receptor Agonism

## Glucose-dependent Insulinotropic Polypeptide Receptor Agonism



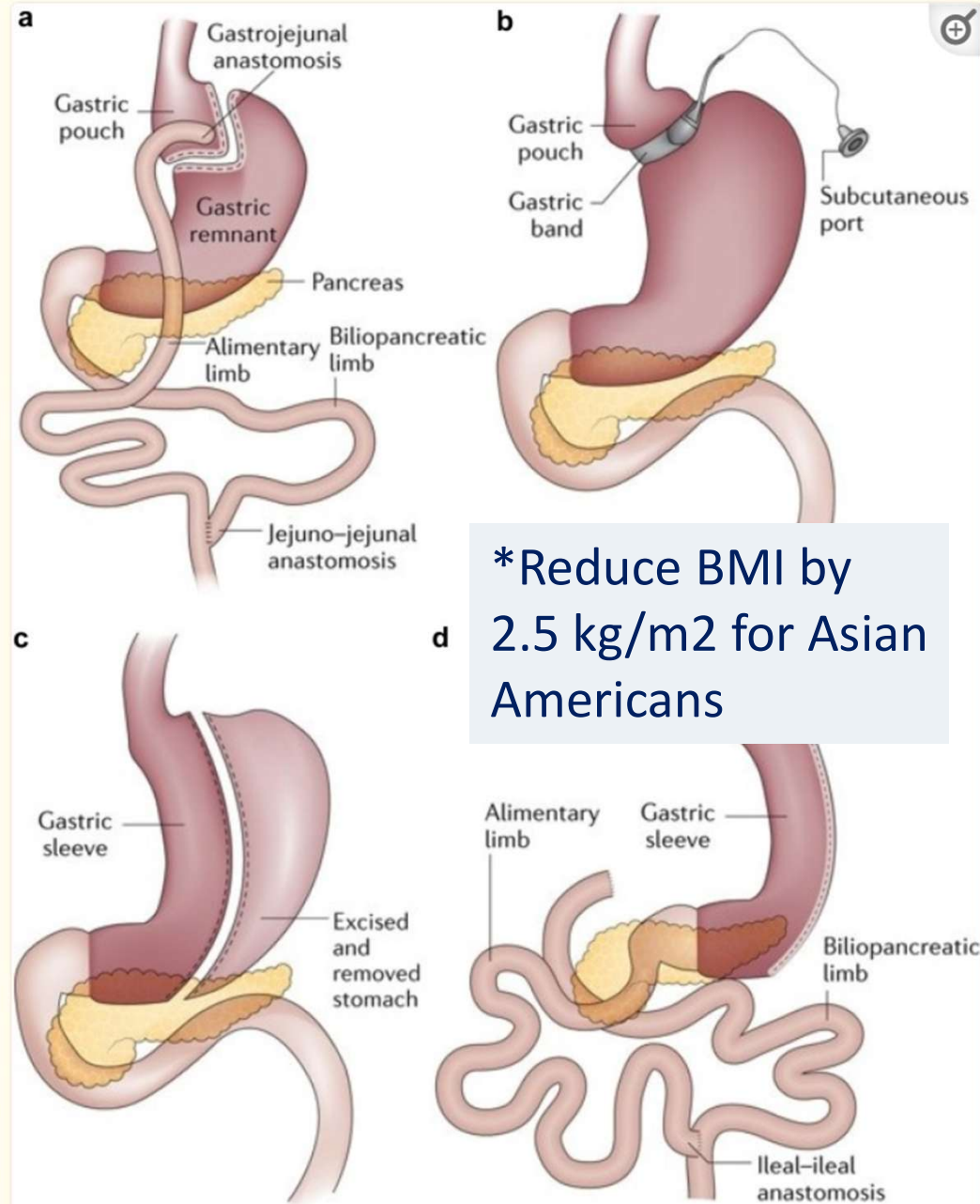
# Pocket Card: GLP-1 & GIP RA

## GLP-1 & GIP Receptor Agonists

| Class/Main Action                                                                                                                                                                                                                                                      | Name                                                     | Dose Range                                                                                                                                                 | Considerations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>GLP-1 RA - Glucagon Like Peptide Receptor Agonist</b><br><br><b>"Incretin Mimetic"</b> <ul style="list-style-type: none"> <li>Increases insulin release with food</li> <li>Slows gastric emptying</li> <li>Promotes satiety</li> <li>Suppresses glucagon</li> </ul> | exenatide (Byetta)                                       | 5 and 10 mcg BID                                                                                                                                           | <b>Side effects:</b> nausea, vomiting, weight loss, injection site reaction. Report signs of acute pancreatitis or intestinal blockage (ileus) and stop med.<br><b>Black box warning:</b> Thyroid C-cell tumor warning (avoid if family history of medullary thyroid tumor).<br><br>*Significantly reduces risk of CV death, heart attack, and stroke.<br>§Approved to reduce risk of CKD<br>†Approved for pediatrics 10-17 yrs<br><br>Lowers A1C 0.5 – 1.6%<br>Weight loss: 4-6% body weight loss. |
|                                                                                                                                                                                                                                                                        | exenatide XR† (Bydureon)                                 | 2 mg 1x a week<br>Pen injector - Bydureon BCise                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                                                                                                                        | liraglutide*† (Victoza)                                  | 0.6, 1.2 and 1.8 mg daily                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                                                                                                                        | dulaglutide*† (Trulicity)                                | 0.75, 1.5, 3.0 and 4.5 mg<br>1x a week pen injector                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                                                                                                                        | semaglutide*§ (Ozempic)<br><br>(Rybelsus)<br>Oral tablet | 0.25, 0.5, 1.0 and 2.0 mg<br>1x a week pen injector<br><br>3, 7, 14 mg - Original dosing.<br>1.5, 4, 9 mg - New dosing.<br>AM dose, pre-food, w/ water sip |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>GLP-1 &amp; GIP Receptor Agonist</b><br><br>Activates receptors for GLP-1 (see above) & Glucose-dependent Insulinotropic Polypeptide (GIP).                                                                                                                         | Tirzepatide (Mounjaro)                                   | 2.5, 5.0, 7.5, 10, 12.5 and 15 mg<br><br>1x a week prefilled single dose pen<br><br>Increase dose by 2.5 mg once monthly to reach targets.                 | <b>Side effects:</b> nausea, diarrhea, injection site reaction. Report pancreatitis, signs of intestinal blockage.<br><b>Black box warning:</b> Avoid if family history of medullary thyroid tumor.<br><br>Lowers A1C ~ 1.8 - 2.4%<br>Weight loss: 7-13% body weight loss at max dose.                                                                                                                                                                                                              |

# Metabolic Surgery for Weight Loss

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



*\*Reduce BMI by 2.5 kg/m<sup>2</sup> for Asian Americans*

# Metabolic Surgery for Weight Loss

## Advantages in T2DM

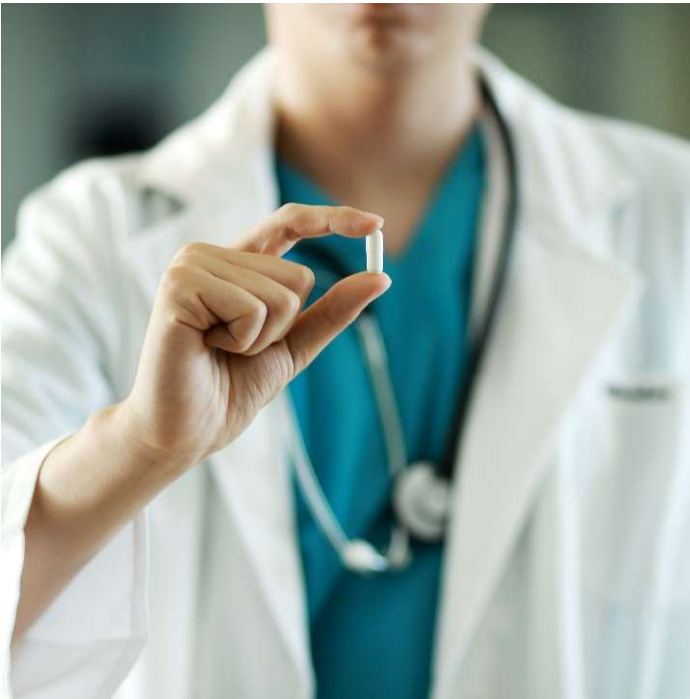
- ▶ Diabetes remission in 30-63% of those with RYGB.
  - ▶ 35-50% of those who go into remission experience recurrence, but median disease-free period is 8.3 years.
- ▶ Many with diabetes will sustain glycemic improvement for 5-15 years.
- ▶ Additional health benefits



## 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

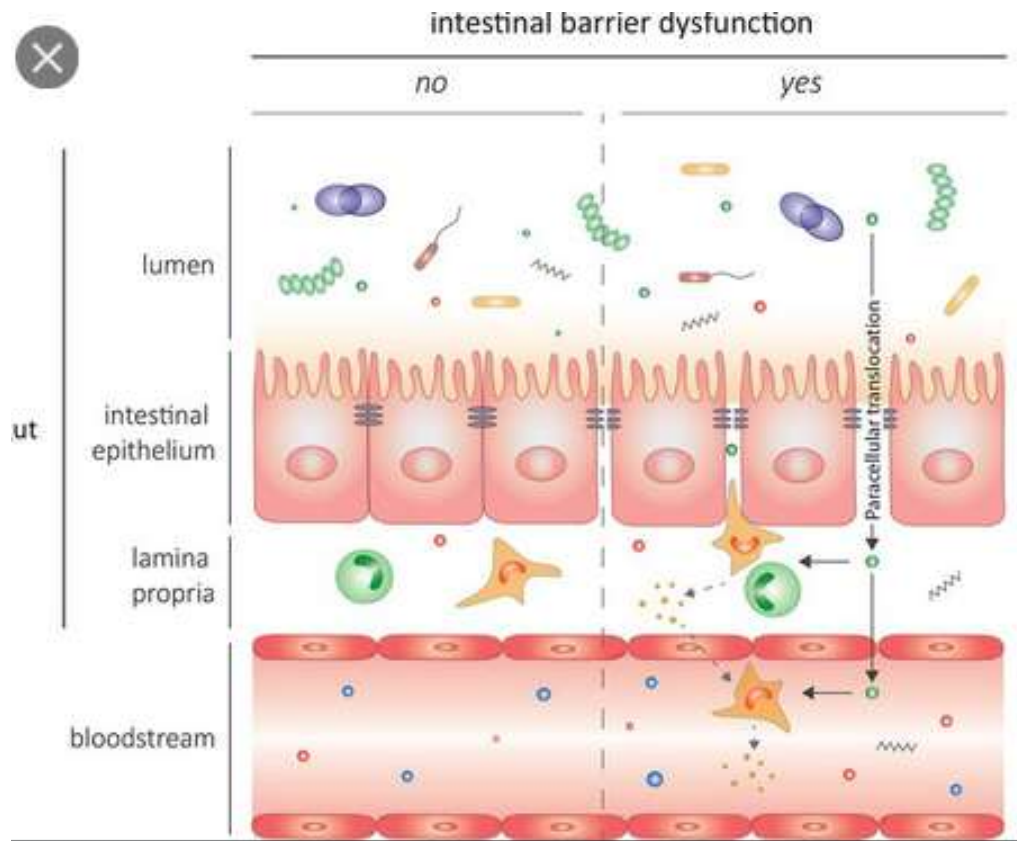


- Induces GLP-1 secretion
- Changes in *Bacteroidetes/Firmicutes* ratio
- Capacity to induce mucin expression similar to *Akkermansia muciniphila*
- Improves the metabolic profile by lowering tissue inflammation in the presence of extra weight

Especially increases  
*Akkermansia* and  
*Bifidobacterium*.

<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.

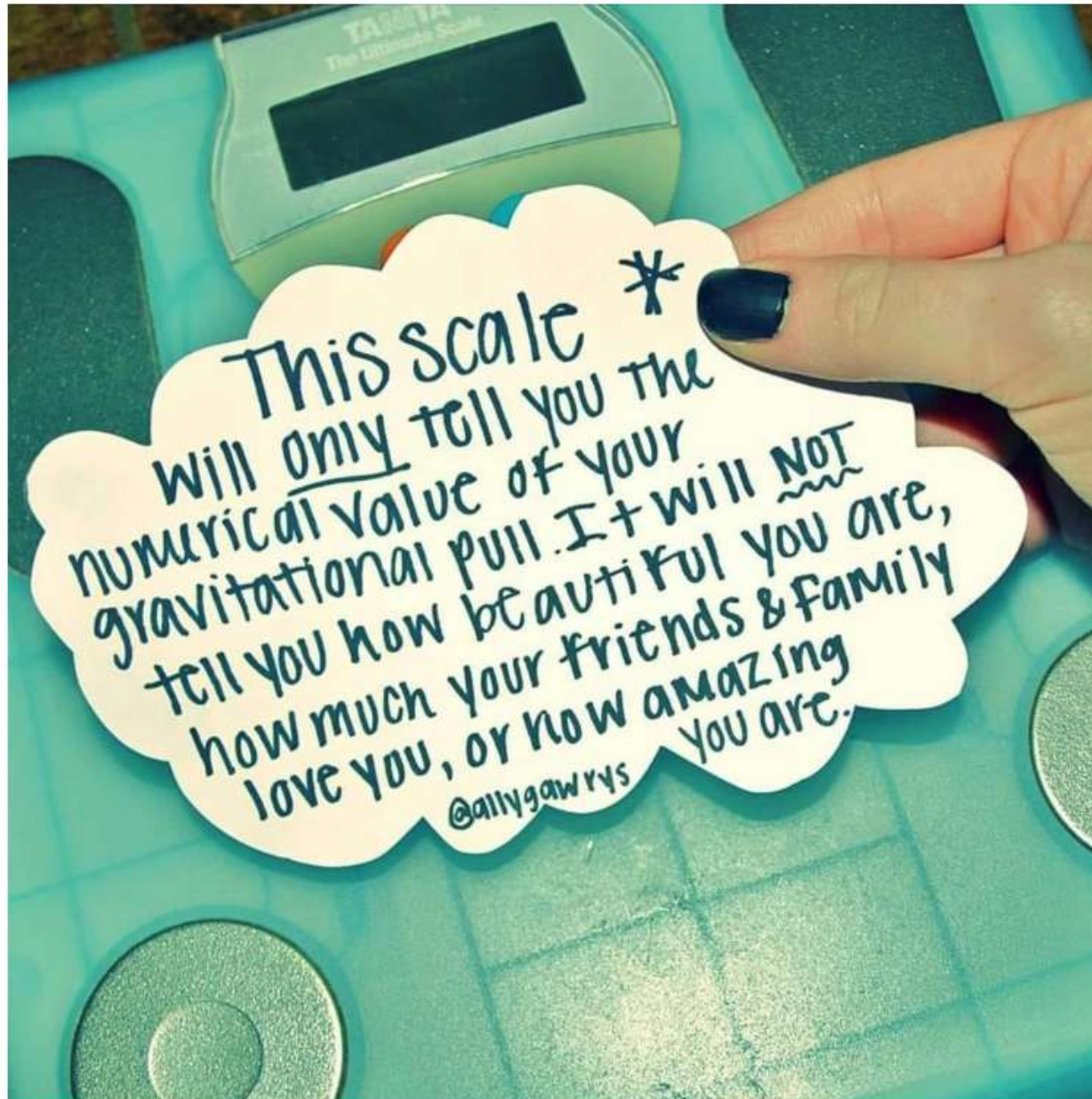
Mucus lining protector and increases presence of short chain fatty acids.

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.

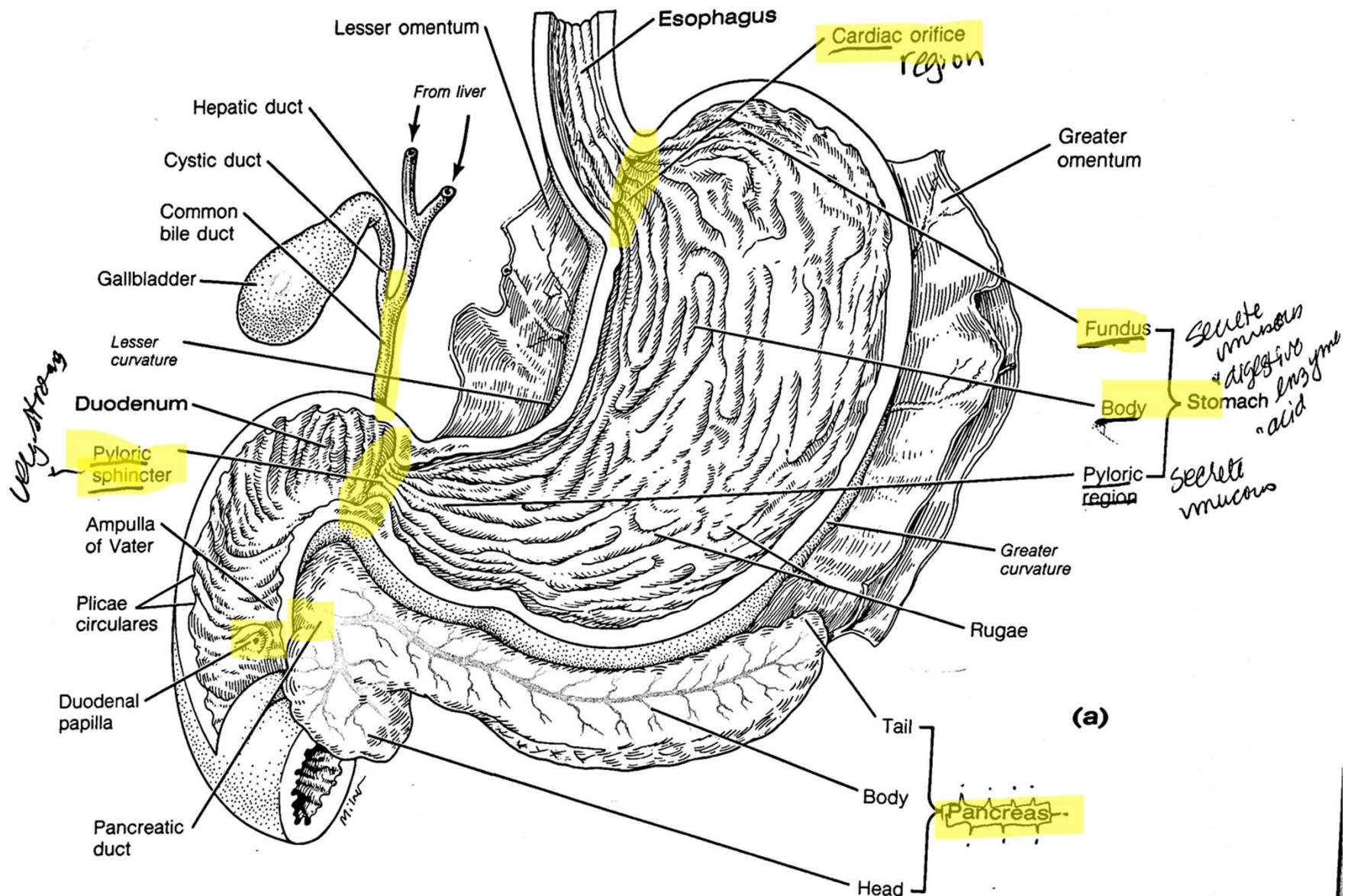
# Weight is a Heavy Issue



# Now to the Duodenum



# Duodenum, gallbladder, pancreas

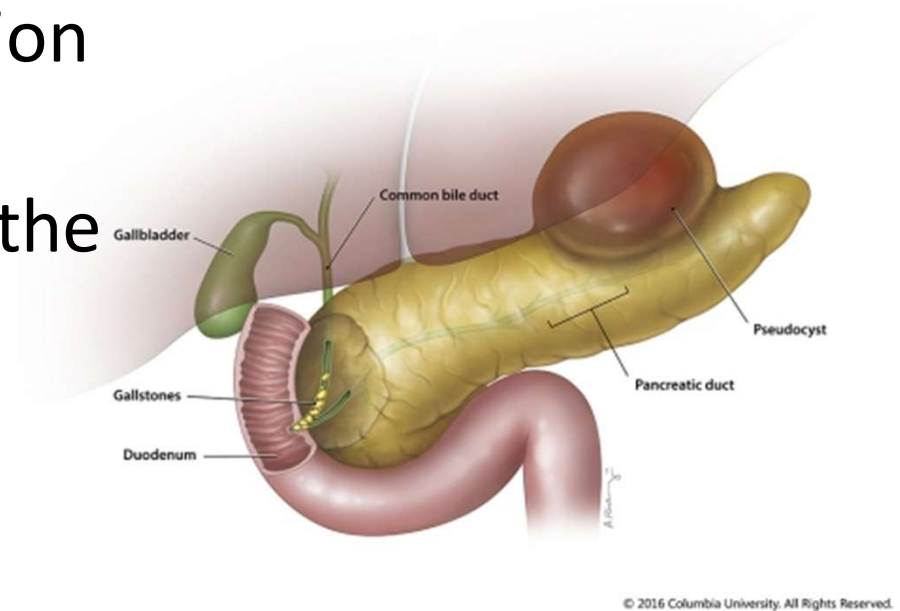


# Type 3c Diabetes (Pancreatogenic)

- ▶ 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
  - ▶ rare genetic disorders, and idiopathic

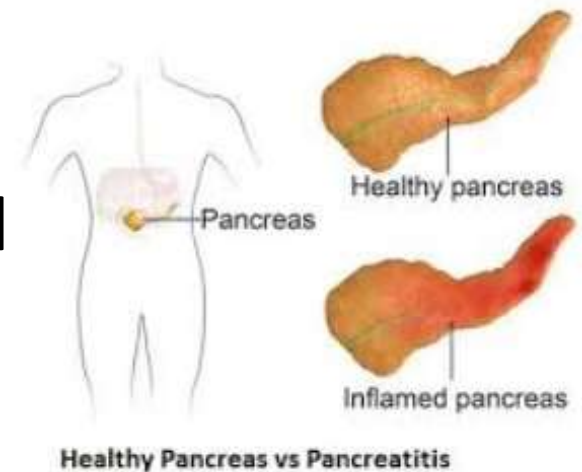
# Pancreatitis

- ▶ 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



# 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.



# 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



# PANCREATIC CANCER

PANCREATIC  
CANCER  
ACTION  
NETWORK

## 16 WARNING SIGNS YOU SHOULD KNOW

### SYMPTOMS

Pancreatic cancer may cause only vague symptoms. If you are experiencing one or more of these unexplained symptoms, the Pancreatic Cancer Action Network urges you to see your doctor.



Abdominal or  
mid-back pain



Loss of  
appetite



Jaundice



Weight loss



Nausea



Change in stool



Recent onset  
diabetes

### **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/>

# Liver Nomenclature Update



## Old Terms

- ▶ Fatty Liver Disease
- ▶ Non-Alcoholic Steatohepatitis (NASH)
- ▶ Non-Alcoholic Fatty Liver Disease (NAFLD)

## New Terms

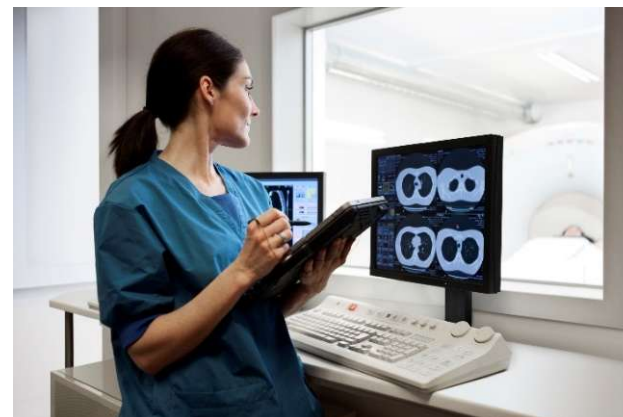
- ▶ Steatotic Liver Disease
- ▶ Metabolic Dysfunction-Associated Steatohepatitis (MASH)
- ▶ Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD)

# Steatotic Liver Disease (SLD)

MASLD\* is when fat reaches 5% to 10% of the liver's weight

Adults with type 2 diabetes.

- ▶ MASLD is prevalent in >70%
  - ▶ Of those 50% have NASH\*
- ▶ 12-20% have fibrosis
- ▶ Need evaluation for nonalcoholic steatohepatitis and liver fibrosis for those:
  - ▶ At high risk: type 2 or prediabetes with cardiometabolic risk factors
  - ▶ Elevated liver enzymes (ALT) or
  - ▶ Fatty liver on imaging or ultrasound

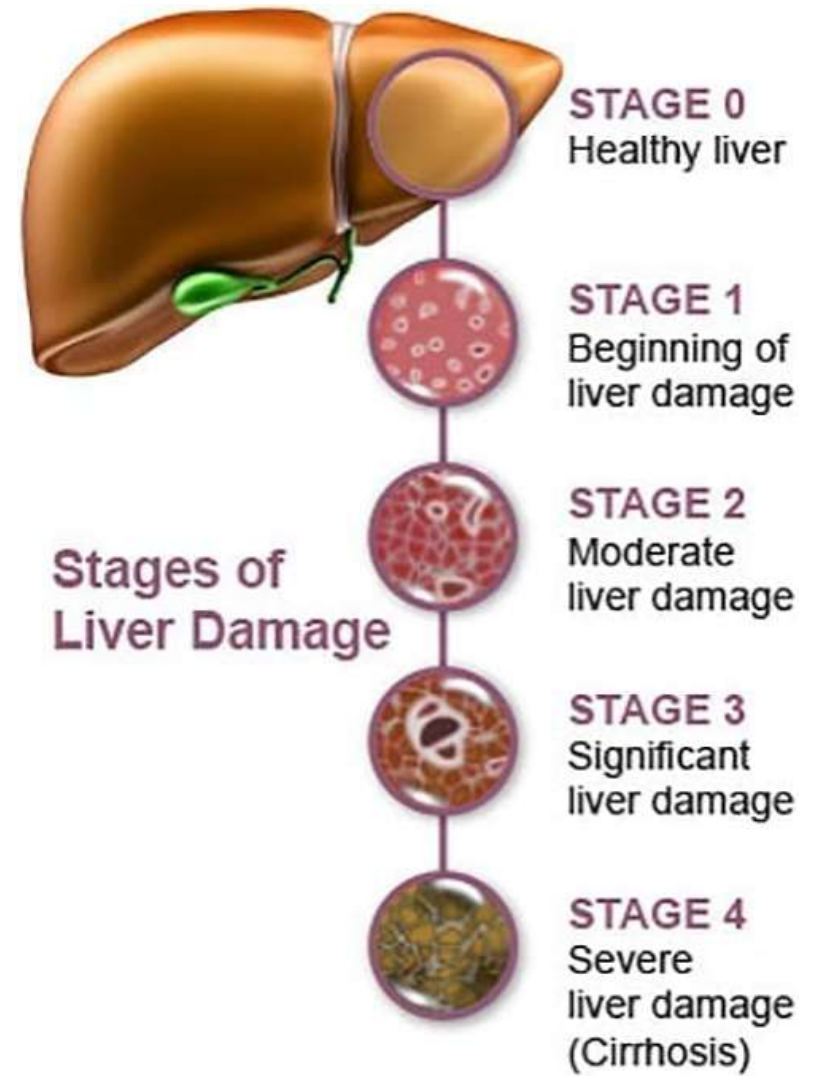
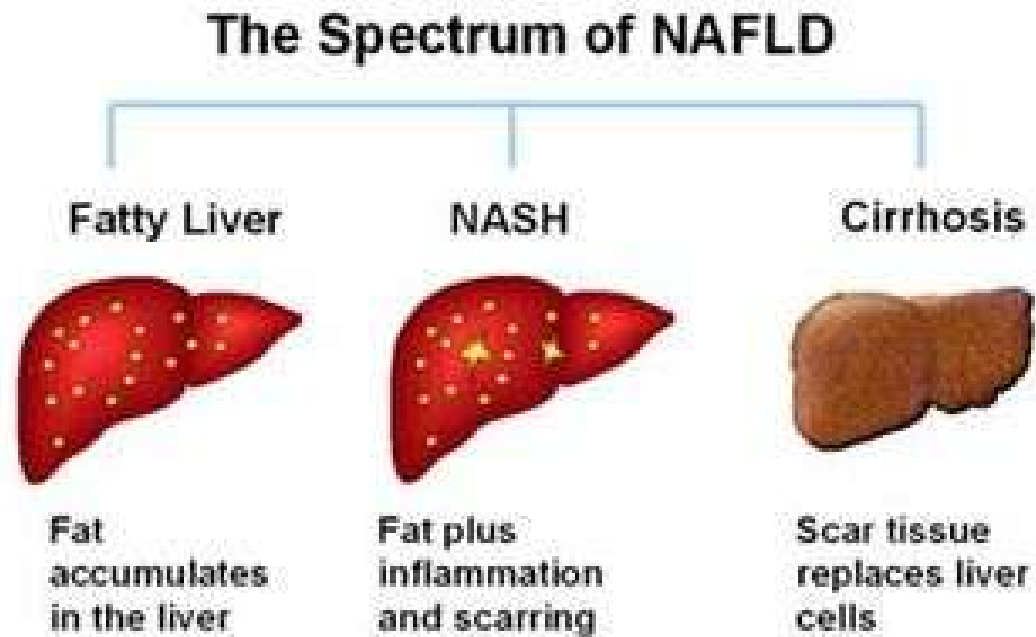


**Associated with :**

- Increased BMI (30+)
- Cardiometabolic risk factors
- Over 50 yrs
- ALT & AST 30 units/L +

**\*Now called MASH -  
Metabolic Dysfunction-  
Associated  
Steatohepatitis.**

# Natural History of MASLD\* to MASH\*\*



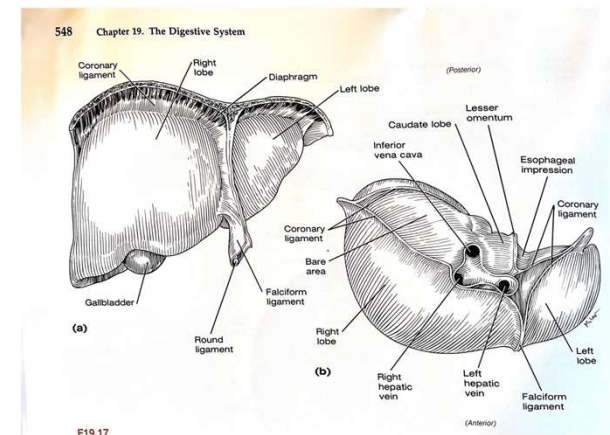
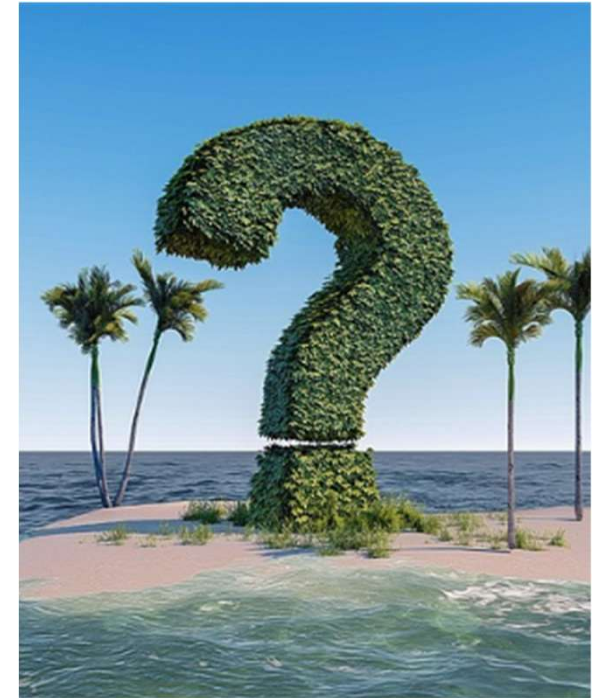
\*Metabolic Dysfunction-Associated Steatotic Liver Disease

\*\*Metabolic Dysfunction-Associated Steatohepatitis.

# 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 (m<sup>2</sup>)



# Screening for NASH – FIB-4

## Fibrosis-4 (FIB-4) Calculator

The Fibrosis-4 score helps to estimate the amount of scarring in the liver. Enter the required values. It will appear in the oval on the far right (highlighted in yellow).

$$\text{FIB-4} = \frac{\text{Age (years)} \times \text{AST Level (U/L)}}{\text{Platelet Count (10}^9\text{/L)} \times \sqrt{\text{ALT (U/L)}}} = 2.61$$

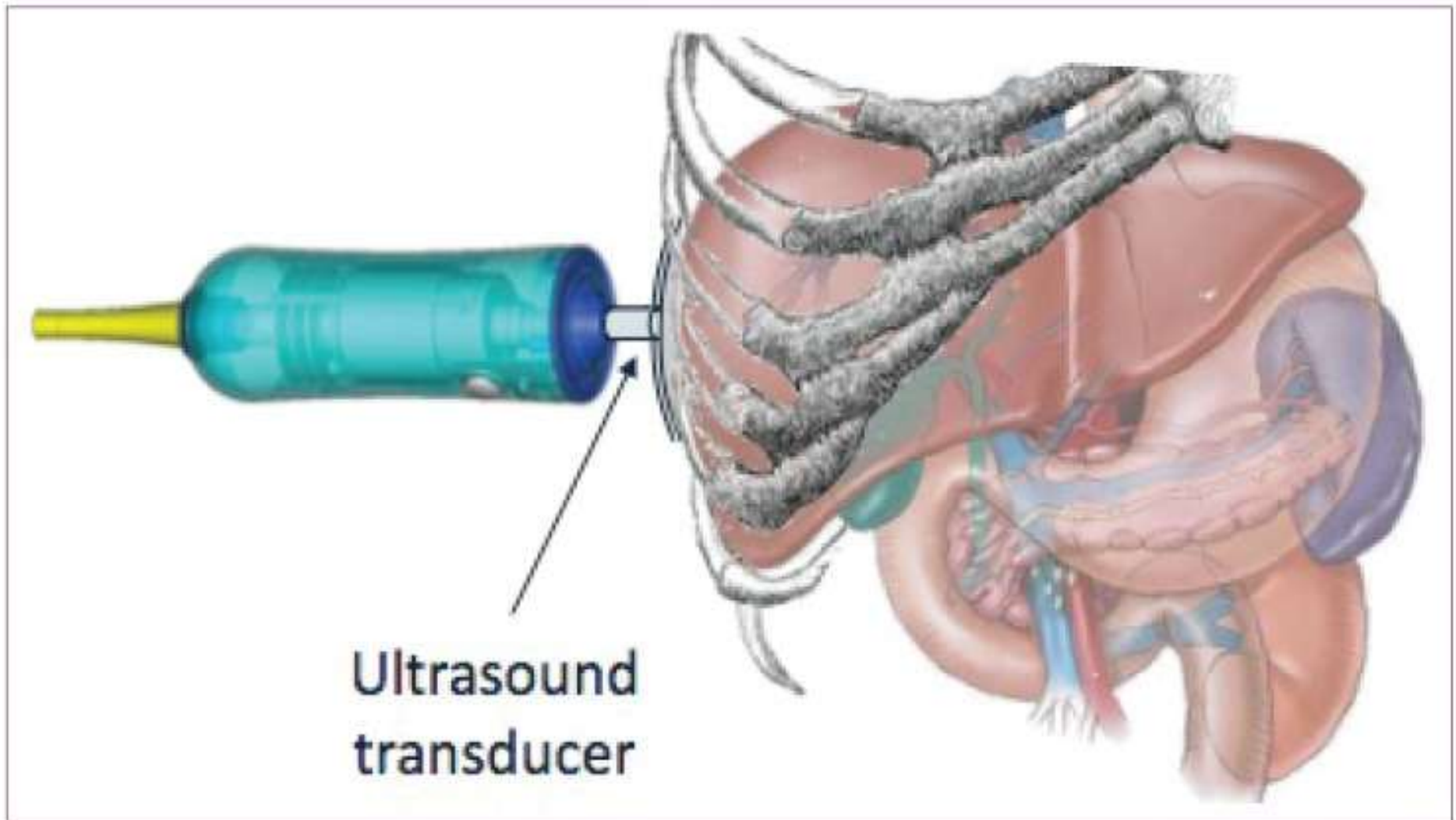
- ▶ The American College of Gastroenterology considers Upper limit of normal ALT levels:
  - ▶ 29–33 units/L for males
  - ▶ 19–25 units/L for female individuals

([mdcalc.com/calc/2200/fibrosis-4-fib-4-index-liver-fibrosis](http://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 (especially sugary beverages)
- ▶ Less alcohol
- ▶ See RDN

## ▶ Treatment

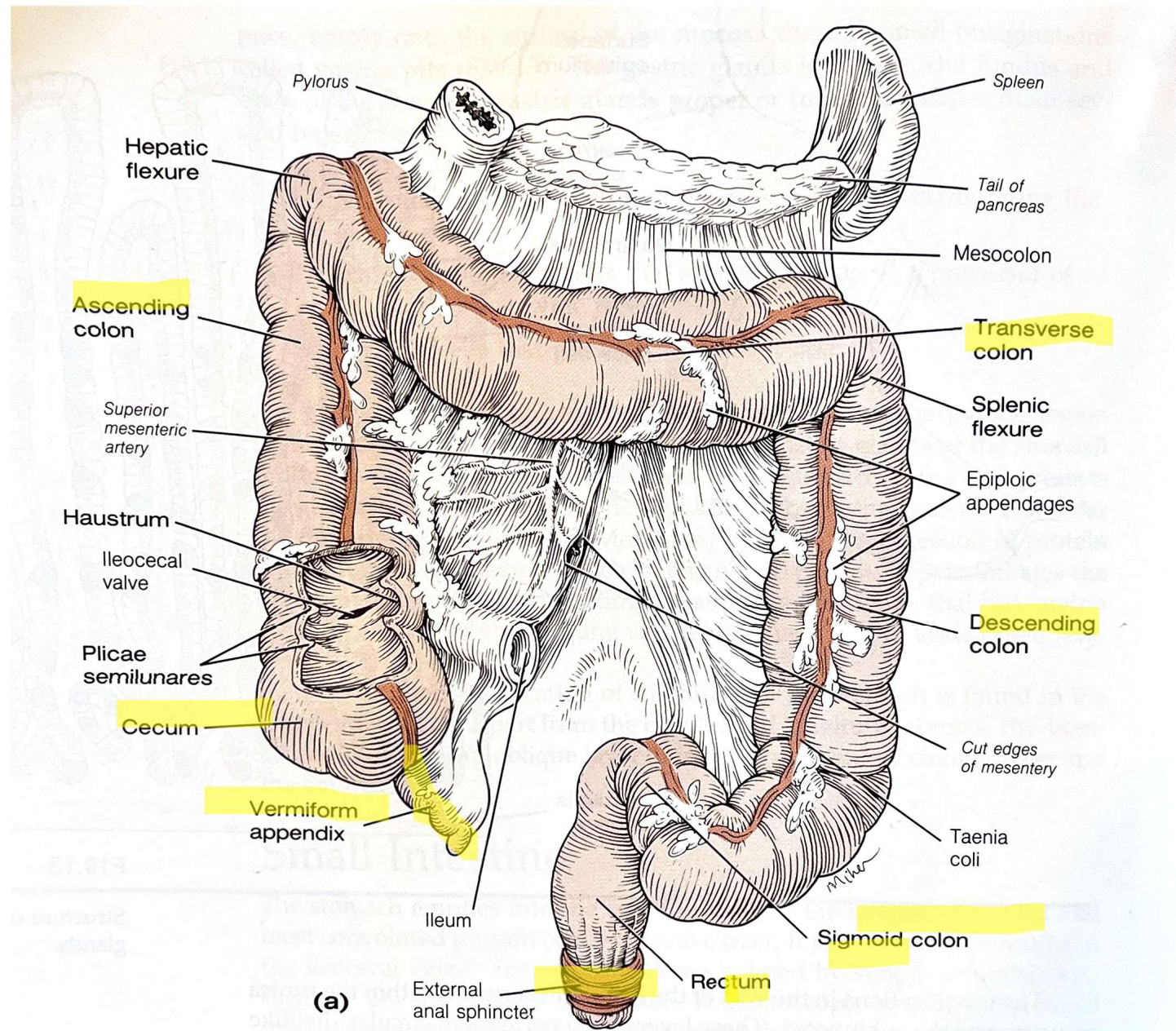
- ▶ Pioglitazone (Actos)
- ▶ GLP-1
- ▶ Statins

## ▶ Prevention

- ▶ Cancer Screenings
- ▶ Decrease inflammation



# 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**

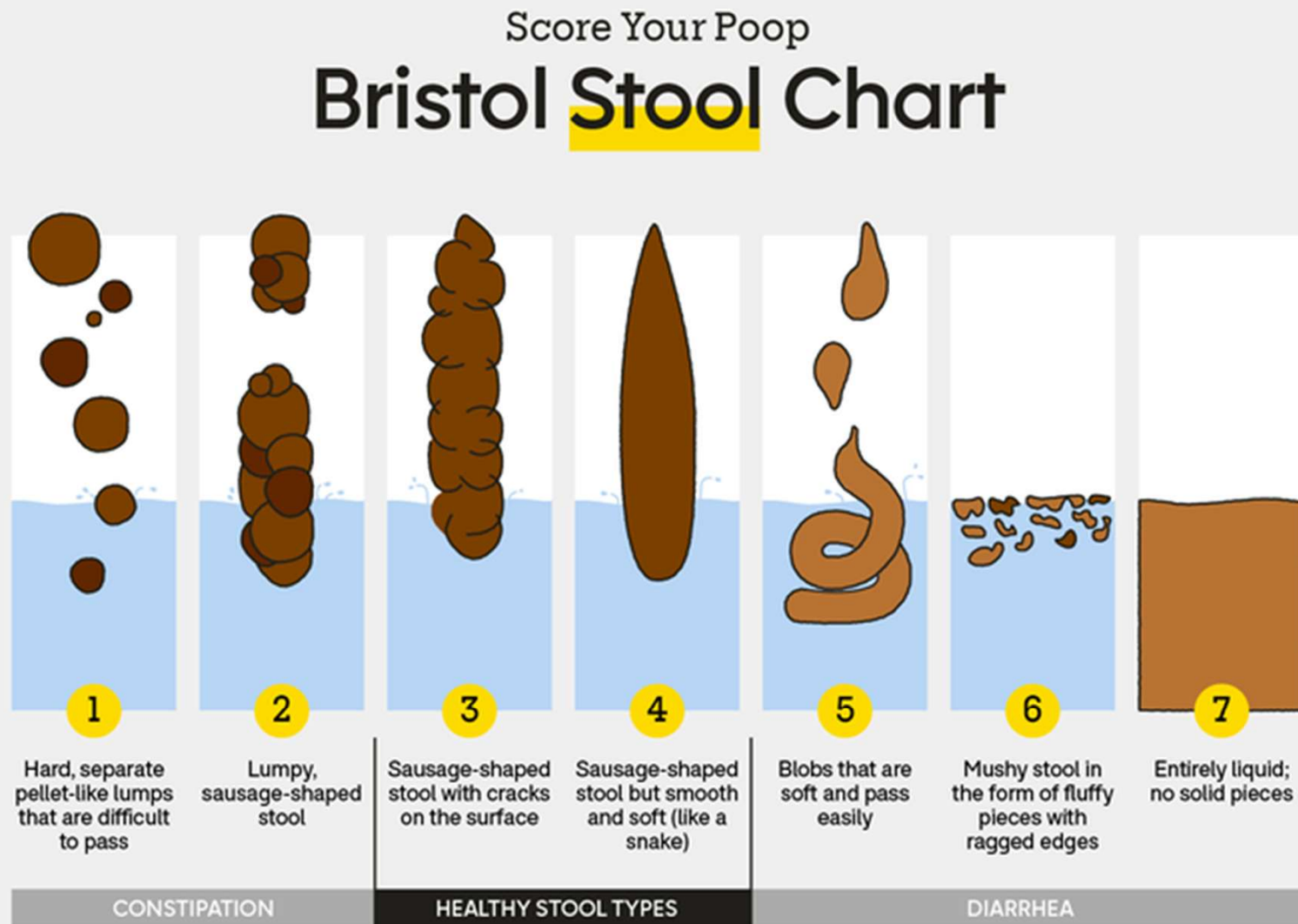
- ▶ Elevated glucose
- ▶ Autonomic neuropathy
- ▶ Metformin
- ▶ GLP-1 RA's
- ▶ Celiac disease
- ▶ Bacterial /yeast infection
- ▶ Exocrine pancreatic insufficiency
- ▶ Irritable bowel syndrome
- ▶ Sugar free foods
- ▶ Other

# 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, H<sub>2</sub>O
  - ▶ Bulking agents (psyllium)
  - ▶ Laxatives or other agents
  - ▶ Bathroom habits review



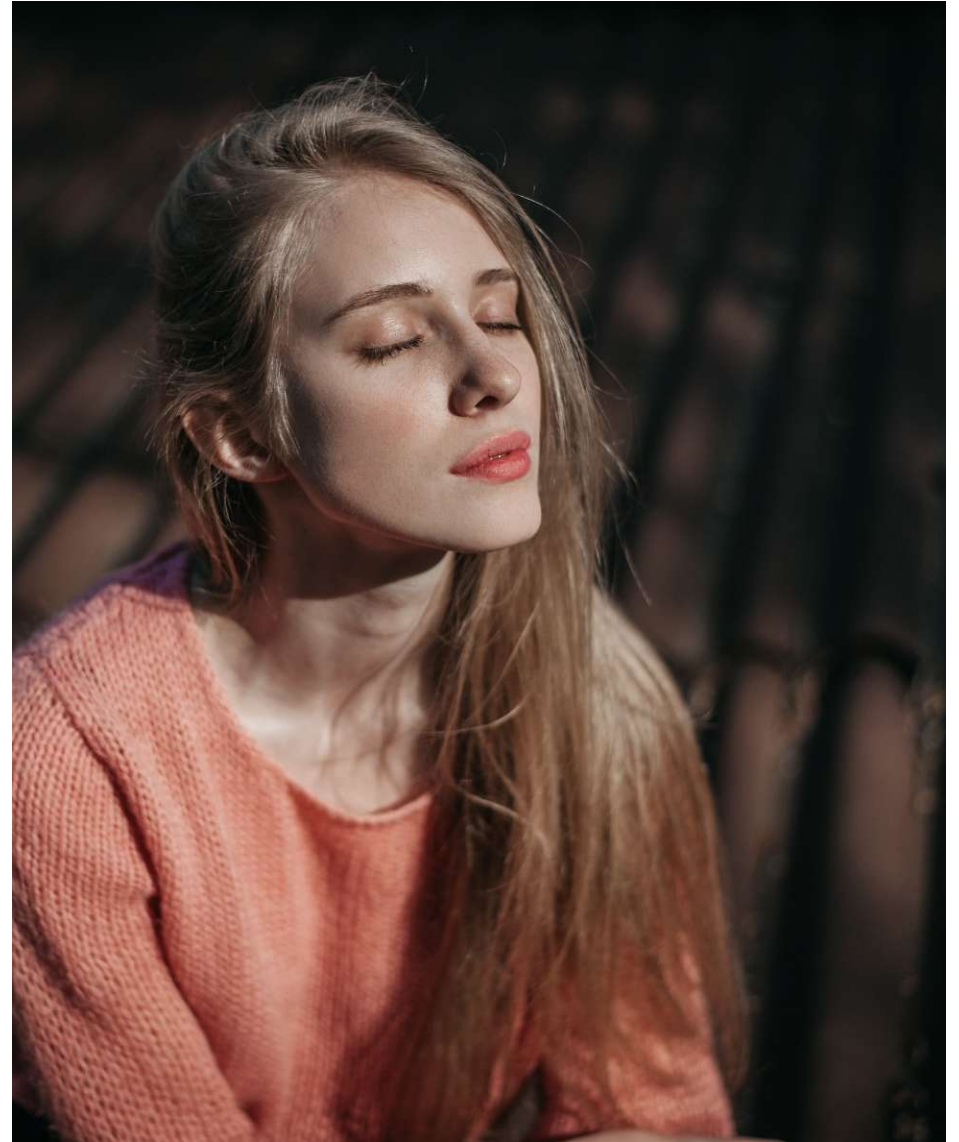
# Look at your Poop – Stool Chart



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

# 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

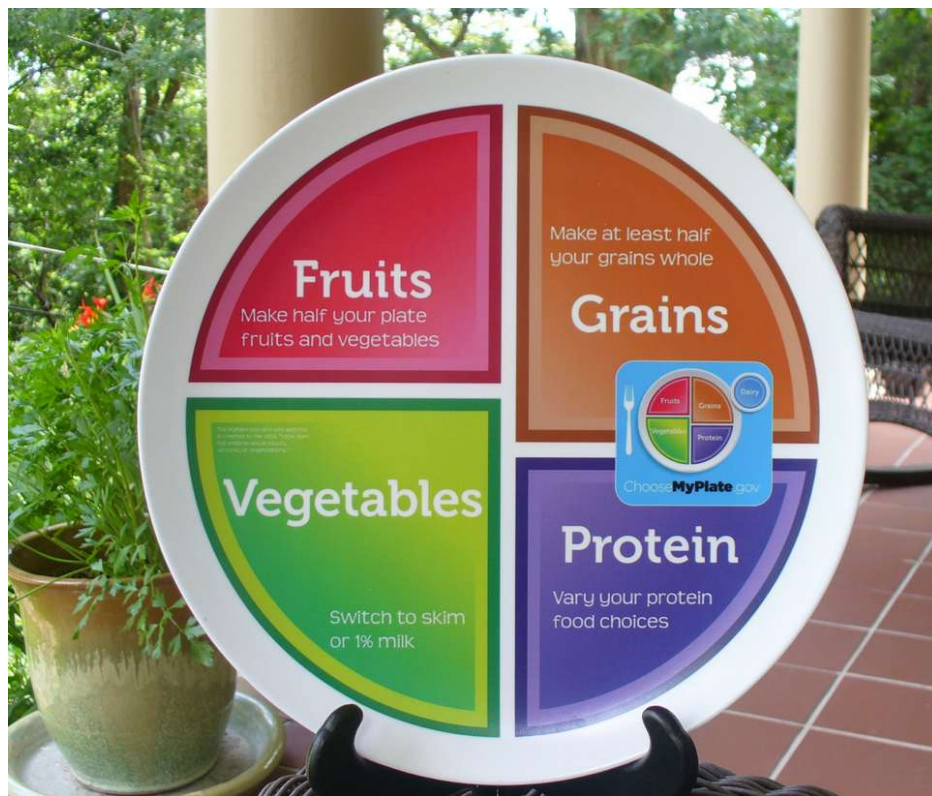
| Amount Per Serving |              |     |
|--------------------|--------------|-----|
| Calories           | 190          |     |
| Calories from Fat  | 10           |     |
|                    |              | %DV |
| Total Fat          | 1g           | 2%  |
| Saturated Fat      | 0g           | 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!

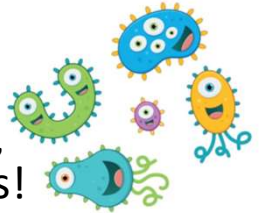
Inside the intestines, 30 feet of tube,  
3 pounds of bacteria digesting your food.

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!

# Thank You



- ▶ Questions?
- ▶ Email [info@diabetesed.net](mailto:info@diabetesed.net)
- ▶ Web [www.DiabetesEd.net](http://www.DiabetesEd.net)
- ▶ Phone 530-893-8635